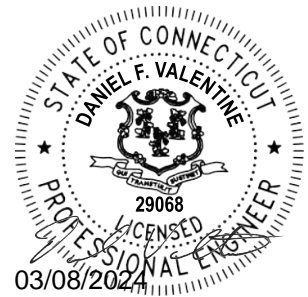
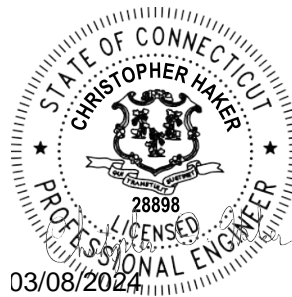


Project Manual
Volume 1 of 1

Brush Reservoir Dam Improvements Aquarion Water Company

Stamford, CT

February 2024



Issued for Bidding

Tighe & Bond

**Brush Reservoir Dam Improvements
Aquarion Water Company
Stamford, CT**

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DIVISION 0 – BIDDING AND CONTRACT REQUIREMENTS

DOCUMENT 00010

INVITATION FOR BID

BRUSH RESERVOIR DAM IMPROVEMENTS
Stamford, Connecticut

All proposals for the Brush Reservoir Dam Improvements Project in Stamford, Connecticut will be submitted through Aquarion Water Company's (AWC) E-Bid system and will remain sealed until 2:00 p.m, current local time, on **Monday, April 15, 2024** at which time and place they will then be available for review by AWC.

A mandatory pre-bid meeting will be held at 9:00 a.m on Wednesday, March 20, 2024 at the project site located at Barn Hill Road in North Stamford, Connecticut.

Deadline to Submit Requests for Clarifications: **3:00 p.m. March 29, 2024**
Bid Closing: **2:00 p.m April 15, 2024**

Upon receipt of this RFP, please be sure to indicate your intention to bid, or not bid by communicating your decision through the "Clarifications" tab in this electronic bid portal (Aquarion.Procureware.com).

Aquarion Water Company reserves the right to waive any informality or to reject any or all bids.

Note: Bid Bonds will not be required for this project.

No bidder may withdraw his bid within sixty (60) days after the scheduled closing time of this bid.

Any technical or commercial questions regarding the bid or bid documents should be communicated through the "Clarifications Tab" in the Aquarion.Procureware.com system portal.

Questions or issues regarding working or navigating in the Aquarion.Procureware.com portal should be directed to Ken Feldkamp (203) 362-3064, email: kfeldkamp@aquarionwater.com.

Ken Feldkamp
Buyer

DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these Instructions to Bidders will 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 where the bidding procedures are to be administered.

ARTICLE 2 - COPIES OF BIDDING DOCUMENTS

2.01 Complete sets of Bidding Documents must be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.02 Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

ARTICLE 3 - QUALIFICATIONS OF BIDDERS

To demonstrate Bidder's qualifications to perform the Work, within five days of Owner's request, Bidder shall submit written evidence such as financial data, previous experience, present commitments, and such other data as may be called for below.

- A. Standard Equipment and Wage Rates: Within five (5) days (not including Sunday) from the date of the award, the party to whom the contract is awarded shall submit to the Engineer its Standard Hourly Wage Rates and its Standard Equipment Billing Rate Schedule.
- B. Guidelines for Contractors Engaged By Aquarion Water Company - Agreement and Acknowledgement: Within five (5) days (not including Sunday) from the date of the award, the party to whom the contract is awarded shall submit to the Engineer a completed AGREEMENT AND ACKNOWLEDGEMENT form contained in the Guidelines for Contractors Engaged By Aquarion Water Company, included in Document 00852 Special Conditions.

ARTICLE 4 - EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

4.01 Subsurface and Physical Conditions

- A. The Supplementary Conditions identify:
 - 1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Bidding Documents.
 - 2. Those drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in paragraph 4.01.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.02 of the General Conditions has been identified and established in paragraph 4.02 of 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.

4.02 Underground Facilities

- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 Hazardous Environmental Condition

- A. The Supplementary Conditions identify those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that ENGINEER has used in preparing the Bidding Documents.
- B. Copies of reports and drawings referenced in paragraph 4.03.A will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which Bidder is entitled to rely as provided in paragraph 4.06 of the General Conditions has been identified and established in paragraph 4.06 of 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.

- 4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated conditions appear in paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work appear in paragraph 4.06 of the General Conditions.
- 4.05 Upon request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.
- 4.06 Reference is made to Article 7 of the Supplementary Conditions for the identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. Upon request, Owner will provide to each Bidder for examination access to or copies of Contract Documents (other than portions thereof related to price) for such other work.
- 4.07 It is the responsibility of each Bidder before submitting a Bid to:
- A. Examine and carefully study the Bidding Documents, the other related data identified in the Bidding Documents, and any Addenda;
 - B. Visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
 - C. Become familiar with and satisfy Bidder as to all Federal, State, and local Laws and Regulations that may affect cost, progress, or performance of the Work;
 - D. Carefully study all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions, and (2) reports and drawings of Hazardous Environmental Conditions at the Site which have been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions;
 - E. Obtain and carefully study (or accept consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto;
 - F. Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents;
 - G. Become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;

- H. Correlate the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents;
 - I. Promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
 - J. Determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.08 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 - PRE-BID CONFERENCE

- 5.01 A pre-bid meeting will be held at the location, date and time as stated in Document 00010 INVITATION FOR BID.

ARTICLE 6 - SITE AND OTHER AREAS

- 6.01 The Site is identified in the Bidding Documents. Easements for permanent structures or permanent changes to existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

ARTICLE 7 - INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted through the Clarifications tab of Aquarion's E-Bid system: aquarion.procureware.com. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda through Aquarion's E-Bid system to all parties recorded by Aquarion's Procurement Department as having received the Bidding Documents. Questions received less than five days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer.

ARTICLE 8 - BID SECURITY - OMITTED

ARTICLE 9 - CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 - LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages are set forth in the Agreement.

ARTICLE 11 - SUBSTITUTE AND "OR-EQUAL" ITEMS

11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or "or-equal" materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or "or-equal" item. Request for Engineer's clarification of materials and equipment considered "or-equal" prior to the Effective Date of the Agreement must be received by the Engineer at least 5 days prior to the date for receipt of Bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

ARTICLE 12 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

12.01 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

12.02 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest responsible Bidder that proposes to use acceptable Subcontractors, Suppliers, individuals, or entities. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner and Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

12.03 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

12.04 The Contractor shall not award work to Subcontractor(s) in excess of the limits stated in paragraph 6.06 of the Supplementary Conditions.

ARTICLE 13 - PREPARATION OF BID

13.01 The Bid form is included with the Bidding Documents. Additional copies may be obtained from Engineer.

13.02 All blanks on the Bid form shall be completed by printing in ink or by typewriter and the Bid signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each bid item listed therein, or the words "No Bid," "No Change," or "Not Applicable" entered.

13.03 A Bid by a corporation shall be executed in the corporate name by the president or a vice-president or other corporate officer accompanied by evidence of authority to sign. If required by State where work is to be performed, the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporation business address and state of incorporation shall be provided on the Bid Form.

- 13.04 A Bid by a partnership shall 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 business address of the partnership shall be provided on the Bid Form.
- 13.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the business address of the firm must be provided on the Bid Form.
- 13.06 A Bid by an individual shall show the Bidder's name and business address.
- 13.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid form. The business address of the joint venture must be provided on the Bid Form.
- 13.08 All names shall be typed or printed in ink below the signatures.
- 13.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers and dates of which shall be filled in on the Bid form.
- 13.10 The address and telephone number for communication regarding the Bid shall be shown.
- 13.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the Contract. Bidder's state contractor license number for the state of the Project, if any, shall also be shown on the Bid Form.

ARTICLE 14 - BASIS OF BID; COMPARSION OF BIDS

14.01 Unit Price

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the Bid schedule.
- B. The total of all bid prices will be the sum of the products of the estimated quantity of each item and the corresponding unit price. The final quantities and Contract Price will be determined in accordance with paragraph 11.03 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. Discrepancies between words and figures will be resolved in favor of the words.

ARTICLE 15 - SUBMITTAL OF BID

- 15.01 With the electronic copy of the Bidding Documents, a Bidder is furnished with the Bid Form, and Certification of Responsible Contractor Status form. The Bid Form is to be completed and submitted with all the attachments outlined in Article 7 of the Bid Form.
- 15.02 A Bid shall be submitted no later than the date and time prescribed in the Invitation for Bids through the electronic bid portal (Aquarion.Procurement.com) , and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate envelope plainly marked on the outside with the notation "BID ENCLOSED." When using the mail or other delivery system, the Bidder is totally responsible for the mail or other delivery system delivering the Bid at the place and prior to the time indicated in the Invitation for Bid. A mailed Bid shall be addressed to Owner at address in Article 1.01 of Bid Form.
- 15.03 List of required Documents to be completed (uploaded) for General Bid submission:

- 1. Bid Form Document 00300
- 2. Certification of Responsible Contractor Status Document 00320

ARTICLE 16 - MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.
- 16.02 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid or negotiated, that Bidder will be disqualified from further bidding on the Work. This provision to withdraw a Bid without forfeiting the Bid security does not apply to Bidder's errors in judgment in preparing the Bid.

ARTICLE 17 - OPENING OF BIDS

- 17.01 Bids will be privately opened at the time and place indicated in the Invitation for Bid. Bid results will not be made public.

ARTICLE 18 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form.

ARTICLE 19 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 19.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.
- 19.03 In evaluating Bids, Owner will consider whether or not 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.
- 19.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities to perform the Work in accordance with the Contract Documents.
- 19.06 If the Contract is to be awarded, Owner will award the Contract to the responsible Bidder whose Bid, conforming with all the material terms and conditions of the Instructions to Bidders, is lowest, price and other factors considered.

ARTICLE 20 - CONTRACT SECURITY AND INSURANCE

- 20.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to insurance.

ARTICLE 21 - SIGNING OF AGREEMENT

21.01 When Owner gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement with the other Contract Documents which are identified in the Agreement as attached thereto. Within 15 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 22 - SALES AND USE TAXES

22.01 Instructions for applicability of Sales and Use Taxes are found in sections 00700 General Conditions and 00800 Supplementary Conditions.

ARTICLE 23 - CONTRACTS TO BE ASSIGNED - OMITTED

ARTICLE 24 - STATEMENT OF TAX COMPLIANCE - OMITTED

ARTICLE 25 - NOTICE TO PROCEED

25.01 DOCUMENT 00650, NOTICE TO PROCEED shall be issued within ten (10) days of execution of DOCUMENT 00500, FORM OF AGREEMENT by the Owner. Should there be reasons why DOCUMENT 00650, NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the Owner and Contractor. If DOCUMENT 00650, NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the Contractor may terminate DOCUMENT 00500, FORM OF AGREEMENT without further liability on the part of either party.

ARTICLE 26 - WAGE RATES - OMITTED

ARTICLE 27 - LAWS AND REGULATIONS

27.01 Applicable provisions of the General Laws and regulations of the State where work under this contract is being performed and/or the United States Code and Code of Federal Regulations govern this Contract; and any provision violation of the foregoing shall be deemed null, void and of no effect. Where conflict between Code of Federal Regulations and state laws and regulations exist, the more stringent requirement shall apply.

27.02. All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout.

27.03 This Project is subject to the OSHA Safety and Health Regulations of the U.S. Department of Labor set forth in Title 29 CFR, Part 1926 and to all subsequent amendments. Contractors shall be familiar with the requirements of these regulations.

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

ARTICLE 28 - INSPECTION OF THE WORK

28.01 The Contractor shall provide at all times proper facilities for access and inspection by representatives of the Owner, federal, state or other agency having jurisdiction over the Work of this Project.

ARTICLE 29 - WARRANTY

29.01 For information on required warranties, refer to 00700 General Conditions and 00800 Supplementary Conditions contained herein.

ARTICLE 30 – RESPONSIBLE CONTRACTOR POLICY - NOTICE OF RESPONSIBLE CONTRACTOR REQUIREMENTS TO BIDDERS

30.01 Aquarion has adopted a Responsible Contractor Policy (“RCP”) that is given considerable weight in selecting contractors for the performance of capital or maintenance projects or infrastructure operating services (collectively known as “Services”). The successful bidder should meet the requirements of the RCP. A “Responsible Contractor” is a contractor or subcontractor who:

- (a.) Abides by applicable federal, state and local employment laws.
- (b.) Protects the health and safety of all persons at the work site from hazards (including by observing OSHA and environmental legal requirements) arising from the “Services” provided by them.
- (c.) Provides high quality services (including but not limited to construction, repairs, maintenance and infrastructure operating services) to Aquarion on a comparable and relevant basis in the applicable local market consistent with the desired contracting criteria.
- (d.) Pays workers a “fair wage” and “fair benefits.”
 - 1. “Fair benefits” are defined as including, but not limited to, health care coverage, and pension benefits.
 - 2. What constitutes a “fair wage” and a “fair benefit” will depend on the wages and benefits paid on comparable infrastructure projects, based upon local market factors that include the nature of the project (e.g., municipal or commercial, public or private), comparable job or trade classifications, and the scope and complexity of the services provides.
 - 3. In determining “fair wages” and “fair benefits” concerning a specific contract in a specific market, items that may be considered include local wage practices, state laws, prevailing wages, labor market conditions and other items.
- (e.) Provides appropriate worker training and/or apprenticeship programs.
- (f.) Abides by their legal obligations in the event a union is determined to have majority employee support.

30.02 As part of the qualification process, bidders must certify their status as Responsible Contractors by completing and submitting to Aquarion the attached Document 00320, CERTIFICATION OF RESPONSIBLE CONTRACTOR STATUS form. Thereafter, successful bidders must inform any subcontractors of the requirements of the RCP, must confirm their continuing RCP compliance every twelve months by re-submitting to Aquarion a signed CERTIFICATION OF RESPONSIBLE CONTRACTOR STATUS form (or as such document may be revised from time to time), may be required to substantiate through payroll, employee and/or other records that they are in compliance with the RCP, and must participate in training programs as Aquarion may offer in furtherance of the RCP.

END OF DOCUMENT

DOCUMENT 00300

BID FORM

Project Name: Brush Reservoir Dam Improvements

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ARTICLE 1 - BID RECIPIENT

1.01 This Bid Is Submitted To:

Aquarion Water Company E-Bid System
600 Lindley Street, Bridgeport, CT 06606
Attn: Dennis Fields

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 the Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGMENTS

2.01 Bidder accepts all of the terms and conditions of the Invitation for Bid and Instructions to Bidders, including without limitations those dealing with the dispositions of Bid security. The Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and is satisfied as to all Federal, State, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in paragraph 4.02 of the Supplementary Conditions, and (2) reports and drawings of a Hazard Environmental Condition, if any, which has been identified in paragraph 4.06 of the Supplementary Conditions.
- E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by the Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.
- F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of the Work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.
- I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
- J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.
- K. Bidder will submit written evidence of its authority to do business in the State where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 4 - FURTHER REPRESENTATIONS

4.01 Bidder further represents that:

- A. This Bid is genuine and not made in the interest of or on the behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

ARTICLE 5 - BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Item	Description and Unit Price	Estimated Quantity	Extended Total
1	General Dam Improvements and Related Work		
	Dollars (\$)) Lump Sum	1	
2	Rock Removal		
	Dollars (\$)) Cubic Yards	150	
3	Tree Removal (4-12" dia.)		
	Dollars (\$)) Each	24	
4	Tree Removal (12-18" dia.)		
	Dollars (\$)) Each	11	
5	Tree Removal (18-24" dia.)		
	Dollars (\$)) Each	9	
6	Tree Removal (Greater than 24" dia.)		
	Dollars (\$)) Each	2	
7	Remove and Dispose of Unsuitable Material		
	Dollars (\$)) Cubic Yards	30	
8	Granular Fill		
	Dollars (\$)) Cubic Yards	60	
9	Demolition of Dam Concrete		
	Dollars (\$)) Cubic Yards	320	
10	Spray Applied Cementitious Repair Mortar		
	Dollars (\$)) SF	2300	
11	Dam Spall Repairs (Less than 4" Depth)		
		550	

	Dollars (\$) Square Feet		
12	Dam Spall Repairs (Greater than 4" Depth)	400	
	Dollars (\$) Square Feet		
13	Liquid Chemical Grout Injection	350	
	Dollars (\$) Linear Feet		
14	Reinforced Concrete Cap	200	
	Dollars (\$) Cubic Yards		
15	Reinforced Concrete Training Wall and Spillway	50	
	Dollars (\$) Cubic Yards		
16	Unreinforced Concrete Footing	15	
	Dollars (\$) Cubic Yards		
17	Type 1 Rip Rap	105	
	Dollars (\$) Tons		
18	Type 2 Rip Rap	875	
	Dollars (\$) Tons		
19	Loam and Seed	1900	
	Dollars (\$) Square Yards		
20	Sediment Transportation and Disposal	60	
	Dollars (\$) Tons		
21	Additional Site Restoration at the Direction of Owner	N/A	\$31,208
	Dollars (\$) Allowance		
22	Additional Reinforced Concrete at the Direction of Owner	N/A	\$41,611
	Dollars (\$) Allowance		
23	Additional Work at the Direction of Owner	N/A	\$31,208
	Dollars (\$) Allowance		
	TOTAL BID COST PROPOSAL		
	Dollars (\$) Total		

- A. Unit Prices have been computed in accordance with paragraph 11.03.A of the General Conditions.
- B. Bidder acknowledges that 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.

ARTICLE 6 - TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work within the Contract Times.

ARTICLE 7 - ATTACHMENTS TO THIS BID

- 7.01 The following document is attached to and made a condition of the Bid:
 - A. Completed Document 00320, Certification of Responsible Contractor Status Form.

ARTICLE 8 - DEFINED TERMS

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

ARTICLE 9 – SCHEDULE OF VALUES

- 9.01 Within 7 days of a request by the Owner, Bidder shall provide a Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivide 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.

ARTICLE 10 - BID SUBMITTAL

10.01 This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____
(Individual's signature)

SEAL, if required by State

Doing business as: _____

A Partnership

Partnership Name: _____

By: _____
(Signature of general partner -- attach evidence of authority to sign)

SEAL, if required by State

Name (typed or printed): _____

A Corporation

Corporation Name: _____

State of Incorporation: _____

Type (General Business, Profession, Service, Limited Liability): _____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Attest _____
(Signature of Corporate Secretary)

CORPORATE
SEAL,
if required by State

Date of Qualification to do business in the State of _____ * is ___/___/_____

* The date of qualification shall be the state in which the work under this contract is to be completed.

A Joint Venture

Name of Joint Venture: _____

First Joint Venture Name: _____

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

SEAL,
if required
by State

Name (typed or printed): _____

Title: _____

Second Joint Venture Name: _____

By: _____
(Signature of joint venture partner -- attach evidence of authority to sign)

SEAL,
if required
by State

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is party to the venture should be in the manner indicated above.)

Bidder's Business address: _____

Business Phone No. (_____) _____

Business FAX No. (_____) _____

Business E-Mail Address _____

State Contractor License No. _____ . (If applicable)

Employer's Tax ID No. _____

Phone and FAX Numbers, and Address for receipt of official communications, if different from Business contact information:

9.02 Bid submitted on _____
Date

CERTIFICATION OF RESPONSIBLE CONTRACTOR STATUS**GENERAL INFORMATION**

Company Name	
Address	
City	
Telephone Number ()	Fax Number ()
Ownership Structure (Please check one)	
<input type="checkbox"/> Sole Proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation <input type="checkbox"/> Joint Venture <input type="checkbox"/> Other	
Description of Service(s) Provided	
Contractor's License #	

RESPONSIBLE CONTRACTOR STATUS

Please check one of the following boxes:

1. Meets all Responsible Contractor requirements
2. Meets none of the Responsible Contractor requirements
3. Meets certain of the Responsible Contractor requirements (*provide explanation below*)

If you have checked box 3 above, please provide an explanation below (*attach additional pages if necessary on questions 3, 4 and 5*):

Explanation: _____

4. Has your firm ever been fined, received an adverse judgment, penalty, or received any mandated changes to its corporate policy in the past 18 months resulting from violations of State or Federal labor laws, including but not limited to the National Labor Relations Board, or Equal Opportunity Commission (i.e. sexual harassment and/or discrimination violations)? If yes, please explain.

Explanation: _____

5. Relative to question #4, are there any complaints that you are aware of that have been filed with your firm or any entities listed under question #4? If yes, please explain. (Affirmative answer(s) to the question will not necessarily disqualify the vendor from being the successful bidder. The level of investigation of the complaints listed in response to the question will be left to the judgment of the investment partner.)

Explanation: _____

OWNER'S CERTIFICATION OF RESPONSIBLE CONTRACTOR STATUS

On behalf of the above-named company, the undersigned certifies that the information and response provided herein are true, complete and accurate as of this date, and he/she is aware that any intentionally misrepresented or falsified information may result in disqualification from future contracting opportunities.

Signature _____ Date _____
 Name (please print) _____ Title _____

DOCUMENT 00430

NOTICE OF AWARD

Dated _____

Project: Brush Reservoir Dam Improvements	Owner: Aquarion Water Company of Connecticut	Owner's Contract No.: N/A
Contract:		Engineer's Project No.:
Bidder:		
Bidder's Address:		

You are notified that your Bid dated _____ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for the Brush Reservoir Dam Improvements, Stamford, Connecticut.

The Contract Price of your Contract based on the Total Amount of Base Bid is _____ Dollars and _____ Zero Cents (\$ _____) subject to unit prices and quantities.

4 copies of each of the proposed Contract Documents (except Drawings) will be delivered separately by the Engineer.
2 sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within [10] days of the date you receive this Notice of Award.

1. Deliver to the Engineer 4 fully executed counterparts of the Contract Documents.
2. Deliver to the Engineer with the executed Contract Documents, the Contract Security and Insurance as specified in the Instructions to Bidders (Article 20), General Conditions (Paragraph 5.01), and Supplementary Conditions (Article 5).
3. Other conditions precedent:
Within 7 days of this Notice of Award, the Successful Bidder must submit to the Owner and Engineer a Schedule of Values as described in Section 00300, Article 9 and a Cash Flow Schedule projecting the value of work to be completed each month throughout the project and a Site Specific Health and Safety Plan.

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 ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

Aquarion Water Company of Connecticut
Owner

By: _____
Authorized Signature

Buyer
Title

Copy to Engineer

DOCUMENT 00500

FORM OF AGREEMENT
EJCDC
FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR FOR
CONSTRUCTION CONTRACT (STIPULATED PRICE)
FUNDING AGENCY EDITION

THIS AGREEMENT is by and between Aquarion Water Company of Connecticut (Owner)
and _____ (Contractor).

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described:

Brush Reservoir Dam Improvements

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by Tighe & Bond, Inc., who is to act as Owner's representative, assumes all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

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

4.02 Days to Achieve Substantial Completion and Final Payment

A. The Work will be substantially completed within 365 days after the date when the Contract Time commence to run as provided in Paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions within 425 days after the date when the Contract Time commence to run.

4.03 Liquidated Damages

A. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. 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), Contractor shall pay Owner \$1,200.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete.

ARTICLE 5 - CONTRACT PRICE

A. For all Work, at the prices stated in the Contractor's Bid as referenced in Document 00430 Notice of Award.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

B. Each application for payment shall be accompanied by an Updated Cash Flow Projection, estimating the future monthly payments to the Contractor for the remainder of the project.

6.02 Progress Payments

A. Owner shall make monthly progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment, which shall be submitted to the Owner on the first work day of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Paragraph 2.07.A of 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 in the General Requirements:

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 Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 14.02 of the General Conditions:

a. Substantial Completion shall be a line item on the schedule of values worth no less than 3 percent of the total contract value and shall be paid upon issuance of the Certificate of Substantial Completion, less such amounts as Engineer shall determine in accordance with Paragraph 14.02 B.5 of the General Conditions.

b. Final Completion shall be a line item on the schedule of values worth no less than 2 percent of the total contract value and shall be paid upon issuance of the Certificate of Final Payment and Completion of Work, less such amounts as Engineer shall determine in accordance with Paragraph 14.02 B.5 of the General Conditions.

6.03 Final Payment

A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 14.07 of the General Conditions, Owner shall pay Contractor as provided in Paragraph 14.07 of the General Conditions the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 14.07, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages.

ARTICLE 7 – INTEREST - Omitted

ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

E. Contractor does not consider that any 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 Documents.

F. 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.

G. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement
2. Performance Bond
3. Payment Bond
4. General Conditions
5. Supplementary Conditions

6. Special Conditions - General
 7. Technical Specifications as listed in the table of contents of the Project Manual.
 8. Drawings entitled, Brush Reservoir Dam Improvements consisting of sheets number 1 through 15.
 9. Addenda (numbers _____ to _____, inclusive).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Notice of Award
 - b. Contractor's Bid
 - c. Documentation submitted by Contractor prior to Notice of Award
 11. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed
 - b. Application for Payment
 - c. Work Change Directives
 - d. Change Order(s)
 - e. Certificate of Substantial Completion
 - f. Waiver of Liens
 - g. Certificate of Final Payment and Completion of Work
 - h. Transfer of Title
- B. The documents listed in Paragraph 9.01.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 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

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

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are 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 Documents.

10.03 Successors and Assigns

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

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall 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.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in four copies. One counterpart each has been delivered to Owner, Contractor, Engineer, and Agency. All portions of the Contract Documents have been signed, initialed, or identified by Owner and Contractor or identified by Engineer on their behalf.

This Agreement will be effective _____, _____ (which is the Effective Date of the Agreement). This Agreement shall not be effective unless and until Agency's designated representative concurs.

OWNER:

CONTRACTOR:

Aquarion Water Company of Connecticut

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

[CORPORATE SEAL]

[CORPORATE SEAL]

Attest: _____

Attest: _____

Title: _____

Title: _____

Designated Representatives:

Designated Representatives:

Name: _____

Name: _____

Title: _____

Title: _____

Address for giving notices:

Address for giving notices:

Aquarion Water Company

600 Lindley Street

Bridgeport, CT 06606

Phone: _____

Phone: _____

Email: _____

Email: _____

License No.: _____

(Where applicable)

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Owner-Contractor Agreement.)

Agent for service or process: _____

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

Agency Concurrence:

As lender or insurer of funds to defray the costs of this Contract, and without liability for any payments thereunder, the Agency hereby concurs in the form, content, and execution of this Agreement.

Agency: _____

By: _____

Date: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00650

NOTICE TO PROCEED

Dated _____

Project: Brush Reservoir Dam Improvements	Owner: Aquarion Water Company of Connecticut	Owner's Contract No.: N/A
Contract:		Engineer's Project No.:
Contractor:		

Contractor's Address: [send Certified Mail, Return Receipt Requested]

You are notified that the Contract Times under the above contract will commence to run on _____ . On or before that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Agreement, the date of Substantial Completion is _____ , and the date of readiness for final payment is _____ .

Before you may start any Work at the Site, Paragraph 2.01.B of the General Conditions provides that you and Owner must each deliver to the other (with copies to Engineer and other identified additional insureds) certificates of insurance which each is required to purchase and maintain in accordance with the Contract Documents.

Also, before you may start any Work at the Site, you must:

_____ Contractor	Aquarion Water Company of Connecticut _____ Owner
Received by: _____	Given by: _____ Authorized Signature
_____ Title	_____ Title
_____ Date	_____ Date

Copy to Engineer

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. 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 which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer 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, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given 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 under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *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.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *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 for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *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 at the Site.
44. *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 thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, 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 Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *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, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. 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 Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. 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 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean 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, shall mean 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, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. 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 Bonds and Evidence of Insurance

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement 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 Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), 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 Documents;
 - 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.

2.06 *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 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, 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 instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial 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 for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall 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 component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one 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. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement 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, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, 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) any standard, specification, manual, or code, or (c) 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 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
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 Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); 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 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier 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 editions; or
 2. 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.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor 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. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- 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 the Work is to be performed 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.

4.02 *Subsurface and Physical Conditions*

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

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or

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 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition 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 meet any one or more of the categories described in Paragraph 4.03.A; and
 - 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 Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final 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
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, 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 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract

Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *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.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 - 3. 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 any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) 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 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. 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, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. 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. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. 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 or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds 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 shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 Licensed Sureties and Insurers

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 Certificates of Insurance

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of

insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed 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:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their 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 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 Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (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. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. 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:
 - 1. loss 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 perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery

against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, 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. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *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. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *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 at all times maintain good discipline and order at the Site.
- B. 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 shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *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.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall 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 shall 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.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 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 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description 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 or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it 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; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) 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
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. 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.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will

be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. 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 Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (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 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.

6.07 *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 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.

- 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.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. 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 opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *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. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear 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. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *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.

6.11 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
 3. 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 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 by or based upon Contractor's performance of the Work.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall 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 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 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 property to stresses or pressures that will endanger it.

6.12 *Record Documents*

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

6.13 *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. 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, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. 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. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. 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.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.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 (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).

- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of 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.

6.16 *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 threatened 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 thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will 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 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.
- b. 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 6.17.D.

B. 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. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

- a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
- c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. 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, conform to the information given in 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 (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.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's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

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.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *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 and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper 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.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is

not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

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 or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. 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 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 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 6.20.A shall 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.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. 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. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, 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.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER’S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

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

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner’s duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *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.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *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 Documents.

8.12 *Compliance with Safety Program*

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 pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *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 Documents.

9.02 *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 9.09. 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.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which 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. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. 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, subject to the provisions of Paragraph 10.05.

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

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents 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 shall 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 Paragraph 14.07.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 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *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 by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *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 as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the 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; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *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.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall 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. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall 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 shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall 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, who 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 shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including 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, and hand tools not owned by the workers, 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.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the 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 property insurance established in accordance with Paragraph 5.06.D), 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 shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall 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 telegrams, long distance telephone calls, telephone 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 Contractor is required by the Contract Documents to purchase and maintain.

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

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety 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 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. 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.
5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 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:*

1. Contractor agrees that:

- a. 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
- b. 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 on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a 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 on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *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. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- 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. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for 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, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall 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 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five 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 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a

deduction in Contractor's fee by an amount equal to five percent of such net decrease;
and

- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, 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 the Contract Price or the Contract Times, or both. 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.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or 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) sustained by Contractor on or in connection with any other project or anticipated project.

- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will 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 therewith as applicable.

13.03 Tests and Inspections

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- 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 and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in

the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

- E. 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.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, 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, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay 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 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 Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. 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, or both, 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, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *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, 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 shall 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.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay 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 correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If 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. 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 correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. 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.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, 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.

- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay 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) 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 pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *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 rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, 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, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, 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 (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) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the

Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. 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 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. 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. 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 shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, 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 9.07, 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 Documents; 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, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, 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 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

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

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. 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;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action 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, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *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 (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- 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 tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. 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 tentative list.

14.05 *Partial Utilization*

- 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. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and 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 14.04.A through D for that part of the Work.
 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and 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 14.04 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 5.10 regarding property insurance.

14.06 *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 is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *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, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) 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.

B. Engineer's Review of Application and Acceptance:

1. 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 Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. 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. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 Final Completion Delayed

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without

terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *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 notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will 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 established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. 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
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.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 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed 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.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. 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. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven 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;
 3. 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) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven 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 15.03.
- 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, seven 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 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 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 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 Giving Notice

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

- A. When any period of time is referred to in the Contract Documents 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.

17.03 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 Documents. 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.

17.04 Survival of Obligations

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

17.05 *Controlling Law*

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

17.06 *Headings*

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

DOCUMENT 00800

SUPPLEMENTARY CONDITIONS

PART 1 AMENDMENT TO GENERAL CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

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

The address system used in the Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

SC-1.01A22 Delete paragraph 1.01A.22 in its entirety and insert the following in its place:

22. "*Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, Radioactive Material or other material or substance subject to Laws and Regulations in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto or exceeding applicable standards in such Laws and Regulations."

SC-1.01A38 Insert after the words "support scheduled performance of" the words "Work and" in paragraph 1.01.A.38.

SC-1.01A41 Delete paragraph 1.01.A.41 in its entirety and insert the following in its place:

41. "*Site*—Public and private real properties or areas indicated in the Contract Documents upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other real properties which are designated for the use of Contractor."

SC-1.01A42 Delete paragraph 1.01.A.42 in its entirety and insert the following in its place:

42. "*Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto as contained in the Project Manual."

SC-1.01A44

- A. For water main replacement Contracts, delete paragraph 1.01.A.44 in its entirety and insert the following in its place:

44. "*Substantial Completion* – The time when all Work, in the opinion of the Engineer and Owner, is complete in accordance with the Contract Documents including acceptable potability and pressure testing, except for permanent pavement and landscape restoration. Permanent pavement and landscape restoration shall include, but not be

limited to, final restoration of pavement, pavement markings, signage, loop detectors, sidewalks, curbing, walls, fences, mail boxes, trees, lawn, landscaped areas, and any other areas disturbed by the Contractor within the project limits.”

- B. For all other Contracts, insert after the words “in the opinion of Engineer” the words “and Owner” in paragraph 1.01A.44.

SC-1.01A50 Add the following new paragraph 1.01.A.50 immediately after paragraph 1.01.A.49 and renumber the definitions for Work and Work Change Directive as Sections 51 and 52 respectively:

50. “*Warranty Period*—shall mean, with respect to a Project, the period that commences with the achievement of completion of the Work or Substantial Completion for such Project and expires two (2) years after acceptance of such Project by Owner or Final Acceptance except as otherwise set forth in this Agreement or the applicable Work or Project specific agreement.”

SC-1.01A52 Delete “recommended by” from the second line and add the following language at the end of Paragraph 1.01A.52:

“To the extent that the Owner directs Contractor in writing to perform Work under the Work Change Directive in advance of the issuance of the Change Order, Contractor shall implement such Work changes in advance of the issuance of the Change Order.”

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.01A Insert after the words “deliver to Owner such bonds” the words “or other performance assurance” in paragraph 2.01.A.

SC-2.01B Delete paragraph 2.01.B in its entirety and insert the following in its place:

- A. “*Evidence of Insurance*: Pursuant to and in accordance with the Notice of Award, Contractor shall deliver to Owner, with a copy to Engineer, certificates of insurance (and other evidence requested by Owner) which Contractor is required to purchase and maintain in accordance with the requirements of Article 5.”

SC-2.03A Delete paragraph 2.03.A in its entirety and insert the following in its place:

- A. The Contract Times will commence to run on the date specified in the Notice to Proceed.

SC-2.06B Amend the first sentence of paragraph 2.06.B by inserting “Engineer” between “Owner” and “and Contractor” in the first sentence.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

SC-3.01B At the end of paragraph 3.01.B, insert the following:
“Each and every provision of Laws and Regulations and clauses required by Laws and Regulations to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if

through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.”

SC-3.02A1 Delete paragraph 3.02.A.1 in its entirety and insert the following in its place:

1. “Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect on the Effective Date of the Agreement, except as may be otherwise specifically stated in the Contract Documents.”

SC-3.02A2 Delete paragraph 3.02.A.2 in its entirety and insert the following in its place:

2. “Except for Work changes as expressly authorized by Owner after having been informed of new or changed relevant standard, specification, manual, or code, or any instruction of a Supplier that impacts Work, no provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, 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 Contract Documents.”

SC-3.03A3 Delete paragraph 3.03.A.3 in its entirety.

SC-3.03B Add “or as otherwise expressly preauthorized and approved in writing by the Owner,” after the words “Except as may be otherwise specifically stated in the Contract Documents.”.

SC-3.03C Add the following new paragraphs SC-3.03C-P immediately after paragraph 3.03.B:

- C. “This Agreement contains the entire agreement between the Parties pertaining to the Work and supersedes any and all prior oral or written agreements, proposals, negotiations and representations with respect to that subject matter.
- D. No amendments or modifications of this Agreement or any Project-Specific Agreement shall be valid unless evidenced in writing and signed by duly authorized officers of Owner and Contractor.
- E. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. Insofar as possible, all requirements, terms, conditions, and provisions of the Contract Documents shall be construed and interpreted consistently. To the extent any activity or requirement is not specifically called out, but is necessary in Owner's opinion to the performance of the Work to complete the Work, such activity or requirement shall be deemed to have been implied by the Parties and called for just as if it had been expressly set forth at length in the Contract Documents. In any case of inconsistency, conflict, or ambiguity between, or among

this Agreement, the Project Specific Agreement, the exhibits, the schedules, the appendices and any of the other Contract Documents, the order of precedence shall be as follows except as otherwise designated in advance and in writing by Owner:

1. the body of this Agreement;
 2. the Technical Specifications (including Project Drawings and designs) provided or developed for each Project, as part of the Design and Engineering Services; provided that, in the absence of direction from Owner to the contrary, the more stringent requirement of the applicable Technical Specifications shall be deemed to apply in the event of any inconsistency, conflict, or ambiguity between or among two or more requirements therein;
 3. Pricing Schedule;
 4. all other exhibits;
 5. the schedules;
 6. the appendices; and
 7. any documents furnished or issued by Owner to Contractor in accordance herewith (including Change Orders).
- F. Notwithstanding anything to the contrary in the foregoing, Owner's interpretation shall prevail in the event of any inconsistency, conflict, or ambiguity within, between, or among this Agreement, the exhibits, the schedules, the appendices and any of the other Contract Documents.
- G. Reference to a given article, section, exhibit, schedule or appendix is reference to an article, section, exhibit, schedule or appendix of this Agreement, unless otherwise specified. The terms "hereof", "herein", "hereto", "hereunder" and "herewith" refer to this Agreement as a whole.
- H. All terms defined in Section 1.1 or in other provisions of this Agreement in the singular shall have the same meanings when used in the plural and vice versa.
- I. Except where otherwise expressly provided or unless the context otherwise necessarily requires: (i) reference to a given Law shall mean such Law in effect as amended or modified as of the date on which the reference is made, or performance and/or compliance is required; (ii) reference to a given agreement or instrument is a reference to that agreement or instrument as originally executed, and as modified, amended, supplemented and restated through the date as of which reference is made to that agreement or instrument or performance is required under that agreement or instrument; (iii) "includes", "including" or any other variant thereof means "including, without limitation,;" (iv) the phrase "and/or" shall be deemed to mean the words both preceding and following such phrase, or either of them; (v) reference to a Person includes its heirs, executors, administrators, successors and permitted assigns; and (vi) any pronoun includes the corresponding masculine, feminine or neuter forms. The words "will" and "shall" are used interchangeably throughout this Agreement and the Project-Specific Agreements; the use of either connotes a mandatory requirement; and the use of one or the other will not mean a different

degree of right or obligation for either Party. The captions for the articles and sections contained in this Agreement and in any Project-Specific Agreement have been inserted for convenience only and form no part of this Agreement (other than with respect to the caption in Section 12.8) and shall not be deemed to affect the meaning or construction of any of the covenants, agreements, conditions or terms of this Agreement.

- J. Unless otherwise indicated, whenever this Agreement or any Project-Specific Agreement refers to a number of days, such number shall refer to calendar days.
- K. Whether or not specifically provided, all Work shall be performed (i) in accordance with the Contract Documents, and (ii) for the Contract Compensation.
- L. Owner's determination on all matters forming the basis for any action taken or to be taken under the Contract Documents shall be binding as between the Parties and any surety or issuer of any bond, guaranty, or letter of credit, subject to dispute resolution hereunder.
- M. Failure of Owner to exercise any of its rights under this Agreement or under any Project-Specific Agreement will not excuse Contractor from compliance with the provisions of the Contract Documents, nor constitute a waiver of, or otherwise prejudice any rights or remedies of Owner.
- N. No acknowledgement, consent, approval, direction or other authorization required hereunder from Owner shall be effective for any purpose unless such acknowledgement, consent, approval, direction or other authorization is in writing and signed by Owner or the Owner Representative, as the context requires, for the affected Project.
- O. Unless otherwise specified herein, all certifications required from Contractor hereunder shall be made by the Contractor Representative for the affected Project or an executive officer of Contractor, as determined by Owner, and shall constitute a sworn statement that the Person executing such certification (i) has reviewed the underlying submission with diligence; (ii) has made the appropriate inquiry of Persons familiar with the work product embodied in such submission; and (iii) believes that, based on such review and inquiry, such submission does not contain any untrue statement of a material fact, or omit to state a material fact necessary in order to make the information so furnished, in the light of the circumstances under which such information is furnished, not misleading.
- P. The Parties acknowledge that (i) they are of equal bargaining strength and have jointly participated in the preparation of this Agreement, and (ii) any rule of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply in the interpretation of this Agreement, any portion hereof, or any amendment thereto.”

SC-3.05A1 Insert after the words “(or copies of any thereof)” the words “provided by Owner or” in paragraph 3.05A.1.

SC-3.05A2 Delete paragraph 3.05.A.2 in its entirety and insert the following in its place:

2. “reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without the prior written consent of Owner and, if such documents were prepared by or bearing the seal of Engineer or its consultants, the prior written consent of Engineer.”

SC-3.06A Delete paragraph 3.06.A in its entirety and replace with the following:

“A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, is furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such data will be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.”

SC-3.06C Amend the first sentence of paragraph 3.06.C by replacing the words “the transferring party” with the word “Owner.”

SC-4.01 Add “owned by Owner” after “Availability of Lands”

SC - 4.01A Delete the first sentence of this section SC - 4.01A and replace with the following: “If Owner has title to or easement rights to the Site where Work is to be performed, Owner shall notify Contractor 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.”

SC-4.06 Delete paragraph 4.06 Hazardous Environmental Condition at Site in its entirety and insert the following in its place:

- A. “Except as identified by Owner in the specific Project documents, no reports or drawings related to Hazardous Environmental Conditions at the Site are known to the Owner.
- B. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible or for any exacerbation of pre-existing Hazardous Environmental Condition.
- C. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for the retention of a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner or Contractor, as the case may be, shall take such actions as are necessary to permit Owner or Contractor to timely obtain required permits and thereafter abate said Hazardous Environmental Condition.

- D. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of any Work Stoppage, any additional conditions under which the Work shall be resumed and/or deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- E. 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 or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- F. 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 a Hazardous Environmental Condition created or exacerbated by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- G. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 - BONDS AND INSURANCE

- SC-5.01 Add the words "and Liquidated damages" after "Performance, Payment, and Other Bonds".
- SC-5.01A Amend the second sentence of paragraph 5.01.A by replacing the words "correction period" with the words "warranty period."
- SC-5.01D Add the following new paragraph 5.01.D immediately after paragraph 5.01.C:
 - D. "Owner may require prior to the signing of the Agreement that Contractor provide performance assurance in favor of Owner with respect to all or any portion of the Work or Project, in an amount and form an issuer satisfactory to Owner, and/or require liquidated damages as set forth in an attached Schedule for the applicable Work or Project. Unless otherwise specified by Owner, any performance assurance shall remain in effect until the expiration

of the warranty period for the applicable Work or Project. In Owner's sole and exclusive discretion, Contractor shall increase the amount available to Owner on account of such then outstanding performance assurance within ten (10) days after written notice to Contractor. The Agreement compensation shall include Contractor's cost of procuring such performance assurance, but shall not include any cost for Contractor's extension of such performance assurance due to failure of Contractor to complete Work in accordance with the applicable Work or Project schedule. Owner reserves the right to supplement these terms and conditions with provisions regarding liquidated damages as stated or referenced in the Order.”

SC-5.02A Add the following at the end of paragraph 5.02A:

“Surety and insurance companies shall be rated A- or higher by A. M. Best at the time of contract award. “

SC-5.03 Certificates of Insurance. Add the following new paragraph immediately after paragraph 5.03E:

5.03F “Insurance certificate(s) shall also contain the following:

1. Confirmation regarding whether the General Liability policy covers all of the Contractor’s operations or only the Work under this Contract, with project specific limits.
2. Confirmation that the General Liability policy includes XCU coverage.
3. Confirmation that automobile insurance covers all Scheduled, Hired and Non-Owned vehicles.
4. Names of all additional insureds as specified herein.”

SC-5.04B1 Insert after the words “these additional insureds shall provide primary” the words “and non-contributory” in paragraph 5.04B1.

SC-5.04B3 Delete paragraph 5.04.B.3 in its entirety and insert the following in its place:

3. “include contractual liability insurance covering Contractor’s contractual, warranty and indemnity obligations under Paragraphs 6.11, 6.19 and 6.20;”

SC-5.04B5 Delete paragraph 5.04.B.5 in its entirety and insert the following in its place:

4. “remain in effect at least until the later of the expiration of the warranty period and final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and”

SC-5.04B6 Delete the words “one year thereafter” at the end of the section and replace with the words “for the duration of the warranty period.”

SC-5.04C Add new paragraph 5.04.C as follows:

C. "Except for additional coverages required for a particular Project, the limits of liability for the insurance required by paragraph 5.04 shall provide coverage for not less than the following amounts or greater where required by law:

1. Worker's Compensation and Employer's Liability \$1,000,000 / \$1,000,000 / \$1,000,000.

2. Contractor's General Liability under paragraphs 5.04A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages:

a. General Aggregate \$2,000,000

b. Products/Completed Operations Aggregate \$2,000,000

c. Personal and Advertising Injury \$1,000,000

d. Each Occurrence (Bodily Injury and Property Damage) \$1,000,000

e. Damage to Rented Premises \$1,000,000

f. Excess or Umbrella Liability, which may be used to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with paragraph 5.04

1) General Aggregate \$5,000,000

2) Each Occurrence \$5,000,000

3. Commercial Automobile Liability under paragraph 5.04A.6 of the General Conditions including all scheduled, hired and non-owned vehicles:

a. Bodily Injury:

Each Person \$1,000,000

Each Accident \$1,000,000

b. Property Damage:

Each Accident \$1,000,000

4. The following shall be included on the policy and identified on the certificate as additional insureds:

a. Consulting Engineer - See Schedule 5.04 (C) 4A

b. Aquarion Water Company and Affiliates
600 Lindley Street
Bridgeport, CT 06606”

SC-5.05 Delete paragraph 5.05 in its entirety and insert the following in its place:

5.05 “Contractor has the option to carry liability insurance for the Owner in accordance with either 5.05.A or 5.05.B described below:

5.05.A The Contractor shall purchase and maintain a separate Owner’s Protective Liability policy, issued to Owner at the expense of Contractor, including Owner and Engineer as named insured. This insurance shall provide coverage for not less than the following amounts:

Bodily Injury	\$1,000,000	Each Occurrence
Property Damage	\$1,000,000	Each Occurrence
	\$2,000,000	Aggregate

5.05.B In lieu of a separate Owner’s Protective Liability policy, the Contractor shall include and provide copies of the following endorsements:

CG 2026 0704 – Additional Insured
CG 2010 0704 – Additional Insured - Owners Lessors or Contractors
CG 2037 0704 – Owners, Lessors and Contractors Completed Operations”

SC-5.06 Delete the paragraph in its entirety and replace with the word “RESERVED.”

SC-5.08 Delete the paragraph in its entirety and replace with the word “RESERVED.”

SC-5.09A Delete paragraph 5.09.A in its entirety and insert the following in its place:

A. “If Owner has any objection to the coverage afforded by the provisions of the bonds or insurance required to be purchased and maintained by the Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the Owner shall so notify the Contractor in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Contractor shall provide to Owner such additional information in respect of insurance provided as the Owner may reasonably request. If Contractor does not purchase or maintain all of the bonds and insurance required by the Contract Documents, Owner shall notify the Contractor 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. Without prejudice to any other right or remedy, Owner may elect to obtain equivalent bonds or insurance to protect their interests at the expense of the Contractor who was required to provide such coverage,

and a Change Order shall be issued to adjust the Contract Price accordingly.”

ARTICLE 6 - CONTRACTOR’S RESPONSIBILITIES

SC-6.01B Add the following new paragraph immediately after paragraph 6.01B.

- C. “Whenever Owner notifies Contractor in writing that any person on the Work appears to be incompetent, disorderly, or otherwise unsatisfactory, such person shall be removed from the Project and shall not again be employed on the Project or assigned to perform any other work for Owner except with the prior written consent of Owner.”

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

- A. “Schedule Commitment/Notice of Delay. Time is of the essence with respect to the performance of the Work. Each Party shall give the other prompt written notice of any circumstances that may delay performance of the Work including any force majeure condition as described in Paragraph 12.03. Contractor shall notify Engineer and Owner of any such circumstance orally as soon as possible after such circumstance occurs and in writing within twenty-four (24) hours after the occurrence of such circumstance. Contractor shall record the cause of any resulting delay and the time lost in its reports and shall submit such reports and related information, as requested by Engineer or Owner, to Engineer and Owner.”

SC-6.06 Delete paragraphs 6.06A and 6.06B in their entirety and insert the following in their place.

- A. “Contractor shall not employ any Subcontractor, Supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner may have objection. Acceptance of any Subcontractor, other person or organization by Owner shall not constitute a waiver of any right of Owner to reject defective Work.
- B. If the percentage of work performed by Subcontractors is to be limited, it shall be detailed in a separate Schedule 6.06B.”

SC-6.06B Add the following new paragraph immediately after paragraph 6.06.B:

- C. Owner may furnish to any such Subcontractor, Supplier or other person or organization, to the extent practicable, information about amounts paid on their behalf to Contractor in accordance with Contractor’s Applications for Payment.

SC-6.06C Delete “or Engineer” after “Owner” in the first line.

SC-6.07B Delete the paragraph 6.07B in its entirety and replace with the word “RESERVED.”.

SC-6.07C Insert after the words “Laws and Regulations, Contractor shall” the word “defend” in paragraph 6.07.C.

SC-6.08A Delete the word “Owner” in the last sentence of Paragraph 6.08A and replace with the word “Contractor.”

SC-6.08B Add the following new paragraph SC-6.08B immediately after paragraph SC-6.08A:

6.08B “The Owner has obtained or will obtain the permits and approvals for the Project attached to the Project Manual. The Contractor is required to comply with the permit provisions. Copies of the permits are appended to the Project Manual.

SC-6.10 Delete paragraph 6.10 in its entirety and insert the following in its place:

“6.10 Taxes

Contractor shall pay all required sales, consumer, use, and other similar taxes in accordance with the Laws and Regulations applicable to the Project and the Work.

The Pricing Schedule for the Work shall include any present or future Federal, State, county, municipal or other sales, use, excise or similar tax only to the extent there are tax obligations for the Work and the Work is not tax exempt. Contractor is responsible to properly assess and pay all applicable taxes and the following information is for Contractor’s general information only and Contractor should undertake Contractor’s own due diligence to understand all tax obligations applicable to the Work being performed for Owner. If Owner objects to any tax assessment, Owner may, however, direct Contractor to withhold such payment and to contest the amount of any such tax imposition. Contractor shall fully cooperate with Owner in any such tax contest. Owner may, however, direct Contractor to withhold such payment and to contest the amount of any such tax imposition. Contractor shall fully cooperate with Owner in any such tax contest:

CT	Sales of and the storage, use or other consumption of any personal property of any services to a water company, as defined in Section 16 1 , for use in maintaining, operating, managing or controlling any pond, reservoir, stream, well or distributing plant or system employed for the purpose of supplying water to fifty or more customers are exempt from sales and use tax.		X	CGS Section 12-412(126).	CERT-130
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* Contractor is required to check and confirm all consumer, use, and other similar taxes required to be paid by Contractor and include only required taxes for applicable services, materials and equipment.

SC-6.11A1 Add the following new paragraph 6.11.A.1 immediately before paragraph 6.11.A.2:

1. “Required Rights. If necessary for a Project, Contractor shall be responsible, at its sole cost and expense, for acquiring all necessary rights for parking, laydown and/or storage area(s) and, if applicable, a construction field office,

each in the vicinity of (but not on) the applicable Site and otherwise in accordance with the terms and conditions of this Agreement and related documentation for the applicable Project or Work. Contractor shall not permit any personal vehicle parking, staging or other activities not directly required for the conduct of physical Work in any state/commonwealth road, any right of way, and/or any other area owned by, or subject to the control of, any governmental authority. Contractor shall provide, at its sole cost and expense, reasonable security measures to adequately protect such parking, laydown and/or storage area(s) and field offices, and the materials, equipment and supplies stored thereon.”

SC-6.11A2 Insert after the words “and other areas permitted by Laws and Regulations” the words “and property owners, including, without limitation, municipal and state authorities,” in paragraph 6.11.A.2.

SC-6.11A4 Insert after the words “Laws and Regulations, Contractor shall” the word “defend” in paragraph 6.11.A.4.

SC-6.11A5 Add the following new paragraph SC-6.11A5 immediately after paragraph 6.11.A.4:

5. “Traffic Control. Contractor shall arrange all traffic control services (e.g., flagging, police services) as required or appropriate for the applicable Project. Contractor shall make all arrangements with police and others to supply traffic control services to Owner and its contractors and make commercially reasonable efforts to mitigate associated costs. Contractor shall make direct payment for such traffic control services to providers of such services and pass through such costs to Owner without mark-up; provided that Contractor shall solely bear all traffic control costs associated with Work necessitated by Contractor's failure to maintain the appropriate schedule and/or other failure to comply with the Agreement documents. Contractor shall be responsible for coordinating and otherwise scheduling the Work with the traffic control service provider, and Contractor shall immediately notify the Engineer or Owner Representative of any difficulties in that regard.”

SC-6.17 Add the following new paragraphs F and G immediately after paragraph 6.17E:

- F. “Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer’s time for reviewing subsequent submittals of Shop Drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer’s charges for such time.
- G. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer’s charges for its review time unless the need for such change is beyond the control of the Contractor.”

SC-6.19 Delete paragraph 6.19 in its entirety and insert the following in its place:

6.19 “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 and its officers,

directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee. Contractor warrants that any Services performed or provided by, through, or on behalf of Contractor as part of or in connection with the Agreement shall (i) be performed by Contractor resources who are fully qualified and competent and whose recommendations, guidance and performance reflect professional knowledge, judgment, and performance in accordance with the highest professional standards applicable to the utility industry and the industry applicable to such Services; and (ii) comply with and conform to all provisions and requirements of the Agreement and to any and all provisions of any and all applicable law.

- B. Except for any longer warranty period for any Services identified and set forth in the applicable specifications for the Work, for a period of two (2) years after Acceptance of all Work under the Agreement, if Owner determines that any portion of the Services performed by, through, and/or on behalf of Contractor fails to comply with the warranties set forth above, or if a defect or error is discovered in any Design Documents supplied with such Services, Contractor shall, at its sole cost and at Owner's option, (i) correctly re-perform such Services or correct the defect or error in the Information, or (ii) return to Owner the charges paid by Owner and attributable to such Services or defective or erroneous Information supplied. Owner shall have the right to set-off against other amounts due Contractor hereunder or otherwise any amount owed by Contractor to Owner. In addition, Owner shall have the right to (i) require Contractor to complete such warranty Work, or (ii) take over the Work and receive from Contractor reimbursement for such warranty Work.
- C. Supplier Warranties. Contractor shall take all reasonable steps to transfer for the benefit of Owner all warranties or guarantees available from the suppliers of any portion of the Work.
- D. Equipment and Materials Warranty: Except for any longer warranty period for any Equipment identified and set forth in the applicable specifications for the Work, for a minimum period of one (1) year after Acceptance of all Work under the Agreement, Contractor warrants that all Equipment and materials it supplies shall be new when delivered and free from defects in title, design, material and workmanship and shall conform to the Specifications set forth in the Agreement. Within the applicable warranty period of not less than one (1) year after Final Acceptance of the Equipment and materials, if Owner determines that the warranty set forth above is breached, Contractor shall at its sole cost and expense and at Owner's option, either repair or replace the affected Equipment and materials.
- E. Completion Warranty. Contractor warrants that it shall complete the Work in accordance with the Work schedule. If the Work falls behind schedule due to causes attributable to Contractor or Contractor Resources, Contractor shall, at its sole cost and expense, use its best efforts to restore the Work to schedule, including the following measures: placing Contractor Resources on extended working hours; assigning additional personnel to the Work, and prioritizing Contractor's resources and obligations to ensure that the Work is completed on schedule.
- F. Restoration. Contractor shall promptly repair and restore all property after completion of that portion of the Work affecting a Site, in all cases in accordance with any applicable Property Owner Arrangements and the requirements of all Permits, as well as Owner requirements. Without limiting the generality of the

foregoing, Contractor shall obtain all relevant concurrence of the applicable Governmental Authorities and/or system owner with respect to maintaining the integrity of the existing facilities located within the road and/or the associated right of way. Contractor shall protect all survey monuments affected by the Work and re-establish in conformity with survey standards then currently established any survey monuments disturbed and/or destroyed. Contractor also shall be responsible, at Contractor's sole cost and expense, for all damages to Owner's or third party property resulting from any Work. Contractor shall immediately report any such damage, suspected or actual, to the Owner Representative for such Project, followed by a written report of the incident and proposed remediation within five (5) Business Days after the event. In the case of third party property, Contractor shall comply with any community and public relations protocol provided by Owner as well as any state or municipality requirements.

G. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper 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.

H. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents or of Contractor's warranty obligations:

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 or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner."

SC-6.20A Delete paragraph 6.20.A in its entirety and insert the following in its place:

- A. "To the fullest extent permitted by Laws and Regulations, Contractor shall defend, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors ("Indemnified Parties") 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 except to the extent the foregoing liabilities are proven to have been caused by any negligent act or omission of Indemnified Parties.”

SC-6.20C Delete the paragraph and replace with the word “RESERVED.”

SC-6.20D Add the following new paragraph SC-6.20D immediately after paragraph 6.20.C.

6.20D “If, through acts or omissions on the part of Contractor, any other Contractor or any Subcontractor shall suffer loss or damage on the Work, Contractor shall settle with such other Contractor or Subcontractor by agreement or arbitration if such other Contractor or Subcontractor will so settle. If such other Contractor or Subcontractor shall assert any claim against Owner on account of any such damage alleged to have been sustained, Owner shall notify Contractor, who shall indemnify, defend, and save harmless Owner against any such claim.”

SC-6.21A Amend the first sentence of paragraph 6.21.A by replacing the word “required” with the word “necessary” in line three of this Paragraph.

SC-6.21B Delete paragraph 6.21.B in its entirety and insert the following in its place:

- B. “If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall be responsible to perform such services and provide such certifications in accordance with such criteria and by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional’s written approval when submitted to Engineer.”

SC-6.21E Delete paragraph 6.21.E in its entirety and insert the following in its place:

- E. “Contractor shall not be responsible for the adequacy of the performance or design criteria provided by the Owner and approved by Engineer and required by the Contract Documents but shall communicate any concerns related to such criteria to Engineer and Owner”.

SC-6.21E Add the following new paragraphs F- I immediately after paragraph 6.21.E:

- F. “Preliminary, certified for construction and as-built drawings shall be submitted to Engineer for approval in the form requested by Owner and Engineer, and may be subject to Owner’s review and acceptance upon Owner’s request. Any drawing shall be produced in accordance with any Specifications and acceptable industry practices, and shall be legible such that Owner is able to clearly distinguish all characters and lines.

- G. For submittals, drawings and related design documents (“Design Documents”) that include information that is not prepared exclusively and solely for Owner, Contractor shall retain title to any such information (excluding any portion thereof that contains Owner’s Confidential Information) that is subject to Contractor’s patents, copyrights, trademarks, service marks, intellectual property rights or proprietary interests provided that Owner shall have unrestricted and non-exclusive rights and license to use such Design Documents. For Design Documents that includes information that is prepared exclusively and solely for Owner, all such information is the proprietary information of Owner and shall be subject to the requirements applicable to Owner's Confidential Information, whether or not each such document is so identified.
- H. Contractor shall be responsible for the completeness and accuracy of the Design Documents it provides and shall correct, at its expense, all errors or omissions therein. Without limitation of any and all other rights and remedies available to Owner, the reasonable cost necessary to correct matters attributable to such errors shall be chargeable to Contractor.
- I. Contractor shall provide Owner and Engineer with all information necessary for Owner's use and understanding of the Work and the installation, operation, maintenance and repair thereof, and to allow Owner to satisfy any legal process, or any filing or disclosure requirement required under law or regulation or requirement of a governmental body. Except for information deemed to be proprietary to Contractor under the terms of the Agreement, and except as set forth in this Article 6.21, all Information supplied or delivered to Owner pursuant to the Agreement shall be the property of Owner. Contractor may retain for its records only, copies of any information furnished to Owner, and unless otherwise agreed to by the parties, shall treat such information in accordance with the requirements applicable to Owner's Confidential Information.”

SC-6.21 Add the following new paragraph immediately after paragraph 6.21:

SC-6.22 “Assignment of Procurement Contracts from Owner to Contractor:

TO BE SPECIFIED IN SCHEDULE 6.22”

SC-6.23 Add the following new paragraph 6.23 immediately after paragraph 6.22:

“6.23 DELIVERY, TITLE AND RISK OF LOSS TO EQUIPMENT AND MATERIALS.

A. Except as otherwise specified in the Agreement, delivery of any equipment and materials to be purchased by the Owner shall be F.O.B. Destination. Whenever Contractor provides equipment that will not be subject to further Work by Contractor, title and risk of loss shall pass to Owner upon the delivery of the equipment F.O.B. Destination set forth in the Agreement and Acceptance. Except as otherwise expressly agreed to by the parties in writing in the Agreement Owner shall not pay any amounts for transportation or packaging.

B. Except as provided for in Paragraph A above, title and risk of loss to all equipment and materials supplied by Contractor shall pass upon Acceptance of Work by Owner.

C. Title to all materials to be removed by Contractor shall pass to Contractor upon the loading of the materials into the containers supplied by Contractor or onto Contractor's truck, whichever occurs first. For purposes of this Paragraph 6.23, the term Contractor shall include any Subcontractor performing Work under the Contract

D. For Equipment returned to Contractor's facility for repair or modification, title shall remain with Owner. For warranty work, Contractor shall bear the risk of loss from the time it leaves the Site until it returns to the Site. In all other cases, Owner shall bear risk of loss until the Equipment is delivered to Contractor's site and Contractor shall bear risk of loss from the time of delivery at its site until the equipment is returned to Owner's Site.

E. Contractor shall deliver the equipment and materials purchased by Owner to the location stated in the Agreement in accordance with the delivery dates and any schedule of performance provided in the Agreement, time being of the essence for each such delivery for which a date or a length of time is fixed for delivery.

F. Contractor shall exercise reasonable care in the receipt, storage, handling, and installation of all materials, whether supplied by Owner, by Contractor, or by another contractor. All excess material supplied by or charged to Owner shall be handled and managed as directed by Owner.”

ARTICLE 7 - OTHER WORK AT THE SITE

SC-7.02A Delete paragraph 7.02A in its entirety and replace with the following:

“7.02A The Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions or related Project documents:

1. the individual or entity who will have the authority and responsibility for coordination of the various contractors will be identified;
2. the specific matters to be covered by such authority and responsibility will be itemized; and
3. the extent of such authority and responsibilities will be provided.”

SC -7.04 Add the following new paragraph immediately after paragraph 7.03:

“7.04 Claims Between Contractors

- A. Should Contractor cause damage to the work or property of any separate contractor at the Site, or should any claim arising out of Contractor's performance of the Work at the Site be made by any separate contractor against Contractor, Owner, Engineer, Engineer's consultants, or the construction coordinator, then Contractor (without involving Owner, Engineer, or construction coordinator) shall either (1) remedy the damage, (2) agree to compensate the other contractor for remedy of the damage, or (3) remedy the damage and attempt to settle with such separate contractor by agreement, or to

otherwise resolve the dispute by the Dispute Resolution Process described in the Agreement.

- B. Contractor shall, to the fullest extent permitted by Laws and Regulations, defend, indemnify and hold harmless Owner, Engineer, or Engineer's consultants, Construction Coordinator, and the officers, directors, partners, employees, agents and other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages (including, but not limited to, fees and charges of engineers, architects, attorneys, and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against Owner, Engineer, Engineer's consultants, or the Construction Coordinator to the extent said claim is based on or arises out of Contractor's performance of the Work. Should a separate contractor cause damage to the Work or property of Contractor or should the performance of work by any separate contractor at the Site give rise to any other Claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, Engineer's consultants, or Construction Coordinator or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from Owner, Engineer, or Engineer's consultants, or the Construction Coordinator on account of any such damage or Claim.
- C. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate contractor, and Owner and Contractor are unable to agree as to the extent of any adjustment in Contract Times attributable thereto, Contractor may make a Claim for an extension of times in accordance with Article 12. An extension of the Contract Times shall be Contractor's exclusive remedy with respect to Owner, Engineer, and Engineer's Consultants, for any delay, disruption, interference, or hindrance caused by any separate contractor. This paragraph does not prevent recovery from Owner, Engineer, or Engineer's Consultant, for activities that are their respective responsibilities."

ARTICLE 8 – OWNER'S RESPONSIBILITIES

SC-8.01A Delete paragraph 8.01.A in its entirety and replace with the following:

"8.01 Communications to Contractor

- A. Except as otherwise provided in the Contract Documents or as necessitated by exigent circumstances, Owner shall issue all communications to Contractor through Engineer."

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

"8.02 Replacement of Engineer

- A. In the event Owner replaces the Engineer at Owner's discretion, Owner will notify Contractor promptly."

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

"8.03 Furnish Data

A. Owner shall make efforts to promptly furnish the data required of Owner under the Contract Documents.”

SC-8.07A Delete paragraph 8.07.A in its entirety and replace with the following:

“8.07 Change Orders

A. Owner is obligated to review and execute approved Change Orders as indicated in Paragraph 10.03.”

SC-8.12A Delete paragraph 8.12.A in its entirety and replace with the following:

“8.12 Compliance with Safety Program

A. While at the Site, Owner’s employees and representatives shall comply with Owner’s Safety Program and any additional safety requirements reasonably requested by Contractor while on Site in the vicinity of where Contractor is performing Work. “

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-9.02A Delete paragraph 9.02.A in its entirety and replace with the following:

A. “Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Owner 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 and 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 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.”

SC-9.03A Delete paragraph 9.03.A in its entirety and replace with the following:

A. “If requested by Owner, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions or Project documents, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions or Project documents.”

SC-9.05A Delete paragraph 9.05.A in its entirety and replace with the following:

A. “Engineer or Owner will have authority to reject Work which either believes to be defective, or that Owner or Engineer believes will not produce a completed Project that

conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Owner or Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.”

SC-9.07A Delete the words “Owner and” in the second sentence after the words “(except as modified by Engineer to reflect changed factual conditions or more accurate data) upon” in paragraph 9.07.A.

SC-9.08 Delete paragraph 9.08 in its entirety and replace with the following:

9.08 “Decisions on Requirements of Contract Documents and Acceptability of Work

A. Engineer and Owner will be the interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer and Owner in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred, subject to Owner’s approval. If Contractor disagrees with any such decision, a Claim may be made under Paragraph 10.05. The date of Engineer’s decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.”

SC-9.09A Delete the words “any other individual or entity” in the sentence after the words “owed by Engineer to Contractor, any Subcontractor, any Supplier” in paragraph 9.09.A.

SC-9.09B Delete the words “Engineer will not be responsible for Contractor’s failure to perform the Work in accordance with the Contract Documents” in the third sentence after the words “with Laws and Regulations applicable to the performance of the Work.” in paragraph 9.09.B.

SC-9.09C Delete paragraph 9.09.C in its entirety and replace with the word “RESERVED.”

SC-9.09D Delete paragraph 9.09.D in its entirety and replace with the word “RESERVED.”

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

SC-10.02A Delete paragraph 10.02.A in its entirety and replace with the following:

A. “Contractor shall not be entitled to make any unauthorized changes to Work not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.”

SC-10.05 Delete paragraph 10.05.A in its entirety and replace with the following:

A. “Engineer’s Decision Required: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. An Owner approved decision by Engineer shall be required as a condition precedent to any exercise by Contractor of any

rights or remedies Contractor may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

- B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 15 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 30 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. Engineer's Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim and submit the same to Owner for approval; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Contractor, unless Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05."

ARTICLE 11 - COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01 Delete paragraph 11.01A.5.c in its entirety and replace with the following:

11.01A.5.c "The fair rental of all machinery and equipment used on the extra work for the period of such use. The fair rental for all machinery and equipment shall be based upon the most recent edition of "Rental Rate Bluebook for Construction Equipment" (the "Bluebook"), published by Nielson/Dataquest, or a similar publication approved by Engineer. Rental periods corresponding to the overall

period of use shall be used, except if a piece of equipment used on extra work is already on the job, or has previously been rented for a long period of time (months), then the long-term rental rate (monthly) shall be used in determining costs.”

SC-11.01B.5 Add the following new paragraph immediately after paragraph 11.01B.5:

“11.01B.6 Costs of or rental of small tools; costs of or rental of buildings.”

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.03A Delete paragraph 12.03.A in its entirety and replace with the following:

- A. “Neither Party shall be liable to the other for loss or damage resulting from any delay or failure of a Party to perform its contractual obligations due to conditions or circumstances which are beyond that Party's control, including: acts of God; war; acts of a public enemy; riot; civil commotion, sabotage; Federal, state or municipal action, inaction or regulation; strikes or other labor troubles (excluding those involving such Party's employees); fire; flood; accidents; epidemics; quarantine restrictions; embargoes; damage to or destruction in whole or in part of equipment or manufacturing plant, to the extent such facilities are necessary to proper performance of the Party's obligations under any Agreement and alternate facilities are not reasonably available; and inability to obtain raw material, labor, fuel or supplies; provided however, that such failure or delay is not caused by that Party's failure to satisfy its obligations under the Agreement or could not have been prevented by reasonable precautions taken by the non-performing Party, or could not reasonably be circumvented by the non-performing Party through the use of alternate sources or plans or other means. Force majeure shall extend the time for Contractor's performance to the extent such condition directly affects completion of Work. Contractor shall use its best efforts to reschedule its Work to mitigate the effect of such condition and to eliminate such condition as soon as possible. If the Work falls behind schedule due to a Force Majeure, Owner may direct Contractor to accelerate the Work by whatever means Owner may deem necessary, including subcontracting Work or working additional hours or shifts, and Owner shall pay Contractor for the agreed direct actual costs incurred by Contractor in connection with any such directed acceleration. Neither this Article nor any other provision of the Agreement shall excuse the non-performance or delayed performance of Contractor due to any failure of the Contractor to prepare for the Work or due to any commercial impracticability experienced by Contractor, including market changes, increased costs or insufficient money or other resources.”

SC-12.03B Delete the words “shall be entitled to” in line four and replace with “may request.”

SC-12.03C Delete the words “shall be entitled to” in line four and replace with “may request.”

ARTICLE 13 - TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.03 Insert after the word “notice” the words “(minimum of 24 hours)” in paragraph 13.03A.

SC-13.04C Delete paragraph 13.04.C in its entirety and replace with the following:

- C. “If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all ancillary, Owner internal costs, as well as court or arbitration or other dispute resolution costs) 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 Owner shall be entitled to bill Contractor and Contractor shall pay Owner promptly within 30 days of receipt of invoice or, alternatively, Owner may make an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.”

SC-13.05 Add the following new paragraph immediately after paragraph 13.05A.

“13.05B If Owner stops work under Paragraph 13.05, Contractor shall not be entitled to an extension of Contract Time nor to an increase in Contract Price.”

SC-13.06A Delete paragraph 13.06.A in its entirety and replace with the following:

- A. “Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all ancillary, Owner internal costs, as well as court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others). Owner may bill Contractor for all such costs and Contractor shall pay Owner promptly within 30 days of receipt of invoice or, alternatively, Owner may make an appropriate decrease in the Contract Price.”

SC-13.06 Add the following new paragraph immediately after Paragraph 13.06B.

“13.06C. At any time during the progress of the Work, Engineer and Owner shall have the right to reject any work which does not conform to the requirements of the Contract Documents, even though such work has been previously inspected and paid for.”

13.07 Delete the words “Correction Period” and replace with “Warranty” so that the title of this paragraph is “Warranty.”

SC-13.07A Delete paragraph 13.07.A in its entirety and replace with the following:

- A. “If during the course of the Work and within the Warranty Period (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor’s use by Owner or permitted by Laws and Regulations as

contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
2. correct such defective Work; or
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom."

SC-13.07C Amend the paragraph 13.07.C by replacing "correction period" with "warranty period."

SC-13.07D Amend the paragraph 13.07.D by replacing "correction period" with "warranty period."

SC-13.09A Amend the paragraph 13.09.A by replacing the words "seven days" with the word "providing."

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02 Delete paragraph 14.02A.1 and replace with the following:

1. "No more frequently than once per month, Contractor shall submit to Engineer for review an Application for Payment covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents or otherwise requested by Owner. Engineer shall review the Application for Payment with Contractor and if acceptable, Engineer and Contractor shall sign the Application for Payment prior to submission to Owner."

SC-14.02A.3 Delete paragraph 14.02A.3 in its entirety.

SC-14.02B Delete paragraph 14.02.B in its entirety and replace with the following:

B. "Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, 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 9.07, 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. RESERVED.
 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, relieve Contractor of Contractor's responsibility:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to transfer title to any of the Work, materials, or equipment 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 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has taken measures to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A
 - e. Owner has incurred costs arising from and related to Contractor delays (e.g. traffic costs, engineering) or defective Work."

SC-14.02C Delete paragraph 14.02.C in its entirety and replace with the following:

C. "Payment Becomes Due:

1. Thirty (30) days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor. D. Reduction in Payment:
2. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

- b. 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;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
 - e. Owner has incurred costs arising from and related to Contractor delays (e.g. traffic costs, engineering) or defective Work by Contractor.
- 3. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor prompt written notice (with a copy to Engineer) stating the reasons for such action 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, when Contractor remedies the reasons for such action to Owner's satisfaction.
 - 4. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 provided in the Agreement."

SC-14.04 Delete paragraphs 14.04A through 14.04D in their entirety and insert the following in its place:

"14.04A 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 (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a Certificate of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Engineer shall make an inspection of the Work to determine the status of completion. If, after consultation with Owner, Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor. If, after consultation with Owner, Engineer considers and the Owner agrees that the Work is substantially complete, Engineer will prepare and deliver to Contractor, in a form approved by Owner, a Certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be included in the certificate a list of items to be completed or corrected before final payment and a time frame for completion."

SC-14.04 Renumber 14.04E as 14.04B.

SC-14.05 Add the following new paragraph 14.05.A.4 immediately after paragraph 14.05A.3:

"14.05.A.4 Owner may at any time notify Contractor that it will take over operation of any part of the Work although all Work is not substantially complete. A copy of such notification will be sent to Engineer, and within a reasonable time thereafter Owner, Contractor, and Engineer shall inspect that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. Contractor shall notify Owner and Engineer immediately if such part of the Work is not ready for separate operation

by Owner, the reasons therefore, and the earliest time that such Work shall be ready for operation. The parties shall discuss alternatives acceptable to Owner, and Engineer will finalize the list of items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner may, in its sole discretion, allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.”

SC-14.05A. Paragraph 14.05.A.4 shall be renumbered to 14.05.A.5

SC-14.06A Insert after the words “final inspection with Owner and Contractor and” the words “Owner or Engineer” in paragraph 14.06.A.

SC-14.07B Delete paragraph 14.07.B. in its entirety and insert the following in its place:

“14.07.B If, on the basis of Engineer’s observation of the Work during construction and final inspection, and Engineer’s review of the final Application for Payment and accompanying documentation, all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor’s other obligations under the Contract Documents have been fulfilled, Engineer will indicate in writing his/her recommendation of payment and present the Application to Owner for payment. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.09. Otherwise, Engineer will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are appropriate as to form and substance, and acceptable to Owner, Owner shall in accordance with the applicable Law, pay Contractor the amount recommended by Engineer.”

SC-14.07C Add “and approved by Owner” after “recommended by Engineer” in the second line.

SC-14.08A Delete paragraph 14.08.A in its entirety and replace with the following:

- A. “If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor’s final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. For the remaining balance to be held by Owner for Work not fully completed or corrected, if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted together with any extensions necessary for the bonding for the Work to be completed shall be submitted by Contractor to Engineer with the Application for such payment. Such payment

shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.”

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

SC-15.01A Add “each” after “90 consecutive days” in the second line.

SC-15.02A Add the following two Paragraphs 5 and 6 to 15.02A as follows:

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

6. Contractor is subject to a voluntary or involuntary bankruptcy filing.”

SC-15.02B In line two, add the words “or such other period as determined by Owner pursuant to exigent circumstances” after “seven days written notice.”

SC-15.02C Delete Paragraph SC-15.02C in its entirety and replace with the following Paragraph:

SC-15.02C “If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment except for Work completed as of the termination . If the unpaid balance of the Contract Price exceeds 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) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer and deducted from invoices outstanding. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.”

SC-15.02D Delete Paragraph SC-15.02D in its entirety and replace with the following Paragraph:

SC-15.02D “Notwithstanding Paragraphs 15.02.B and 15.02.C, unless otherwise directed by Owner in writing as part of the notice of termination, Contractor’s services will not be terminated if Contractor begins within the cure commencement period set forth in the notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within the cure period set forth in such notice.”

SC-15.03 Delete paragraph 15.03A in its entirety and replace with the following:

15.03A Owner May Terminate For Convenience

- A. Upon seven 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. pro-rated portion of reasonable expenses actually incurred by Contractor prior to the effective date of termination related to services, labor, materials, or equipment provided or performed and would have been paid as part of Contract pricing and allocated across terminated Work not performed;
3. all reasonable 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) incurred after Contractor has made best efforts to mitigate such costs in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
4. reasonable expenses directly caused by such termination and approved by Owner.

SC-15.04 Delete paragraph 15.04 in its entirety and replace with the following:

15.04 Contractor Nonpayment Right

- A. If, through no act or fault of Contractor, Owner fails to pay Contractor an undisputed invoice that has been approved by Engineer and Owner for 60 days after such approvals, then Contractor may, upon written notice to Owner and Engineer with a demand payment within seven (7) business days, and provided Owner does not make payment of such undisputed invoices within that seven (7) business day period after Owner's receipt of such notice, terminate the Contract and/or follow the dispute resolution process as set forth in Article 16 to recover from Owner payment on the same terms as provided in Paragraph 15.03.

ARTICLE 16 - DISPUTE RESOLUTION

SC-16.01 Delete paragraph 16.01 in its entirety and insert the following in its place:

- A. "The Parties shall attempt in good faith to resolve any dispute arising out of or relating to this Agreement promptly by negotiation between executives with authority to settle the dispute and who are at a higher level of management than the persons with direct responsibility for administration of this Agreement. Any party may give the other written notice of any dispute, which notice shall include a summary of that party's position and the name and title of the executive who will be representing that party. Within fifteen (15) days after delivery of the notice, the receiving party shall respond with a summary of that party's position and the name and title of the executive who will represent that party. Within thirty (30) days after the initial notice, the Parties' executives shall meet at a mutually acceptable time and place to attempt to resolve the dispute. All reasonable requests for information made by one party to the other in support of the negotiation will be honored, and all negotiations pursuant to this Article 16 shall be confidential and treated as compromise and settlement negotiations.
- B. If the dispute has not been resolved by negotiation within forty-five (45) days after the disputing party's notice, or if the Parties failed to meet within thirty (30) days, the Parties shall proceed to mediation under the then current CPR Mediation Procedure,

and, unless otherwise agreed, will select a mediator from the CPR Panels of Distinguished Neutrals.

- C. Any dispute arising out of or relating to this Agreement, including the breach, termination or validity thereof, that has not been resolved by a non-binding procedure as provided herein within ninety (90) days of the initiation of such procedure, shall be finally resolved by arbitration in accordance with the then current CPR Rules for Non-Administered Arbitration by a sole arbitrator, for disputes involving amounts in the aggregate under Three Million Dollars (\$3,000,000), or three arbitrators, for disputes involving amounts in the aggregate equal to or greater than Three Million Dollars (\$3,000,000), of whom each party shall designate one in accordance with the "screened" appointment procedure provided in CPR Rule 5.4, with the third arbitrator selected pursuant to CPR Rules 5 and 6. The arbitration shall be governed by the Federal Arbitration Act, 9 U.S.C. §§ 1-16, and judgment upon the award rendered by the arbitrator(s) may be entered by any court having jurisdiction thereof. Unless otherwise agreed to by the parties, the place of arbitration shall be at Owner's option, Hartford, Connecticut or Boston, Massachusetts.
- D. Any award or determination made by the arbitrator(s) shall be subject to the limitations of liability set forth in this Agreement. The arbitrator(s) are not empowered to award damages in excess of compensatory damages and each party expressly waives and foregoes any right to punitive, exemplary or similar damages unless a statute requires that compensatory damages be increased in a specified manner. Each Party shall be responsible for its own costs and expenses, including attorney's fees. Unless otherwise directed in writing by Owner and to the extent permitted by law, Contractor shall continue performance of the Work in compliance with the Agreement notwithstanding the existence of any Dispute between the Parties. Nothing herein shall prejudice, impair or otherwise prevent Owner from receiving equitable relief pending the conclusion of any mediation and/or arbitration proceeding.
- E. Each Party will proceed in good faith to conclude the arbitration proceeding as quickly as reasonably possible. If a party refuses to participate in an arbitration proceeding as required by this, Agreement, the other party may petition any governmental authority having proper jurisdiction for an order directing the refusing Party to participate in the arbitration proceeding. All costs and expenses incurred by the petitioning Party in enforcing such participation will be paid for by the refusing Party. The parties hereby consent to the exclusive jurisdiction of the courts of the State of Connecticut for enforcement of all arbitration procedures pursuant to this Article 16 and any other legal proceedings arising out of or relating to the Agreement and the transactions contemplated hereby."

ARTICLE 17 - MISCELLANEOUS

SC-17.06 Add the following new paragraphs immediately after paragraph 17.06:

17.07 US EPA Phase II Storm Water Program

Contractor shall comply with all applicable requirements of the US EPA Phase II Storm Water Program for Construction Activities Greater than 1 Acre.

17.08 Confidentiality:

- A. For purposes of this Agreement, “Confidential Information” shall include confidential and/or proprietary information of a party to this Agreement. Owner’s Confidential information includes written, oral, or electronic information and information containing personal information, proprietary information, business plans, marketing strategies, bidding activities, commercial, technical and performance information, contracts, financial Information, research documentation, information about any company or individual with whom Owner does business, information considered by Owner to be a trade secret and/or of a commercially valuable and sensitive nature or information that may otherwise be deemed confidential by law or regulatory agency or any other information that Owner designates as confidential and desires to protect against unrestricted disclosure or competitive use. The parties intend that the designation of Contractor's Information as Confidential Information shall be limited to non-public financial information and non-public information that has unique commercial value and was developed independently from the Work.
- B. Each party acknowledges that it may be necessary to disclose Confidential Information to the other party. Except to the extent set forth in this Article 17.08, or as otherwise agreed to in writing by the parties, each party shall maintain the Confidential Information of the other party in a secure and confidential manner. Each party shall exercise the same degree of care and security that it exercises with its own Confidential Information, and in no event less than a reasonable degree of care and security. Contractor agrees to use Owner’s Confidential Information solely for the provision of Work and to not disclose to third parties or to publish any of Owner’s Confidential Information without Owner’s advance written consent. However, if Owner, within one hundred eighty (180) days of receipt of Contractor's Confidential Information, disputes the proprietary nature of such Information by written notice to Contractor, the parties shall consult to resolve such dispute. Each party shall advise its employees, contractors, consultants, agents and those under its and/or their respective control of these requirements for confidentiality with regard to Confidential Information.
- C. Owner shall have the right, without Contractor's approval, to disclose Contractor's Confidential Information to the limited extent required (i) for financing, acquisition or conveyance of ownership share, licensing, construction, startup, commissioning operation, maintenance or repair of the facility at which the Work is performed, and (ii) to comply with any request or order of a governmental agency or court. Each party shall have the right to disclose the other party’s trade secret or other Confidential Information (a) to federal, state, or local government officials, to their attorneys, or in a sealed court document, for the purpose of reporting or investigating a suspected violation of the Defend Trade Secrets Act of 2016; or (b) to their attorneys or in a sealed court document in connection with a lawsuit for retaliation by an employer for reporting a suspected violation of the Defend Trade Secrets Act of 2016. If Owner discloses Contractor's Confidential Information to any governmental agency or court, Owner shall, to the extent it does not violate or fail to comply with any such request or order, advise Contractor prior to disclosure and, at Contractor's sole cost and expense, cooperate in any effort by Contractor to minimize the amount of Confidential Information disclosed, secure confidential treatment of such Confidential Information, or seek permission from such governmental agency or court to revise the Confidential Information in a manner consistent with Contractor's interests, the interests of Owner, and in a manner that meets the requirements of the governmental authority or court.
- D. Any Information transmitted to either party will not be deemed Confidential Information if that Information is: (a) in the receiving party's possession without restriction on disclosure

prior to disclosure hereunder; (b) at the time of disclosure, generally available to the public without restriction on disclosure; (c) after disclosure, generally available to the public without restriction on disclosure, by publication or otherwise, through no fault of the receiving party; or (d) after the time of disclosure, received from a third party who imposes no obligation of confidentiality and who, insofar as the receiving party can reasonably determine, did not acquire any such Confidential Information directly or indirectly from the other party subject to requirements of confidentiality.

- E. Contractor shall notify Owner as soon as possible in writing if any Confidential Information provided to Owner has been changed to a non proprietary status.
- F. The provisions of this Article 17.08 shall also apply to Information that a party identifies and establishes in writing to the others as having been obtained from third parties under agreements for confidentiality.
- G. Owner may demand the return and/or disposal of its Confidential Information at any time upon giving of written notice to Contractor. Within fifteen (15) days of receipt of such notice, Contractor shall return all of the original Confidential Information and shall dispose of all copies, reproductions or extracts (both written and electronic) in its possession and in the possession of any representatives to whom it was disclosed using methods authorized by the National Association for Information Destruction for the media on which the Confidential Information is stored. Except as may otherwise be agreed upon by the parties in writing, Contractor shall provide Owner with written certification of the return and/or disposal of such Confidential Information promptly following the return or disposal of such Confidential Information.
- H. In the event any Confidential Information of Owner is disclosed to Contractor by Owner under this Article 17.08, Contractor shall not make use of such Confidential Information, other than for Owner's sole benefit and for the sole purpose related to the Work for which the Confidential Information has been disclosed.
- I. The provisions of this Article shall survive the termination of the Agreement and shall bind the parties and their successors and assigns.

17.09 SUPPLIER DIVERSITY AND SUBCONTRACTING PLAN.

- A. Owner fully supports the government's policies of ensuring that Small Disadvantaged Businesses (SDB), Women-Owned Small Businesses (WOSB), Service-Disabled Veteran-Owned Small Businesses (SDVOSB), Veteran-Owned Small Businesses (VOSB) and Businesses Located in and qualified as Historically Underutilized Business Zones (HUBZone) have maximum practicable opportunity to compete for contracts and subcontracts. Owner affiliate Eversource Energy has and will continue to commit to filing annual subcontracting plans regarding the utilization of SDB, WOSB, SDVOSB, VOSB and HUBZone as contractors and subcontractors in accordance with Federal Acquisition Regulation (FAR) 52.219. For all Work awarded to Contractor as a subcontractor under Owner's government contracts pursuant to FAR 19.704, Subcontracting Plan Requirements, and FAR Clause 52.219-9, Small Business Subcontracting Plan, Contractor shall be required to submit data and/or subcontracting plans regarding Contractor's utilization and intended utilization of such SB, SDB, WOSB, SDVOSB, VOSB and HUBZone during the term of the Agreement for such work as follows:

Eversource Energy; Manager of Supplier Diversity Program; Procurement Department; P.O. Box 270; Hartford, CT 06141-0270

Contractor may be required to submit data and/or subcontracting plans upon request. Contractor shall supply requested documentation to Owner within a reasonable time after the request is made (but in no event more than fifteen (15) days after the request) and shall comply with such plan in performing the Work to the maximum practicable effort. The text of FAR 52.219 may be accessed electronically at the following address: <https://www.acquisition.gov/far/>. To the extent applicable to Work performed pursuant to a federal government Agreement, this Article 17.09 incorporates one or more clauses by reference, with the same force and effect as if they were given in full text.

17.10 . Call Before You Dig ("CBYD")/Dig Safe.

- A. Connecticut. In Connecticut, by Law, all Persons are required to call CBYD services three (3) Business Days before doing any excavation, digging holes or trenching, regardless of whether it is within the street line or on private property. Contractor will comply with Connecticut State Regulations Sections 16-345-1 to 16-345-9, inclusive, and shall obtain information regarding the existence of any underground facilities by calling:

Connecticut: 1-800-922-4455 (or any successor number)

Contractor shall promptly report all problems associated with the quality and timeliness of markouts ("locates") to Engineer for such Project. Contractor is responsible for locating any underground utilities before excavation, and if any underground utilities are damaged or discovered during construction, all activities shall stop and Engineer for such Project shall be notified. The Parties shall proceed in accordance with Paragraph 9.04 if such discovery results in a Change Order; otherwise, Contractor shall be responsible for noncompliance with this Paragraph 17.10 (including any delays in the applicable Work Schedule) and/or addressing the effects of all utilities shown on the Agreement Documents, irrespective of such markouts.

- B. Massachusetts. In Massachusetts, under Massachusetts Law (M.G.L. ch. 82 § 40, et seq.), any Person making an excavation in any public or private way, any company right-of-way or easement or any public or privately owned land or ways is required to pre-mark not more than 500 feet of the proposed excavation and notify the Massachusetts underground plant damage prevention system (Dig Safe) at least 72 hours (exclusive of Saturdays, Sundays and legal holiday) but not more than 30 days before the proposed excavation is to be made. Contractor shall fully comply with such law at all times and shall obtain information regarding the existence of any underground facilities by calling 1-800-DIG-SAFE (344-7233), or any successor number. Contractor shall also, as necessary or required, contact Massachusetts Highway Department and/or the local municipal road agent or public works department to obtain information regarding the location of any underground State or municipal facilities before excavation in any public highway or roadway right of way.
- C. New Hampshire. In New Hampshire, under New Hampshire Law (RSA) 374:48, et seq), any Person performing an excavation is required to notify the New Hampshire underground utility damage prevention system (Dig Safe) at least 72 hours before excavating on private property or in a public way, right of way, easement, public street or other public place. Contractor shall fully comply with such law at all times and shall obtain information regarding the existence of any underground facilities by calling 1-800-DIG SAFE (344-7233), or any successor number. Contractor shall also, as necessary or required, contact New Hampshire Department of Transportation and/or the local municipal road agent or public works department to obtain

information regarding the location of any underground state or municipal facilities before excavation in any public highway or roadway right of way.

- D. Quality Control. Contractor shall promptly report all problems associated with the quality and timeliness of markouts (“locates”) to the Engineer for such Project. Contractor is responsible for locating any underground utilities before excavation, and if any underground utilities are damaged or discovered during construction, all activities shall stop and Engineer for such Project shall be notified. The Parties shall proceed in accordance with Article 10 if such discovery results in a Change to the Work; otherwise, Contractor shall be responsible for noncompliance with this Paragraph 17.10 (including any delays in the applicable Work Schedule) and/or addressing the effects of all utilities shown on the Agreement Documents, irrespective of such locates.”

END OF SECTION

ATTACHMENTS TO SUPPLEMENTARY CONDITIONS

1. SCHEDULE 5.04 (C) 4A - CONSULTING ENGINEER

SCHEDULE 5.04 (C) 4A
CONSULTING ENGINEER

Tighe & Bond, Inc.
53 Southampton Road
Westfield, MA 01085

SCHEDULE 6.08 B.

PERMITS AND APPROVALS FOR THE PROJECT OBTAINED BY THE OWNER

1. CTDPH Water Company Land Permit Number, DWS Project CT 150011, Permit Number to follow.
2. Individual Permit for Dam Safety, DEEP Dam ID No., 13504.
3. Individual Section 401 Water Quality, Application Number 202308625.
4. US ACOE General Permit 2, OMB No. 0170-0003.

Note: Final permit determinations shall be appended to the Project Manual.

DOCUMENT 00852

SPECIAL CONDITIONS
GENERAL

1.01 STATUTORY REQUIREMENTS IN GENERAL

- A. Keep fully informed of all existing and future State and Federal Laws and municipal ordinances and regulations in any manner affecting those engaged or employed in the Work, or the materials used or employed in the Work, or in any way affecting the conduct of the Work, and of all such orders and decrees of bodies or tribunals having any jurisdiction or authority over the same and of all provisions required by law to be made a part of this Contract, all of which provisions are hereby incorporated by reference and made a part thereof. If any discrepancy or inconsistency is discovered in the Contract Documents for this Work in relation to any such law, ordinance, regulation, order or decree, report the same to the Engineer in writing. At all times observe and comply with, and cause all agents and employees to observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees; and protect and indemnify the Owner and Engineer and all of its and their officers, agents, and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order or decree, whether by itself or its employees or subcontractors.
- B. All materials furnished and Work done shall comply with all State and Federal laws and regulations.

1.02 POLICE OFFICERS

- A. Any police officers, reserve, special or otherwise, employed by the Contractor, shall be paid the prevailing wage rates paid to regular police officers of the municipality in which the Work is to be performed.

1.03 RELATION OF WATER LINES AND SEWER MAINS

- A. Horizontal Separation
 - 1. Whenever possible, sewers and water mains should be laid such that they are at least 10 feet, horizontally, from each other, whether existing or proposed.
 - 2. Should local conditions prevent a lateral separation of 10 feet, they may be laid closer than 10 feet apart if:
 - a. the water and sewer mains are laid in separate trenches;
 - b. or if laid in the same trench, the water main is located at one side on a bench of undisturbed earth.
 - c. In either case the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
- B. Vertical Separation
 - 1. Whenever possible, when sewer and water mains cross, the water main should be at such elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the above requirement cannot be met, the mains shall be installed such that there are no pipe joints for a distance of 10 feet on each side of the crossing.
 - 2. When it is required that the water main cross below the sewer main, the following measures shall be taken:
 - a. the water main should be at such elevation that the top of the water main is at least 18 inches below the bottom of the sewer main and
 - b. the mains shall be installed such that there are no pipe joints for a distance of 10 feet on each side of the crossing.

C. Special Conditions

1. When it is not possible to obtain proper horizontal and vertical separation as stipulated above, installation of the mains shall be as described in the State of Connecticut Public Utilities Regulatory Authority Regulations, DPUC 16-262m-8(i)(16-19), in so far as they apply.

1.04 ACCOUNTING RECORDS AND INVOICE DOCUMENTATION

- A. With each Application for Payment or Invoice submitted to the Owner, the Contractor shall submit documentation supporting the quantities and costs that are for all materials, equipment, and labor entering into the Work. For water main extension, replacement and relocation projects, supporting documentation shall also include a copy of the inspection report signed by the Construction Inspector and the Contractor. Furthermore, the Contractor shall keep such full and detailed accounts as may be necessary for proper financial management under this Agreement, and the accounting methods shall be satisfactory to Owner. Owner shall be afforded access to all Contractor's 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.

1.05 MISCELLANEOUS

- A. Assignment of Contract. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are 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 Documents.
- B. Successors and Assigns. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.
- C. Severability. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall 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.
- D. Other Provisions. Contractors and all Subcontractors shall conform to the requirements set under the Owner's Guidelines for Contractors included in these Contract Documents.

1.06 GUIDELINES FOR CONTRACTORS ENGAGED BY AQUARION WATER COMPANY

- A. Notification to Contractor: As an Aquarion Water Company ("AWC" or the "Company") Contractor, you may have the opportunity to hire and/or employ workers who will be performing services on behalf of AWC. To the extent that you provide employees to AWC or sub-contract AWC work to others, you are responsible for complying with the guidelines as set forth below and submit to AWC a completed AGREEMENT AND ACKNOWLEDGEMENT form contained herein. Each employee or sub-contractor you engage must be trained in and adhere to these guidelines. Failure to abide by these guidelines may result in the immediate termination of your work as an AWC contractor.

B. Definitions:

Service Contractor – A Contractor or Sub-contractor who performs services on behalf of Aquarion Water Company on a customer's service line and interacts directly with customers. A Service Contractor is typically hired through Aquarion's Utility Operations Department to install meters, make repairs to curb stops, valves, meters, pipes on service lines, conduct service shutoffs, and assist in collections.

Facilities Contractor – A Contractor or Sub-contractor under contract with Aquarion Water Company to construct or make improvements to Aquarion's Distribution System, Treatment Facilities, Pump Stations, Wellfields, Storage Tanks, and other structures or properties.

- C. Due to the nature of their work and interaction with customers, Service Contractors are required to adhere to each of the guidelines as described herein. Portions of these guidelines do not pertain to Facilities Contractors and are noted as a "Service Contractor Requirement Only."
- D. Background Checks: Aquarion Water Company (AWC) Service Contractors are required to perform background checks on any of their own or subcontractors' employees who may perform work within the home of an AWC customer. AWC reserves the right to require background checks on any Facilities Contractor employees. All such employees/sub-contractors must consent to such background checks, which will include but not be limited to checks for any criminal convictions, by completing the attached forms:
1. AGREEMENT AND ACKNOWLEDGEMENT,
 2. BACKGROUND INFORMATION FORM FOR BACKGROUND CHECK,
 3. DISCLOSURE REGARDING BACKGROUND INVESTIGATION, and
 4. ACKNOWLEDGEMENT AND AUTHORIZATION FOR BACKGROUND CHECK

AWC's Human Resources staff may assist in obtaining the background check for administrative purposes, in which case the Contractor shall reimburse AWC for performing this service. Contractors agree to refrain from deploying employees/sub-contractors to perform work in the home of any AWC customer unless and until such employees/sub-contractors have been cleared and approved by AWC's Human Resources Department after the completion of an appropriate background investigation.

- E. Equal Opportunity Employer: Aquarion Water Company is an Equal Opportunity Employer. AWC requires that all contractors comply with all Federal and State laws and such contractors must not discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation or physical disability, including, but not limited to, blindness, unless, even with a reasonable accommodation, such disability prevents performance of the essential job functions. The contractor further agrees to take affirmative action to insure that applicants with job-related qualifications are employed and that employees are treated when employed without regard to their race, color, religious creed, age, marital status, national origin, ancestry, sex, mental retardation, or physical disability.

In addition, AWC contractors agree that all employees/sub-contractors who perform services on behalf of AWC shall have provided contractor with proof of their eligibility to work in the United States in accordance with the documentation requirements of the I-9 Form.

Signing the attached AGREEMENT AND ACKNOWLEDGEMENT form contained herein does not constitute any guarantee, promise or contract that AWC will engage the Contractor for any specific period of time or for any specific project. Unless otherwise specified in the Contract Documents, AWC shall have the right to terminate its working relationship with any contractor, or with any employee/sub-contractor of any contractor, at any time, with or without cause or advance notice.

- F. Purpose of Guidelines: The purpose of these Guidelines for Contractors is to provide you with AWC's expectations and requirements with respect to the issues described herein. Our customers' impressions and attitude regarding AWC is influenced greatly by their interactions with AWC representatives, including contractors, as well as the appearance of AWC representatives, and the manner in which AWC vehicles are operated on public streets and highways. To that end, we insist that you keep in mind the following expectations for basic courtesy when you are working on behalf of AWC (Service Contractor Requirement Only):
1. Identify yourself as a contractor working for AWC;
 2. Show your identification badge provided to you by AWC (see below);
 3. Verify with the customer that you have a scheduled appointment and explain the reason for your visit (work to be performed);
 4. Invite the customer to confirm your appointment or work order by contacting AWC's Customer Service Department at (203) 445-7310 (toll-free at 800-732-9678);
 5. Answer any questions the customer may have, or if you are unable to do so, direct the customer to an appropriate customer service representative at AWC as outlined below;
 6. Be courteous to the customer; for instance, offer to leave muddy boots at the door or ask for a path of plastic bags or newspapers to protect rugs and floors.

- G. Company Identification Cards - (Service Contractor Requirement Only): All contractors must arrange for their employees/sub-contractors to obtain and carry AWC contractor identification cards ("ID cards") by contacting AWC's Human Resources Department at (203) 337-5991. These ID cards should be carried at all times while the employee/sub-contractor is performing work on behalf of AWC. ID cards are not transferable, and lost cards should be reported to the Human Resources Department as soon as possible. When an employee/sub-contractor

terminates service with the contractor for any reason, the ID card must be returned to AWC's Human Resources Department. Similarly, if the contractor ceases working for AWC for any reason, then all AWC ID cards must be returned to AWC's Human Resources Department. In addition, if an employee/sub-contractor's appearance changes in any significant manner (e.g., beard, glasses, etc.), it is the responsibility of the contractor to have that employee/sub-contractor's ID card updated.

- H. Guidelines for Appropriate Conduct: Contractor's employees/sub-contractors must conform their behavior to AWC's standards and expectations. The following is a list of prohibited conduct that will result in the immediate dismissal of an employee/sub-contractor from performing work for AWC and may be grounds for terminating the contractor's entire relationship with AWC. This is a list of sample behaviors and is not an all-inclusive list. AWC reserves the right to terminate its relationship with any contractor, or any employee/sub-contractor of any contractor, at any time, with or without cause or notice. Prohibited includes, but is not limited to:
1. Violation of any Company rule or policy contained in these Guidelines or any action that is detrimental to the Company's operations or reputation.
 2. Violation of security or OSHA safety rules, failure to observe OSHA safety rules, failure to wear required safety equipment or tampering with Company equipment or safety equipment.
 3. Negligence or any careless action that endangers the life or safety of another person.
 4. Being intoxicated or under the influence of controlled substance drugs on Company premises or while on Company business, or use, possession or sale of controlled substance drugs while on Company premises or on Company business, except medications prescribed by a physician which do not impair work performance.
 5. Unauthorized possession of dangerous or illegal firearms, weapons, or explosives on Company property or while on Company business.
 6. Engaging in criminal conduct or acts of violence, or making threats of violence toward anyone on Company premises or while on Company business.
 7. Fighting, horseplay, or provoking a fight on Company premises or while on Company business.
 8. Causing damage or destruction to property on Company premises or while on Company business.
 9. Using obscene or abusive language toward any customer, employee or representative of the Company.
 10. Soliciting donations, selling merchandise or collecting funds for any kind for charities or other organizations without authorization during business hours, or at a time or place that interferes with the work of another employee on Company premises.
 11. Violation of the Company's sexual harassment policy.
 12. Falsification or misrepresentation of information on Company records.
- I. Motor Vehicle Licenses and Placards – (Service Contractor Requirement Only): Individuals whose jobs require them to operate a motor vehicle must hold and maintain a valid driver's license. If the employee's/sub-contractor's driver's license expires or is suspended for any reason, you must notify AWC immediately. The operation of any motor vehicle while performing services on behalf of AWC without a valid driver's license will be grounds for termination of the contractor's relationship with AWC. In addition, to the extent a contractor utilizes any motor vehicles while performing services on behalf of AWC, such vehicles must display a placard approved by AWC indicating that the contractor is performing services on behalf of AWC. Contractor must at all times while performing services on behalf of AWC maintain adequate liability insurance on all such vehicles.
- J. Customer Inquiries & AWC's Escalation Procedure: Contractors who perform work for AWC must use their best efforts to satisfy AWC's customer's inquiries, concerns or complaints. If it is not possible for the employee/sub-contractor to satisfy the customer at the initial point of contact, then the employee/sub-contractor shall direct the customer to contact AWC Customer Service at (203) 445-7310 or (800) 732-9678.
- K. Safety Policy: All contractors and their employees/sub-contractors are required to obey all OSHA safety rules and to exercise caution in all work activities. Contractors, sub-contractors, or their employees shall immediately inform the AWC Project Manager of any current or potential safety violations as well as any inspections by OSHA or other safety regulators. Anyone who violates safety standards or causes hazardous or dangerous situations may be subject to immediate termination of his/her working relationship, or contractor status, with AWC. All contractors must maintain the appropriate level of workers' compensation insurance coverage to comply with state law. The Contractor shall complete the attached Contractor Safety Data form beginning with the quarter in which the contract documents are finalized and should be submitted once per quarter until final completion.

L. Sexual Harassment:

1. **Statement of Policy:** Title VII of the Civil Rights Act of 1964 prohibits sexual harassment. At AWC, we expect employees and our contractors and their employees to be considerate of those around them and treat others with respect and dignity. Sexual harassment detracts from these goals, damages morale, and lowers productivity. Sexual harassment by anyone, whether verbal, physical, environmental or otherwise, is unacceptable, illegal, and will not be tolerated. This policy applies to all contractors' employees/sub-contractors, regardless of the sex of the alleged harasser or the sex of the victim.
2. **Prohibition Against Sexual Harassment:** AWC prohibits sexual harassment of its customers, employees and/or its contractors. Sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature when (1) submission to such conduct is made explicitly or implicitly a term or condition of an individual's employment, (2) submission to or rejection of such conduct by an individual is used as a basis for employment decisions affecting such individual, or (3) such conduct has the purpose or effect of unreasonably interfering with an individual's work performance or creating an intimidating, hostile, or offensive working environment. Sexual harassment is a form of sexual discrimination, and neither sexual harassment nor discrimination will be tolerated.
3. **Examples of conduct prohibited as sexual harassment and/or discrimination include, but are not limited to:**
 - a. Demanding sexual favors in exchange for favorable reviews, assignments, promotions, continued employment or promises of the same;
 - b. Continued or repeated sexual jokes, language, epithets, flirtations, advances or propositions;
 - c. Verbal abuse of a sexual nature;
 - d. Graphic verbal commentary about an individual's body, sexual prowess, or sexual deficiencies;
 - e. Sexually degrading or vulgar words to describe an individual;
 - f. Leering, whistling, touching, pinching, brushing the body, assault, coerced sexual acts, or obscene comments or gestures;
 - g. The display in the workplace of sexually suggestive objects, pictures, posters, or cartoons;
 - h. Name calling, relating stories, gossip, comments, or jokes that may be derogatory toward a particular sex;
 - i. The display of sexually suggestive graffiti;
 - j. Retaliation against employees complaining about such behaviors;
 - k. Asking questions about sexual conduct or sexual orientation or preferences; or
 - l. Harassment consistently targeted at one sex, even if the content of the verbal abuse is not sexual.

- M. Complaint Procedure - (Service Contractor Requirement Only): If you experience or witness any harassment or believe you have been treated in an unlawful, discriminatory manner, promptly report the incident to the Director of Human Resources at AWC, or if you are uncomfortable going to the Director of Human Resources, then report it to any AWC Department Manager or any Officer of the Company, who will initiate an appropriate investigation and take appropriate action. Your complaint will be kept confidential to the extent possible. AWC prohibits retaliation against any individual who, acting in good faith, complains of harassment/discrimination, or who participates in any investigation of such allegations.

If the Company determines that improper harassment or discrimination has occurred, then AWC will initiate prompt and effective action to redress the situation. Such prompt and effective action may include the termination of an individual's work on behalf of AWC or the termination of a contractor's working relationship with AWC.

- N. Substance Abuse: The Company has a strong commitment to promoting high standards of job performance and job safety for its employees and its contractors' employees. The use of alcohol or illegal drugs during working hours is inconsistent with those standards and inappropriate for any employee or sub-contractor. The Company regards violation of this policy to be very serious and will enforce disciplinary action that may include the termination of an individual's work on behalf of AWC or the termination of a contractor's working relationship with AWC.

The consumption of alcohol while on Company property and/or during working hours similarly is forbidden. (Company property is defined as land, buildings, garages, pump stations, and vehicles owned, rented, leased or maintained by the Company.) In addition, the possession, sale or use of illegal drugs constitutes a violation of the law and will not be tolerated.

No contractor's employee/sub-contractor shall report to work, or return to work, under the influence of alcohol and/or illegal drugs. Anyone who appears to be in an unfit condition will not be allowed to work for AWC and may be required to undergo a physical examination and drug screening.

It is the responsibility of all employees and contractors to enforce AWC's substance abuse policy for the protection of each and every person performing services on behalf of the Company. Substance abuse - whether it be alcohol or drugs - can affect not only the abuser's health and job performance, but also the safety and job performance of others.

- O. No Smoking Policy: *Effective September 1, 2012 Aquarion Water Company shall be an entirely smoke-free environment.* This policy covers the smoking of any tobacco product and applies to employees, contractors, consultants and visitors. All facilities and grounds owned or operated by Aquarion Water Company and all company-owned vehicles are designated as tobacco-free areas. The use of tobacco is prohibited on company property at all times, including entryways to our buildings, parking lots and the vehicles parked in these areas. There will be no designated smoking areas since no level of tobacco is considered to be safe.

Contractors shall communicate and enforce this policy among their own staff and any subcontracted personnel working on Aquarion projects. In addition, Contractors shall make provisions (provide receptacles) so that the public right-of-way and/or street adjacent to Aquarion property is not used for the disposal of tobacco products.

- P. Uniforms - (Service Contractor Requirement Only): Uniform shirts with Aquarion's logo on them will be issued to employees of contractors in order to provide a distinctive method of identifying persons working on behalf of AWC. Anyone issued a uniform shirt is required to wear it while performing services on behalf of AWC, but such shirts should not be worn at any other time.

Contractor's employees are responsible for maintaining their uniform shirts in presentable condition. This includes laundering and making minor repairs when necessary. Uniform shirts are not to be monogrammed or labeled except for the Company logo.

Uniform shirts that have worn out are not to be discarded, but must be returned to the Company for disposal. A uniform shirt will not be replaced unless it is turned in and a Company representative has determined it needs replacement.

When a contractor's employee is wearing a uniform shirt, he or she is representing AWC. Accordingly, the Company insists that all such contractors' employees report to work in a presentable manner and in appropriate clothing.

- Q. Delineation of Work Areas: Beginning on the day that the contractor mobilizes until AWC accepts the Certificate of Final Payment and Completion of Work, the contractor shall clearly delineate construction work areas. Should the project be confined to specific rooms inside a facility, the contractor shall post warning signs at every entrance to the work area(s) alerting personnel that they are entering a construction area and that appropriate personal protective equipment (PPE) is required. For site projects, similar signage should be posted on site, alerting personnel that appropriate PPE is required and to sign in at the construction trailer. PPE includes but is not limited to a hard hat, safety glasses, and highly visible vest, shirt or coat.

AGREEMENT AND ACKNOWLEDGEMENT

I have received a copy of the Aquarion Water Company (AWC) GUIDELINES FOR CONTRACTORS ENGAGED BY AQUARION WATER COMPANY set forth above and have read it carefully and completely. I understand that these Guidelines were designed to acquaint me with certain policies and procedures, and I understand these policies and procedures. I understand that any provision of these Guidelines may be amended, eliminated or revised at any time by AWC for any reason and without notice. I understand that nothing in these Guidelines in any way creates an express or implied contract of employment between AWC and me, or may be construed to require that AWC engage me as a contractor or sub-contractor for any express period of time or for any specific project.

I acknowledge that unless otherwise specified in the Contract Documents, AWC may terminate the contractor relationship at any time, with or without cause, and with or without advance notice. No representative of AWC, other than its President, has any authority to enter into any agreement with a contractor, contractor's employee or potential employee, or sub-contractor for any specified time or to make any agreement contradicting or contrary to the provisions set forth in these Guidelines.

I understand and agree that it is my responsibility to read and comply with the policies contained in these Guidelines and any revision made to them. I also acknowledge and agree to the Indemnification Provision set forth above in these Guidelines.

Name (please print):	
Signature:	
Contractor:	
Type of Contractor:	Service Contractor or Facilities Contractor (circle one)
Date:	



8850 Tyler Blvd., Mentor, OH 44060 Phone 800-991-9694 Fax (440) 205-8355
 Visit our website at: www.backtracker.com or email us at: btsearches@backtracker.com

BACKGROUND INFORMATION FORM FOR BACKGROUND CHECK (Ver. 1.17)

BackTrack, Inc. is an employment screening company that conducts background checks on prospective employees/employees for our clients as part of their standard hiring procedure. In order to perform this check, we need you to provide the following information. Please be sure to fill out this form completely and legibly.

APPLICANT INFORMATION (please print clearly & accurately)					
Position Applying For:			Expected Salary:		
Last Name		First Name		Middle Name	
Maiden Name		Any Other Name(s) Used		Phone ()	
Home Address			E-Mail Address		
City	State	Zip	County	From Mth/Yr	To Mth/Yr
Social Security Number *		Date of Birth *		Military Branch of Service	
*For background screening purposes only					
Driver's License Number			State License was Issued		
High School		City/State Location		Year Graduated	
Full Name Diploma Issued Under					
If GED received, in what State		City/State Location		Date Received	
Name Used for GED					
College		City/State Location		Year Graduated	
Degree Rec'd: <input type="checkbox"/> Associate <input type="checkbox"/> Bachelor <input type="checkbox"/> Master <input type="checkbox"/> Other _____ Student ID Number: _____ Full Name Used _____					
List Previous Addresses (to cover last 7 years)					
Address		City/State		Zip	
County		From Mth/Yr		To Mth/Yr	
Address		City/State		Zip	
County		From Mth/Yr		To Mth/Yr	

NOTE: The absence of any of the above information could result in a delay in processing your background. If necessary, a representative from BackTrack, Inc. will contact you for additional information in order to expedite the background process. Thank you for your assistance.

---FOR CLIENT USE ONLY - DO NOT WRITE BELOW THIS LINE---

CLIENT INFORMATION	SERVICES REQUESTED <input type="checkbox"/> RUSH ORDER (\$27 extra charge)
Name: Marcy Spieler	PACKAGE: <input type="checkbox"/> Level I (employment, education, criminal search, credit or SSN search, driving) <input type="checkbox"/> Level II (employment, criminal search, credit or SSN search, driving) <input type="checkbox"/> Level III (employment, education, criminal search) <input type="checkbox"/> Level IV (employment, criminal search, credit or SSN search) <input type="checkbox"/> Level V (criminal and SSN search) <input type="checkbox"/> Level VI (employment, education, criminal search, credit or SSN search) (Above packages check here for 5 year emp. history <input type="checkbox"/> Check here for only 3 year <input type="checkbox"/>)
Title: HR Generalist/Safety Specialist	
E-Mail Address: mspieler@aquarionwater.com	
Company Name: Aquarion	
Address: 600 Lindley Street	
City/State/Zip: Bridgeport, CT 06606	
If Applicable, Division or Code #:	<input type="checkbox"/> Criminal History (county) <input type="checkbox"/> Federal District Search <input type="checkbox"/> Civil Litigation <input type="checkbox"/> Statewide Search (where available) <input type="checkbox"/> CrimeTrack (Criminal Database and National Sex Offender Search) <input type="checkbox"/> GlobalTrack (Patriot Act Search)
Phone Number: 203-337-5974	<input type="checkbox"/> Credit Report
Fax Number: 203-330-4662	<input type="checkbox"/> Employment History <input type="checkbox"/> Education <input type="checkbox"/> Driving Record <input type="checkbox"/> SSN Search <input type="checkbox"/> Military <input type="checkbox"/> Credential <input type="checkbox"/> Bus/Personal Ref.

YOU MUST COMPLETE AND RETURN THE BACKGROUND INFORMATION FORM, THE DISCLOSURE FORMS AND THE AUTHORIZATION FORM FOR A BACKGROUND CHECK



8850 Tyler Blvd., Mentor, OH 44060 Phone 800-991-9694 Fax (440) 205-8355
Visit our website at: www.backtracker.com or email us at: btsearches@backtracker.com

DISCLOSURE REGARDING BACKGROUND INVESTIGATION (Ver. 1.17)

The Company may obtain information about you from a consumer reporting agency for employment purposes. Thus, you may be the subject of a “consumer report” and/or an “investigative consumer report” which may include information about your character, general reputation, personal characteristics, and/or mode of living, and which can involve personal interviews with sources such as your neighbors, friends or associates. These reports may contain information regarding your criminal history, credit history, motor vehicle records (“driving records”), verification of your education or employment history or other background checks.

Signature _____ Date _____

Printed Name _____ Company Applying To _____



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RIGHT TO OBTAIN MORE INFORMATION REGARDING
INVESTIGATIVE CONSUMER REPORTS (Ver. 1.17)

You have the right to request disclosure of the nature and scope of any investigative consumer report ordered by the Company. You may either contact the Company for this information or the agency preparing the report, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, 800-991-9694. Please be advised that the nature and scope of the most common form of investigative consumer report obtained by the Company is an investigation into your employment history. You should carefully consider whether to exercise your right to request disclosure of the nature and scope of any investigative consumer report.

Signature _____ Date _____

Printed Name _____ Company Applying To _____



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Visit our website at: www.backtracker.com or email us at: btsearches@backtracker.com

ACKNOWLEDGMENT AND AUTHORIZATION REGARDING BACKGROUND CHECK (Ver. 1.17)

I acknowledge receipt of the following documents: DISCLOSURE REGARDING BACKGROUND INVESTIGATION, A SUMMARY OF YOUR RIGHTS UNDER THE FAIR CREDIT REPORTING ACT, ADDITIONAL STATE LAW NOTICES, and RIGHT TO OBTAIN MORE INFORMATION REGARDING INVESTIGATIVE CONSUMER REPORTS. I certify that I have read and understand those documents. I hereby authorize the obtaining of "consumer reports" and/or "investigative consumer reports" about me by the Company at any time during the hiring process and throughout my employment, if applicable. To this end, I hereby authorize, without reservation, any law enforcement agency, administrator, state or federal agency, institution, school or university (public or private), information service bureau, employer, or insurance company to furnish any and all background information requested by BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694, another outside organization and/or Company itself. I agree that a facsimile ("fax"), electronic or photographic copy of this Authorization shall be as valid as the original.

Oklahoma applicants and employees only: Please check this box if you would like to receive a copy of a consumer report if one is obtained by the Company.

Minnesota applicants and employees only: Please check this box if you would like to receive a copy of a consumer report if one is obtained by the Company.

California applicants and employees only: By signing below, you also acknowledge receipt of the NOTICE REGARDING BACKGROUND INVESTIGATION PURSUANT TO CALIFORNIA LAW. Please check this box if you would like to receive a copy of an investigative consumer report or consumer credit report at no charge if one is obtained by the Company whenever you have a right to receive such a copy under California law.

Signature _____ Date _____

Printed Name _____ Company Applying To _____



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Visit our website at: www.backtracker.com or email us at: btsearches@backtracker.com

ADDITIONAL STATE LAW NOTICES (Ver. 1.17)

If you live in, work in, or are seeking work with the Company in Massachusetts, Minnesota, New Jersey, New York, or Washington State, please note:

MASSACHUSETTS APPLICANTS/EMPLOYEES: You have the right to inspect and promptly receive a copy of any investigative consumer report requested by the Company by contacting the consumer reporting agency, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694.

MINNESOTA APPLICANTS/EMPLOYEES: You have the right, upon written request, to receive a complete and accurate disclosure of the nature and scope of any consumer report by contacting the consumer reporting agency, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694. The consumer reporting agency must make this disclosure within five days of receipt of your request or of Company's request for the report, whichever is later.

NEW JERSEY APPLICANTS/EMPLOYEES: You have the right to inspect and promptly receive a copy of any investigative consumer report requested by the Company by contacting the consumer reporting agency, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694.

NEW YORK APPLICANTS/EMPLOYEES: You have the right, upon request, to be informed of whether or not a consumer report was requested from a consumer reporting agency by contacting the consumer reporting agency, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694. If a consumer report is requested, you will be provided with the name and address of the consumer reporting agency furnishing the report. You may inspect and receive a copy of the report by BackTrack, Inc. with the contact information above.

WASHINGTON STATE APPLICANTS/EMPLOYEES: If the Company requests an investigative consumer report from a consumer reporting agency, you have the right to receive a complete and accurate disclosure of the nature and scope of the investigation requested by Company. You also have the right to request from the consumer reporting agency, BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694, a written summary of your rights and remedies under the Washington Fair Credit Reporting Act.

NOTICE REGARDING BACKGROUND INVESTIGATION
PURSUANT TO CALIFORNIA LAW (Ver. 1.17)

The Company intends to obtain information about you from an investigative consumer reporting agency and/or a consumer credit reporting agency for employment purposes. Thus, you can expect to be the subject of "investigative consumer reports" and "consumer credit reports" obtained for employment purposes. Such reports may include information about your character, general reputation, personal characteristics and mode of living. With respect to any investigative consumer report from an investigative consumer reporting agency ("ICRA"), the Company may investigate the information contained in your employment application and other background information about you, including but not limited to obtaining a criminal record report, verifying references, work history, your educational achievements, licensure, and certifications, your driving record, and other information about you, and interviewing people who are knowledgeable about you. The results of these reports may be used as a factor in making employment decisions. The source of any investigative consumer report or consumer credit report (as those terms are defined under California law) will be BackTrack, Inc., 8850 Tyler Blvd., Mentor, OH 44060, (800) 991-9694. Its privacy policy may be found at <http://backtracker.com/privacy-policy>.

The Company agrees to provide you with a copy of an investigative consumer report when required to do so under California law.

Under California Civil Code section 1786.22, you are entitled to find out from an ICRA what is in the ICRA's file on you with proper identification, as follows:

In person, by visual inspection of your file during normal business hours and on reasonable notice. You also may request a copy of the information in person. The ICRA may not charge you more than the actual copying costs for providing you with a copy of your file.

A summary of all information contained in the ICRA's file on you that is required to be provided by the California Civil Code will be provided to you via telephone, if you have made a written request, with proper identification, for telephone disclosure, and the toll charge, if any, for the telephone call is prepaid by or charged directly to you.

By requesting a copy be sent to a specified addressee by certified mail. ICRA's complying with requests for certified mailings shall not be liable for disclosures to third parties caused by mishandling of mail after such mailings leave the ICRA's.

"Proper Identification" includes documents such as a valid driver's license, social security account number, military identification card, and credit cards. Only if you cannot identify yourself with such information may the ICRA require additional information concerning your employment and personal or family history in order to verify your identity.

The ICRA will provide trained personnel to explain any information furnished to you and will provide a written explanation of any coded information contained in files maintained on you. This written explanation will be provided whenever a file is provided to you for visual inspection.

You may be accompanied by one other person of your choosing, who must furnish reasonable identification. An ICRA may require you to furnish a written statement granting permission to the ICRA to discuss your file in such person's presence.

Para información en español, visite www.consumerfinance.gov/learnmore o escribe a la Consumer Financial Protection Bureau, 1700 G Street N.W., Washington, DC 20552.

A Summary of Your Rights Under the Fair Credit Reporting Act

The federal Fair Credit Reporting Act (FCRA) promotes the accuracy, fairness, and privacy of information in the files of consumer reporting agencies. There are many types of consumer reporting agencies, including credit bureaus and specialty agencies (such as agencies that sell information about check writing histories, medical records, and rental history records). Here is a summary of your major rights under the FCRA. **For more information, including information about additional rights, go to www.consumerfinance.gov/learnmore or write to: Consumer Financial Protection Bureau, 1700 G Street, N.W., Washington, DC 20552.**

You must be told if information in your file has been used against you. Anyone who uses a credit report or another type of consumer report to deny your application for credit, insurance, or employment - or to take another adverse action against you - must tell you, and must give you the name, address, and phone number of the agency that provided the information.

You have the right to know what is in your file. You may request and obtain all the information about you in the files of a consumer reporting agency (your "file disclosure"). You will be required to provide proper identification, which may include your Social Security number. In many cases, the disclosure will be free. You are entitled to a free file disclosure if:

- a person has taken adverse action against you because of information in your credit report;
- you are the victim of identify theft and place a fraud alert in your file;
- your file contains inaccurate information as a result of fraud;
- you are on public assistance;
- you are unemployed but expect to apply for employment within 60 days.

In addition, all consumers are entitled to one free disclosure every 12 months upon request from each nationwide credit bureau and from nationwide specialty consumer reporting agencies. See www.consumerfinance.gov/learnmore for additional information.

You have the right to ask for a credit score. Credit scores are numerical summaries of your credit-worthiness based on information from credit bureaus. You may request a credit score from consumer reporting agencies that create scores or distribute scores used in residential real property loans, but you will have to pay for it. In some mortgage transactions, you will receive credit score information for free from the mortgage lender.

You have the right to dispute incomplete or inaccurate information. If you identify information in your file that is incomplete or inaccurate, and report it to the consumer reporting agency, the agency must investigate unless your dispute is frivolous. See www.consumerfinance.gov/learnmore for an explanation of dispute procedures.

Consumer reporting agencies must correct or delete inaccurate, incomplete, or unverifiable information. Inaccurate, incomplete or unverifiable information must be removed or corrected, usually within 30 days. However, a consumer reporting agency may continue to report information it has verified as accurate.

Consumer reporting agencies may not report outdated negative information. In most cases, a consumer reporting agency may not report negative information that is more than seven years old, or bankruptcies that are more than 10 years old.

Access to your file is limited. A consumer reporting agency may provide information about you only to people with a valid need -- usually to consider an application with a creditor, insurer, employer, landlord, or other business. The FCRA specifies those with a valid need for access.

You must give your consent for reports to be provided to employers. A consumer reporting agency may not give out information about you to your employer, or a potential employer, without your written consent given to the employer. Written consent generally is not required in the trucking industry. For more information, go to www.consumerfinance.gov/learnmore.

You may limit "prescreened" offers of credit and insurance you get based on information in your credit report. Unsolicited "prescreened" offers for credit and insurance must include a toll-free phone number you can call if you choose to remove your name and address from the lists these offers are based on. You may opt-out with the nationwide credit bureaus at 888-5-OPT-OUT (888-567-8688).

You may seek damages from violators. If a consumer reporting agency, or, in some cases, a user of consumer reports or a furnisher of information to a consumer reporting agency violates the FCRA, you may be able to sue in state or federal court.

Identity theft victims and active duty military personnel have additional rights. For more information, visit www.consumerfinance.gov/learnmore.

States may enforce the FCRA, and many states have their own consumer reporting laws. In some cases, you may have more rights under state law. For more information, contact your state or local consumer protection agency or your state Attorney General. For information about your federal rights, contact:

TYPE OF BUSINESS:	CONTACT:
<p>1.a. Banks, savings associations, and credit unions with total assets of over \$10 billion and their affiliates.</p> <p>b. Such affiliates that are not banks, savings associations, or credit unions also should list, in addition to the Bureau:</p>	<p>a. Bureau of Consumer Financial Protection 1700 G Street NW Washington, DC 20552</p> <p>b. Federal Trade Commission: Consumer Response Center – FCRA Washington, DC 20580 (877) 382-4357</p>
<p>2. To the extent not included in item 1 above:</p> <p>a. National banks, federal savings associations, and federal branches and federal agencies of foreign banks</p> <p>b. State member banks, branches and agencies of foreign banks (other than federal branches, federal agencies, and insured state branches of foreign banks), commercial lending companies owned or controlled by foreign banks, and organizations operating under section 25 or 25A of the Federal Reserve Act</p> <p>c. Nonmember Insured Banks, Insured State Branches of Foreign Banks, and insured state savings associations</p> <p>d. Federal Credit Unions</p>	<p>a. Office of the Comptroller of the Currency Customer Assistance Group 1301 McKinney Street, Suite 3450 Houston, TX 77010-9050</p> <p>b. Federal Reserve Consumer Help Center PO Box 1200 Minneapolis, MN 55480</p> <p>c. FDIC Consumer Response Center 1100 Walnut Street, Box #11 Kansas City, MO 64106</p> <p>d. National Credit Union Administration Office of Consumer Protection (OCP) Division of Consumer Compliance and Outreach (DCCO) 1775 Duke Street Alexandria, VA 22314</p>
<p>3. Air carriers</p>	<p>Asst. General Counsel for Aviation Enforcement & Proceedings Aviation Consumer Protection Division Department of Transportation 1200 New Jersey Avenue SE Washington, DC 20423</p>
<p>4. Creditors Subject to Surface Transportation Board</p>	<p>Office of Proceedings, Surface Transportation Board Department of Transportation 395 E Street SW Washington, DC 20423</p>
<p>5. Creditors Subject to Packers and Stockyards Act</p>	<p>Nearest Packers and Stockyards Administration area supervisor</p>
<p>6. Small Business Investment Companies</p>	<p>Associate Deputy Administrator for Capital Access United States Small Business Administration 409 Third Street, SW, 8th Floor Washington, DC 20549</p>
<p>7. Brokers and Dealers</p>	<p>Securities and Exchange Commission 100 F Street NE Washington, DC 20549</p>
<p>8. Federal Land Banks, Federal Land Bank Associations, Federal Intermediate Credit Banks, and Production Credit Associations.</p>	<p>Farm Credit Administration 1501 Farm Credit Drive McLean, VA 22102-5090</p>
<p>9. Retailers, Finance Companies, and All Other Creditors Not Listed Above</p>	<p>FTC Regional Office for region in which the creditor operates or Federal Trade Commission: Consumer Response Center – FCRA Washington, DC 20580 (877) 382-4357</p>

NEW YORK CORRECTION LAW
ARTICLE 23-A

**LICENSURE AND EMPLOYMENT OF PERSONS PREVIOUSLY
CONVICTED OF ONE OR MORE CRIMINAL OFFENSES**

Section 750. Definitions.

751. Applicability.

752. Unfair discrimination against persons previously convicted of one or more criminal offenses prohibited.

753. Factors to be considered concerning a previous criminal conviction; presumption.

754. Written statement upon denial of license or employment.

755. Enforcement.

§750. Definitions. For the purposes of this article, the following terms shall have the following meanings:

(1) "Public agency" means the state or any local subdivision thereof, or any state or local department, agency, board or commission.

(2) "Private employer" means any person, company, corporation, labor organization or association which employs ten or more persons.

(3) "Direct relationship" means that the nature of criminal conduct for which the person was convicted has a direct bearing on his fitness or ability to perform one or more of the duties or responsibilities necessarily related to the license, opportunity, or job in question.

(4) "License" means any certificate, license, permit or grant of permission required by the laws of this state, its political subdivisions or instrumentalities as a condition for the lawful practice of any occupation, employment, trade, vocation, business, or profession. Provided, however, that "license" shall not, for the purposes of this article, include any license or permit to own, possess, carry, or fire any explosive, pistol, handgun, rifle, shotgun, or other firearm.

(5) "Employment" means any occupation, vocation or employment, or any form of vocational or educational training. Provided, however, that "employment" shall not, for the purposes of this article, include membership in any law enforcement agency.

§751. Applicability. The provisions of this article shall apply to any application by any person for a license or employment at any public or private employer, who has previously been convicted of one or more criminal offenses in this state or in any other jurisdiction, and to any license or employment held by any person whose conviction of one or more criminal offenses in this state or in any other jurisdiction preceded such employment or granting of a license, except where a mandatory forfeiture, disability or bar to employment is imposed by law, and has not been removed by an executive pardon, certificate of relief from disabilities or certificate of good conduct. Nothing in this article shall be construed to affect any right an employer may have with respect to an intentional misrepresentation in connection with an application for employment made by a prospective employee or previously made by a current employee.

§752. Unfair discrimination against persons previously convicted of one or more criminal offenses prohibited. No application for any license or employment, and no employment or license held by an individual, to which the provisions of this article are applicable, shall be denied or acted upon adversely by reason of the individual's having been previously convicted of one or more criminal offenses, or by reason of finding a lack of "good moral character" when such finding is based upon the fact that the individual has previously been convicted of one or more criminal offenses, unless:

(1) There is a direct relationship between one or more of the previous criminal offenses and the specific license or employment sought or held by the individual; or

(2) the issuance or continuation of the license or the granting or continuation of the employment would involve an unreasonable risk to property or to the safety or welfare of specific individuals or the general public.

§753. Factors to be considered concerning a previous criminal conviction; presumption. 1. In making a determination pursuant to section seven hundred fifty-two of this chapter, the public agency or private employer shall consider the following factors:

(a) The public policy of this state, as expressed in this act, to encourage the licensure and employment of persons previously convicted of one or more criminal offenses.

(b) The specific duties and responsibilities necessarily related to the license or employment sought or held by the person.

(c) The bearing, if any, the criminal offense or offenses for which the person was previously convicted will have on his fitness or ability to perform one or more such duties or responsibilities.

(d) The time which has elapsed since the occurrence of the criminal offense or offenses.

(e) The age of the person at the time of occurrence of the criminal offense or offenses.

(f) The seriousness of the offense or offenses.

(g) Any information produced by the person, or produced on his behalf, in regard to his rehabilitation and good conduct.

(h) The legitimate interest of the public agency or private employer in protecting property, and the safety and welfare of specific individuals or the general public.

2. In making a determination pursuant to section seven hundred fifty-two of this chapter, the public agency or private employer shall also give consideration to a certificate of relief from disabilities or a certificate of good conduct issued to the applicant, which certificate shall create a presumption of rehabilitation in regard to the offense or offenses specified therein.

§754. Written statement upon denial of license or employment. At the request of any person previously convicted of one or more criminal offenses who has been denied a license or employment, a public agency or private employer shall provide, within thirty days of a request, a written statement setting forth the reasons for such denial.

§755. Enforcement. 1. In relation to actions by public agencies, the provisions of this article shall be enforceable by a proceeding brought pursuant to article seventy-eight of the civil practice law and rules.

2. In relation to actions by private employers, the provisions of this article shall be enforceable by the division of human rights pursuant to the powers and procedures set forth in article fifteen of the executive law, and, concurrently by the New York city commission of human rights.

2024 Contractor Safety Data

As part of our ongoing safety initiatives, we will be collecting safety data from contractors working on Aquarion projects. This initiative was rolled out to our water main installation contractors in 2011 and this year will be requested of contractors on all construction projects. The data should be provided beginning with the quarter in which the contract documents are finalized and should be submitted once per quarter until final completion. Thank you for your cooperation.

<i>Insert contractor name here</i>	Q1 2024	Q2 2024	Q3 2024	Q4 2024	2024Totals
Total hours worked					
OSHA reported injuries					
Cases involving lost time					
Total lost days from work					
OSHA violations					

*For any OSHA reported injury or violation, describe both the nature of the injury/violation and the corrective measures taken. Use the space below or add pages, as needed:

Q1: description of utility work injuries, OSHA violations, and corrective measures

Q2: description of utility work injuries, OSHA violations, and corrective measures

Q3: description of utility work injuries, OSHA violations, and corrective measures

Q4: description of utility work injuries, OSHA violations, and corrective measures

END OF DOCUMENT

DOCUMENT 00905

CHANGE ORDER

Change Order No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

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

Description: _____

Attachments: (List documents supporting change): _____

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
---------------------------	---------------------------

Original Contract Price: \$ _____	Original Contract Times: <input type="checkbox"/> Working days <input type="checkbox"/> Calendar days Substantial completion (days or date): _____ Ready for final payment (days or date): _____
--------------------------------------	--

[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: \$ _____	[Increase] [Decrease] from previously approved Change Orders No. _____ to No. _____: Substantial completion (days): _____ Ready for final payment (days): _____
--	---

Contract Price prior to this Change Order: \$ _____	Contract Times prior to this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
--	---

[Increase] [Decrease] of this Change Order: \$ _____	[Increase] [Decrease] of this Change Order: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
---	--

Contract Price incorporating this Change Order: \$ _____	Contract Times with all approved Change Orders: Substantial completion (days or date): _____ Ready for final payment (days or date): _____
---	--

RECOMMENDED: ACCEPTED: ACCEPTED:

By: _____ Engineer (Authorized Signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
--	---	--

Date: _____	Date: _____	Date: _____
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Approved by Funding Agency (if applicable): _____	Date: _____
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Change Order Instructions

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Price or Times.

Changes that affect Contract Price or Contract Times should be promptly covered by a Change Order. The practice of accumulating Change Orders to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed in the Agreement, any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order should be used.

B. COMPLETING THE CHANGE ORDER FORM

Engineer normally initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by Contractor, or requests from Owner, or both.

Once Engineer has completed and signed the form, all copies should be sent to Contractor for approval. After approval by the Contractor, all copies should be sent to the Owner for approval. The Owner will distribute executed copies after approval by all parties.

If a change only applies to price or to times, cross out the part of the tabulation that does not apply.

DOCUMENT 00945
CERTIFICATE OF SUBSTANTIAL COMPLETION

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions:

_____ 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 Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [revised tentative] [definitive] list of items to be completed or corrected, is attached hereto. 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.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

The following documents are attached to and made 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.

Executed by Engineer	Date
Accepted by Contractor	Date
Accepted by Owner	Date

DOCUMENT 00950

WAIVER OF LIENS

Contract No.: Agreement Date: _____

Owner: Aquarion Water Company of Connecticut

Project Name: _____

Completion Date per Agreement and Change Orders: _____

The undersigned Contractor hereby swears under penalty of perjury that (1) all previous progress payments received from the Owner on account of Work performed under the Contract referred to above have been applied by the undersigned to discharge, in full, all obligations of the undersigned incurred in connection with Work covered by prior Estimates for Partial Payment under said Contract, being Estimates Number 1 through _____ inclusive; and (2) all labor, materials and equipment incorporated in said Project or otherwise listed in or covered by these Estimates for Partial Payment are free and clear of all liens claims, security interests and encumbrances, except those listed below by obligee, nature and amount of obligation and covered by appropriate Bond or Bonds, as listed beside each obligation and attached to and made a part of this certification.

Obligation

Bond

Date

Contractor

Signed by Officer of Corporation

Title

COUNTY OF _____

STATE OF _____

Before me on this _____ day of _____, _____ personally appeared _____ known to me, who being duly sworn, did depose and save that he is the _____ (Officer) of the Contractor above mentioned; that he executed the above statement on behalf of said Contractor and that all of the statements contained therein are true, correct and complete.

NOTARY PUBLIC

My Commission Expires

END OF DOCUMENT

DOCUMENT 00960

CERTIFICATE OF FINAL PAYMENT AND COMPLETION OF WORK

Agreement Date: _____

Owner: Aquarion Water Company of Connecticut

Project Name: _____

Completion Date per Agreement and Change Orders: _____

FINAL CERTIFICATION OF CONTRACTOR

Contractor: _____

Address: _____

City, State Zip Code: _____

agrees to accept \$ _____ as full and final payment for all work completed under this Contract dated _____ with the Aquarion Water Company for the project.

I certify that all construction has been carried out in substantial compliance with the Contract Documents, and that all labor, equipment, materials and Subcontractors have been or will be paid in accordance with the requirements of the Laws of the State of Connecticut.

Date

Contractor

Signed by Officer of Corporation

Title

END OF DOCUMENT

DOCUMENT 00965
TRANSFER OF TITLE

_____, (CONTRACTOR), a corporation, or a partnership, or an individual, having a principal place of business in _____ hereby transfers and conveys to Aquarion Water Company of Connecticut (OWNER), title to the following material(s) delivered and stored at the designated storage area(s) at

_____ upon the receipt of \$ _____, which amount is to be included in the Application and Certification for Payment No. _____.

Therefore, upon the receipt of the sum of \$ _____* paid by the OWNER, the CONTRACTOR waives all of its statutory lien rights regarding the following material. The storage, transportation, protection and ultimate installation of this material remain the responsibilities of the CONTRACTOR.

In witness whereof, the CONTRACTOR has caused this instrument to be executed this

_____ day of _____ 20____ by its duly authorized representative.

Name

Title

Signature

*Amount subject to reductions in accordance with Document 00800 Supplementary Conditions, SC-14.02B and the terms of the Contract between the OWNER and CONTRACTOR.

Title to the following material is being transferred by this document:

County of _____

_____ then personally appeared and acknowledged the foregoing instrument to be the free act and deed of _____ before me.

Sworn to me this _____ day of _____ 20_____.

NOTARY PUBLIC

My Commission Expires: _____

END OF DOCUMENT

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Work of the Contract is shown and described in Drawings and Project Manual entitled:

Brush Reservoir Dam Improvements
Aquarion Water Company
Town of Stamford
February 2024

2. The Work includes, but is not limited to, the following major items:
 - a. Install erosion and sedimentation controls.
 - b. Install construction access road.
 - c. Clear and grub trees, stumps, and brush within 25 feet of the dam.
 - d. Implement and maintain control of water.
 - e. Demolish existing training walls, spillway weir, and portions of dry stack stone masonry road walls.
 - f. Demolish existing valve operators and corbels.
 - g. Demolish top 2.5 feet of dam crest and install 1.5 feet of new concrete cap.
 - h. Demolish existing dam concrete to bedrock where detailed on plans.
 - i. Demolish upstream shotcrete facing and unsound concrete.
 - j. Excavate fill, remove rock and pour concrete for the spillway channel.
 - k. Install reinforced spillway concrete.
 - l. Install new reinforced concrete training wall to form the right side of the spillway channel and left boundary of the downstream rip rap buttress.
 - m. Install upstream concrete repairs and waterproofing.
 - n. Install downstream rip rap buttress.
 - o. Install upstream rip rap at new spillway section.
 - p. Extend downstream 20-inch low-level outlet pipe, fittings, and install outlet end section.
 - q. Abandon and plug existing raw water line through dam.
 - r. Install low-level outlet slide gate, valve stem, and operator.

- s. Install fall protection railing, security gate, and valve operator platform.
- t. Install wetland buffer planting plan.
- u. Landscape and site restoration where disturbed by construction.

B. Related Requirements

- 1. Section 00800 - Supplementary Conditions

1.2 SUBMITTALS

A. Informational Submittals

- 1. Submit copies of permits or approvals required for the Work, prior to initiating the Work.

1.3 EXISTING SYSTEM DESCRIPTION

- A. Brush Reservoir Dam is a concrete dam with a broad crested concrete overflow spillway weir at the left abutment. The dam is a Moderate Hazard (Class BB) dam. The dam is anticipated to overtop by approximately 0.8 feet during the 100-year design storm event. The dam is approximately 243 feet long and up to 23 feet high. The spillway has approximately 2.5 feet of normal freeboard and is 30 feet in length. The upstream and downstream faces are covered by a failing shotcrete surface, and the crest has a bituminous overlay. The dam has two inoperable intake valves, one low-level outlet and one raw water line. The impoundment is a former water supply reservoir that serves to store a relatively small volume of water that discharges to Gray's Pond Brook and conveys flow to Bargh Reservoir (an active drinking water reservoir).

1.4 PROJECT/SITE CONDITIONS

A. Permits

- 1. Obtain the permits and approvals listed below:
 - a. Permits and licenses of a temporary nature necessary to perform the Work.
 - b. Permits for disposal of construction wastes including disposal of cleared and grubbed materials.
 - c. Other permits or licenses required for the Contractor's operations or required elsewhere in the Contract Documents and not included herein.
- 2. Comply with the permits and approvals listed below:
 - a. Connecticut Department of Energy and Environmental Protection (CTDEEP) Section 401 Water Quality Certification and Dam Construction Permit.
 - b. U.S. Army Corps of Engineers Section 404 Pre-Construction Notification.
 - c. Connecticut Department of Public Health (CTDPH) Water Company Land Permit Application.
- 3. Obtain required time extensions to permits obtained by the Contractor, if construction authorized by permits has not been completed by the expiration date noted on these permits.

4. Permits require that a representative of the permitting authority or the Owner be present on site during construction or given the opportunity to observe conditions prior to backfilling or otherwise proceeding with construction. Notify the Owner, Engineer, and the permitting authority prior to performing Work that is governed by the permit.
 5. Obtain permits and approvals from appropriate jurisdictional agencies and property owners for use of premises not furnished by the Owner, and for all off-site areas.
 6. Submit copies of permits prior to performance of Work authorized by permits.
- B. Existing Conditions
1. Use of Premises and Off-site Work
 - a. The Work shall occur on the Owner's property within the limits of Work shown on the Drawings.
 - b. Land owned by the Owner or land permitted for use by easement or temporary access agreement is available for staging and is shown on the Drawings.
 - c. Obtain permits and approvals for use of any land and access thereto that is deemed necessary for the Work, where such land is not available for use by the Owner, including land for temporary construction facilities, access and egress, or for storage of materials. Confine apparatus and storage to such additional areas.
 - d. Obtain permits and written approvals from appropriate jurisdictional agencies for the use of premises not available for use by the Owner, including all offsite staging areas, borrow pits and waste areas. Submit copies of all permits and approvals to the Owner prior to using areas.
 - e. Provide for the disposal of waste materials off-site in accordance with all applicable laws.
 - f. Adhere to the limits of Work as indicated, to minimize obstruction to traffic and inconvenience to the Owner, general public, and residents in the vicinity of the Work, and to protect people and property. Keep fire hydrants on or adjacent to the Work accessible to fire fighting equipment at all times.
 - g. Make temporary provisions to maintain functioning gutters, stormwater systems, drainage ditches, and culverts.
 - h. Maintain public access to residences including driveways at all times during the Work.

PART 2 PRODUCTS

2.1 MATERIALS FURNISHED BY OWNER

- A. The Owner will not furnish any materials, labor or equipment under this Contract.

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01140

WORK RESTRICTIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Work Schedule
2. Construction Constraints
3. Vehicle Access
4. Available Work Area
5. Site Usage Plan

B. Related Requirements

1. Section 01310 - Coordination
2. Section 01325 - Scheduling of Construction

1.2 SUBMITTALS

A. Incorporate the requirements of this Section in the project schedule submitted under Section 01325.

B. Action Submittals

1. Submit site usage plan within 30 days of the Notice to Proceed.

1.3 WORK SCHEDULE

A. Conduct the Work during daylight hours on Monday through Friday, and within the time between 7:00 a.m. and 5:00 p.m. No work is to be done on Owner's holidays, Saturdays, Sundays or outside of the work hours described above. No equipment or machinery may be started at the sites before 7:00 a.m. and all equipment must be shut off by 5:00 p.m.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CONSTRUCTION CONSTRAINTS

A. The following are constraints for the Work. Incorporate these constraints into the schedule required to be submitted under Section 01325.

1. Allowable drawdown of Brush Reservoir shall be in accordance with Section 01571, the Drawings, and permit conditions for the project attached to Section 00800.

3.2 VEHICLE ACCESS

- A. Primary vehicle access to the site is through the construction access road off of Barn Hill Road. The Contractor shall not block Barn Hill Road at any time during construction.
- B. Vehicle parking, refueling, and routine equipment maintenance shall only be performed in the designated staging areas.

3.3 AVAILABLE WORK AREA

- A. Limits of construction are defined on the Drawings. No work will be permitted to be performed outside these boundaries.

3.4 SITE USAGE PLAN

- A. Locations of available staging areas are shown on the Drawings.
- B. Submit a site usage plan showing all proposed staging areas, locations of all office and storage trailers, and material laydown areas. The site usage plan should be a drawing showing the proposed locations and shall include on-site traffic modifications and temporary utilities as may be applicable.

END OF SECTION

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SECTION 01290

APPLICATION AND CERTIFICATE FOR PAYMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Definition and description of measurement and payment to be used for the Work
 - 2. Payment procedures
 - 3. Payment requests for stored materials
- B. Related Requirements
 - 1. Section 01295 - Schedule of Values

1.2 GENERAL

- A. The following paragraphs describe payment procedures for the work to be done under the respective items in the Bid Form.
- B. Each lump sum and unit price will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's overhead and profit for each separately identified item.
- C. Except as provided for in Section 01295, no separate measurement or payment will be made for Work called for in Division 0 or Division 1 of the Contract Specifications, unless specifically covered under the Bid items listed below. All costs associated with this Work will be considered incidental to the Contract Bid price.
- D. Division 2 through Division 16 Work will be measured and paid for at the Contractor's unit Bid price or lump sum Bid price as indicated on the Bid form. Those payable Work items, and related prices as Bid, will be the basis for all compensation to the Contractor for Work performed under this Contract. Work not specifically included as a Bid item, but which is required to properly and satisfactorily complete the Work is considered ancillary and incidental to the Bid item Work, and payment for such Work is considered to be included in the values as Bid for payable items. Compensation for all unit Bid price Work will be made based on the measured quantity of Work under the appropriate Bid items.

1.3 LUMP SUM ITEMS

- A. Each lump sum price stated in the Bid form shall constitute full compensation for all labor, equipment and materials necessary and required to complete the work specified under that particular item, and also all costs for doing related work as set forth in the Contract Documents or implied in carrying out their intent.
- B. Item 1 – General Dam Improvement and Related Work and all Work Not Listed Separately in Bid Items
 - 1. Measurement
 - a. There will be no measurement of quantities for lump sum items. Periodic partial payments for this Work, included under the Agreement, shall be

based on the percent completion of each work item listed in the Schedule of Values provided under Section 01295 estimated by the Contractor and approved by the Engineer.

2. Payment

- a. Payment for Mobilization and Demobilization will be paid in two equal installments. The first installment will occur at the time the first payment requisition is submitted after the Contractor has initiated full-time construction activity. Payment for the second installment will be included in the first payment request after Substantial Completion has been reached and all equipment has been removed from the Site. In no case will the total of both installments exceed 10 percent of the base bid price.
- b. Payment for General Requirements shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for performance and/or temporary construction services, bonds, insurance, project management, administrative services, and close-out documentation in its entirety as detailed in the Contract Documents. Payment shall not exceed 10 percent of the base bid price.
- c. Payment for Related Items shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for construction of the Brush Reservoir Dam Improvements, excluding other bid items, in its entirety as detailed in the Contract Documents.

1.4 UNIT PRICE ITEMS

- A. Each unit price stated in the Bid form shall constitute full compensation for all labor, equipment and materials necessary and required to complete the Work specified under that particular item, and also all costs for doing related work as set forth in the Contract Documents or implied in carrying out their intent.
- B. Payment of the unit price items will only be made for the actual quantity of Work performed in accordance with the Contract Documents.
- C. Item 2 – Rock Removal
 1. Measurement
 - a. Measurement for rock excavation will be on a cubic yard basis as measured in the field by pre- and post-removal survey to be witnessed by the Engineer.
 - b. Rock with earth overburden shall be stripped of earth and exposed so that the rock can be profiled prior to removal. Excavation of earth will not be paid for under this item.
 2. Payment
 - a. Payment of the bid price for rock excavation will be full compensation for all excavation, backfill, compaction, removal and proper off-site disposal of the material, and all labor, equipment and materials required for or incidental to the work.

- b. Boulders less than 1 cubic yard will be paid for as part of the lump sum item and will not be paid for as part of rock excavation.
 - c. Payment for rock excavation will be at the bid price regardless of the depth at which it is encountered and removed.
- D. Item 3 – Tree Removal (4-12” Diameter)
 - 1. Measurement
 - a. Measurement for tree removal will be on a per each basis as measured in the field by the Engineer. This item shall be used for trees removed with a diameter of 4 inches to 12 inches at breast height.
 - b. This item includes tree cutting, clearing, stump removal, and backfill.
- E. Item 4 – Tree Removal (12-18” Diameter)
 - 1. Measurement
 - a. Measurement for tree removal will be on a per each basis as measured in the field by the Engineer. This item shall be used for trees removed with a diameter greater than 12 inches to 18 inches at breast height.
 - b. This item includes tree cutting, clearing, stump removal, and backfill.
- F. Item 5 – Tree Removal (18-24” Diameter)
 - 1. Measurement
 - a. Measurement for tree removal will be on a per each basis as measured in the field by the Engineer. This item shall be used for trees removed with a diameter greater than 18 inches to 24 inches at breast height.
 - b. This item includes tree cutting, clearing, stump removal, and backfill.
- G. Item 6 – Tree Removal (Greater than 24” Diameter)
 - 1. Measurement
 - a. Measurement for tree removal will be on a per each basis as measured in the field by the Engineer. This item shall be used for trees removed with a diameter greater than 24 inches at breast height.
 - b. This item includes tree cutting, clearing, stump removal, and backfill.
- H. Item 7 – Remove and Dispose of Unsuitable Material
 - 1. Measurement
 - a. Measurement for unsuitable material removal will be on a cubic yard basis as measured in the field by the Engineer.
 - b. This item includes excavation of unsuitable soil materials, organics, backfill with suitable material, and compaction. This item applies only to excavation required beyond the dimensions specified in the Contract Documents.
 - c. Unsuitable Sediment Transportation and Disposal will be paid for under Item 14 and not in this bid item.

2. Payment
 - a. Payment shall be full compensation for all labor, equipment, and materials required for or incidental to the work.
 - b. Payment shall include compensation for all costs associated with excavation, soil separation, stockpiling, and disposal of accumulated unsuitable materials, regardless of the depth at which it is encountered.
- I. Item 8 – Granular Fill
 1. Measurement
 - a. Measurement for granular fill will be on an in-place cubic yard basis as measured in the field by the Engineer.
 2. Payment
 - a. Payment of the bid price for granular fill will be full compensation for providing granular fill, excavation, stockpiling, backfill, and compaction of material, and all labor, equipment and materials required for or incidental to the work, for use as replacement of unsuitable soil, as directed by the Engineer.
 - b. Granular fill necessary for the work as shown on the Drawings or included in the Specifications other than as replacement of unsuitable soil shall be paid for in other bid items.
- J. Item 9 – Demolition of Deteriorated Dam Concrete
 1. Measurement
 - a. Measurement for demolition of deteriorated dam crest concrete will be on a cubic yard basis as measured in the field by the Engineer.
 2. Payment
 - a. Payment of the bid price for demolition of dam crest concrete and bituminous concrete crest will be full compensation for all labor, equipment, and materials required for or incidental to the work performed in accordance with the Contract Documents.
 - b. Payment for demolition of deteriorated dam concrete will be at the bid price regardless of the depth at which it is encountered and removed.
- K. Item 10 – Spray Applied Cementitious Repair Mortar
 1. Measurement
 - a. Measurement for spray applied cementitious repair mortar on the upstream face will be on a square foot basis as measured in the field by the Engineer.
 2. Payment
 - a. Payment of the bid price for spray applied cementitious repair mortar will be full compensation for all labor, equipment, and materials required for or incidental to the work performed in accordance with the Contract Documents

- L. Item 11 – Dam Spall Repairs (Less than 4” Depth)
 - 1. Measurement
 - a. Measurement for dam spall repairs (less than 4” depth) on the upstream face will be on a square foot basis as measured in the field by the Engineer.
 - 2. Payment
 - a. Payment of the bid price for dam spall repairs (less than 4” depth) will be full compensation for all labor, equipment, and materials required for or incidental to the work performed in accordance with the Contract Documents.

- M. Item 12 – Dam Spall Repairs (Greater than 4” Depth)
 - 1. Measurement
 - a. Measurement for dam spall repairs (greater than 4” depth) on the upstream face will be on a square foot basis as measured in the field by the Engineer.
 - 2. Payment
 - a. Payment of the bid price for dam spall repairs (greater than 4” depth) will be full compensation for all labor, equipment, and materials required for or incidental to the work performed in accordance with the Contract Documents.

- N. Item 13 – Liquid Chemical Grout Injection
 - 1. Measurement
 - a. Measurement for liquid chemical grout injection on the upstream face will be on a linear foot basis as measured in the field by the Engineer.
 - 2. Payment
 - a. Payment of the bid price for liquid chemical grout injection will be full compensation for all labor, equipment, materials, and services required for or incidental to the work performed in accordance with the Contract Documents.

- O. Item 14 – Reinforced Concrete Cap
 - 1. Measurement
 - a. Measurement for reinforced concrete cap will be on an in-place cubic yard basis as measured in the field by the Engineer.
 - b. Measurement for this item only includes concrete placed on the top of the dam on a sound concrete surface.
 - 2. Payment
 - a. Payment of the bid price for reinforced concrete cap will be full compensation for the formwork and formwork accessories, the furnishing and installation of steel reinforcing in accordance with the Contract Drawings, the furnishing, placing, and curing the concrete, and all labor, equipment, and materials incidental to the work.

- P. Item 15 – Reinforced Concrete Training Wall, Footing, and Spillway
1. Measurement
 - a. Measurement of reinforced concrete training wall, footing, and spillway will be on an in-place cubic yard basis as measured in the field by the Engineer.
 2. Payment
 - a. Payment of the bid price for the reinforced concrete training wall will be full compensation for the formwork and formwork accessories, the furnishing and installation of steel reinforcing in accordance with the Contract Drawings, the furnishing, placing, and curing the concrete, and all labor, equipment, and materials incidental to the work associated with installation of the reinforced concrete training wall, footing, and spillway.
- Q. Item 16 – Unreinforced Concrete Footing
1. Measurement
 - a. Measurement of unreinforced concrete will be on an in-place cubic yard basis as measured in the field by the Engineer.
 - b. Measurement will only include the volume below the nominal foundation dimensions shown on the contract drawings. The maximum height of the unreinforced section shall be 2'-3".
 2. Payment
 - a. Payment of the bid price for the unreinforced concrete will be full compensation for the formwork and formwork accessories, the furnishing and installation of additional steel anchors in accordance with the Contract Drawings, the furnishing, placing, and curing the concrete, and all labor, equipment, and materials incidental to the work associated with the installation of the unreinforced concrete footing below the nominal training wall footing.
- R. Item 17 – Type 1 Rip Rap
1. Measurement
 - a. Measurement for type 1 rip rap will be on a ton basis as measured by weight slips delivered to the site and placed. The weight to be paid will be actual amount of type 1 rip rap placed by the Contractor in accordance with the Drawings or as approved by the Engineer.
 2. Payment
 - a. Payment for the bid price for type 1 rip rap will be full compensation for all labor, equipment, and materials required or incidental to the work.
- S. Item 18 – Type 2 Rip Rap
1. Measurement
 - a. Measurement for type 2 rip rap will be on a ton basis as measured by weight slips delivered to the site and placed. The weight to be paid will be

actual amount of type 2 rip rap placed by the Contractor in accordance with the Drawings or as approved by the Engineer.

2. Payment

- a. Payment for the bid price for type 2 rip rap will be full compensation for all labor, equipment, and materials required or incidental to the work.

T. Item 19 – Loam and Seed

1. Measurement

- a. Measurement for loam and seed will be on an in-place square yard basis as measured in the field by the Engineer.

2. Payment

- a. Payment for the bid price for loam and seed will be full compensation for all labor, equipment, and materials required or incidental to the work.

U. Item 20 – Sediment Transportation and Disposal

1. Measurement

- a. Measurement for sediment transportation and disposal will be on a per ton basis approved by the Engineer from actual trucking slips provided by the Contractor.

2. Payment

- a. Payment for the bid price for sediment transportation and disposal will be full compensation for all removal, transportation, and off-site disposal of sediment, and all labor, equipment, and materials required for or incidental to the work. Excavation, backfill, compaction, and stockpiling of the sediment will be paid for under the Excavation, Backfill, and Compaction item.

1.5 ALLOWANCES

- A. Each allowance stated in the Bid form shall constitute full compensation for all labor, equipment, materials, coordination, supervision, and all applicable taxes necessary and required to complete the Work specified under that particular item, and also all costs for doing related work as set forth in the Contract Documents or implied in carrying out their intent. Overhead and profit have been included in the Contract Price for allowances. Therefore, the Contractor is not entitled to any additional overhead and profit on Work completed under an allowance.
- B. Payment of the allowance items will only be made for the actual quantity of Work performed. Prepare a Change Order proposal based on the difference between purchase amount and the allowance. Prepare explanation and documentation to substantiate distribution of allowance items. Allowance disbursements will be issued by the Owner authorizing the distribution of allowance funds.
- C. At Project closeout, credit unused amounts remaining in the allowance to the Owner by Change Order.
- D. Item 21 – Additional Site Restoration at the Direction of the Owner

1. Measurement
 - a. Measurement for additional site restoration at the direction of the Owner will be on an allowance basis using the actual cost to perform the work. Measurement for additional site restoration will be performed in the field by the Engineer.
 2. Payment
 - a. The allowance payment shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for the construction associated with the additional site restoration authorized at the direction of the Owner. Payment will be made following acceptance of the Change Order proposal by the Owner.
 - b. The allowance established in the bid form is for bidding purposes only, and the actual amount invoiced may differ from the established allowance.
- E. Item 22 – Additional Reinforced Concrete at the Direction of the Owner
1. Measurement
 - a. Measurement for additional reinforced concrete at the direction of the Owner will be on an allowance basis using the actual cost to perform the work. Measurement for additional work will be performed in the field by the Engineer.
 2. Payment
 - a. The allowance payment shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for the construction associated with the additional reinforced concrete authorized at the direction of the Owner. Payment will be made following acceptance of the Change Order proposal by the Owner.
 - b. The allowance established in the bid form is for bidding purposes only, and the actual amount invoiced may differ from the established allowance.
- F. Item 23 – Additional Work at the Direction of the Owner
1. Measurement
 - a. Measurement for additional work at the direction of the Owner will be on an allowance basis using the actual cost to perform the work. Measurement for additional work will be performed in the field by the Engineer.
 2. Payment
 - a. The allowance payment shall be full compensation for furnishing all labor, materials, tools, equipment, and services necessary for the construction associated with the additional work authorized at the direction of the Owner. Payment will be made following acceptance of the Change Order proposal by the Owner.
 - b. The allowance established in the bid form is for bidding purposes only, and the actual amount invoiced may differ from the established allowance.

1.6 PAYMENT PROCEDURES

- A. Informal submittal: Unless otherwise directed by the Engineer:
 - 1. Make an informal submittal of request for payment by filling in, with erasable pencil, pertinent portions of EJCDC C-620, Contractor's Application for Payment, plus continuation sheet or sheets.
 - 2. Make this preliminary submittal to the Engineer at the last regular job meeting of each month.
 - 3. Revise the preliminary submittal as approved by the Engineer and incorporate the approved payments into the formal submittal.
- B. Formal submittal: Unless otherwise directed by the Engineer:
 - 1. Make formal submittal of request for payment by filling in the agreed data, electronically on EJCDC C-620, Contractor's Application for Payment, plus continuation sheet or sheets.
 - 2. Sign and notarize the Application for Payment.
 - 3. Submit the original of the Application for Payment, plus six identical copies of the continuation sheet or sheets, to the Engineer.
 - 4. The Engineer will compare the formal submittal with the approved informal submittal and, if acceptable, will sign the Contractor's Application for Payment, and present the Application to the Owner.
 - 5. Provide a signed and notarized Certificate for Stored Materials and proof of storage in a dry, watertight, heated and insured warehouse facility.

1.7 PAYMENT REQUESTS FOR STORED MATERIALS

- A. Requests for payment for stored materials shall be made in accordance with Section 00700 and shall be accompanied by the attached "Certificate for Stored Materials" form. Payment for stored materials shall not exceed the value actually paid by the Contractor for the stored materials as evidenced by the accompanying bill of sale, invoice, or other documentation.
- B. Partial payment requests for materials stored or so-called "engineering costs" by equipment manufacturers will not be allowed. All such costs shall be distributed proportionately among the various items of equipment/hardware to be furnished.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01290 - Application and Certification for Payment.docx

CERTIFICATE FOR STORED MATERIALS

Tighe & Bond Project No.

We, _____, request payment for materials and/or equipment not incorporated in the work included under our firm's contract with _____ as listed below.

We hereby certify under penalty of perjury, that the materials not incorporated in the work have been delivered and are securely stored at the site or at _____ and that we have title to said materials free and clear of all Liens, as evidenced by the attached bill of sale, invoice, or other documentation.

We also certify that an inventory of said materials and/or equipment has been compiled for the purposes of this monthly partial payment request. This list of materials and/or equipment, including unit prices for said material not incorporated in the work for which payment is hereby requested, consisting of _____ pages and dated _____, is signed and attached hereto.

We acknowledge that payments made based on this request for materials and/or equipment not incorporated in the work does not relieve the contractor of its responsibility for furnishing all materials and equipment required for the satisfactory completion of the project pursuant to the contractual requirements.

We further certify that we can and will adequately protect said materials and/or equipment until they are incorporated in the work; that they meet the requirements of the specifications, and that they will be needed for incorporation in the work in the near future.

IN WITNESS WHEREOF, we, the said _____ h-
ereunto set our hand and seal this _____ day of _____, 20__.

Contractor's Firm Name

SIGNED, SEALED AND DELIVERED IN THE PRESENCE OF

By _____

Title _____

Notary Public

SCHEDULE OF STORED MATERIALS

Job No. _____
 Contract No. _____
 Contractor: _____
 Location: _____

Date _____
 Pay Estimate _____

Item	Description	Supplier/Manufacturer	Quantity Stored and not Incorporated	Unit \$	Certified Value

Signature: _____
 Contractor's Principal

Total Amount Due for Stored Materials _____

Title: _____

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

**Application For Payment
Change Order Summary**

Approved Change Orders	Number	Additions	Deductions	
				1. ORIGINAL CONTRACT PRICE \$ _____
				2. Net change by Change Orders \$ _____
				3. Current Contract Price (Line 1 ± 2) \$ _____
				4. TOTAL COMPLETED AND STORED TO DATE (Column F total on Progress Estimates)..... \$ _____
				5. RETAINAGE:
				a. 5% X _____ Work Completed..... \$ _____
				b. X _____ Stored Material..... \$ _____
				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, PLUS RETAINAGE (Column G total on Progress Estimates + Line 5.c above)..... \$ _____
TOTALS				
	NET CHANGE BY CHANGE ORDERS			

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

By: _____	Date: _____
-----------	-------------

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____ (Engineer) _____ (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____ (Owner) _____ (Date)

Approved by: _____ (Date)
Funding or Financing Entity (if applicable)

SECTION 01295

SCHEDULE OF VALUES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Schedule of Values

1.2 SUBMITTALS

- A. Action Submittals
 - 1. Submit 3 copies of the Schedule of Values for approval within 10 days after the Effective Date of the Agreement.

1.3 SCHEDULE OF VALUES

- A. Schedule of Values shall be a detailed breakdown of the lump sum Work items showing values allocated to the various elements of the Work.
- B. The format of the Schedule of Values shall be a breakdown by Specification Section and content and shall be submitted on EJCDC C-620, Contractor's Application for Payment. The Engineer may require additional detailed documentation to support the values in the form of executed purchase orders, subcontracts, or other agreements.
- C. The Engineer will determine the level of breakdown and detail required. The breakdown shall include materials, installation, and start-up for equipment and controls where applicable. The final document will be the basis of payment requests for the duration of the Contract. No progress payment will be made until the Schedule of Values is approved by the Engineer.
- D. An unbalanced Schedule of Values providing overpayment on items of work performed first will not be accepted.
- E. At the Contractor's option, an item for bonds and insurance may be included in the Schedule of Values. If included, requests for payment including values for bonds and insurance shall be accompanied by matching invoices.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

<J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01295 - Schedule of Values.docx>

SECTION 01300

GEOTECHNICAL DATA

PART 1 GENERAL

1.1 SUMMARY

- A. For the preparation of Bidding Documents, Engineer has relied upon the following reports and tests of subsurface and latent physical conditions of the site. The location of all bore holes is shown on the Drawings.
1. Soil boring data (attached)
 - a. The subsurface data are not guaranteed as to accuracy or completeness, nor are they a part of the Contract Documents.
 - b. Bidders are cautioned that the subsurface data have been utilized for general design purposes only. No explicit or implicit representation is made as to the nature of the materials which may be encountered below the surface of the ground.
 - c. The making available of this subsurface data to Bidders is not intended to relieve them from their responsibility to familiarize themselves with the subsurface and other site conditions.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

<J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01300 - Geotechnical Data.docx>

Project: Brush Reservoir Dam Alternatives Analysis

Location: Stamford CT

Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors

Foreman: A. McKernan

T&B Rep.: B. Opp

Date Start: 06/27/22 End: 06/27/22

Location: See Exploration Location Plan

GS. Elev. 361.5' Datum: NAVD 88

	Casing	Sampler
Type	HSA	Coring
I.D./O.D.	3 1/4" ID	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5						Brown, fine to coarse SAND, some Gravel, little Silt	TOPSOIL		
							FILL		
10		C-1 / 53	2-7	1 min		Hard, moderately weathered, moderately fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 53/60 = 88% RQD 23/60 = 38%	GRANITIC GNEISS		
				1 min					
				2 min					
				2 min					
15		C-2 / 52	7-12	1 min		Hard, moderately weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 52/60 = 87% RQD 27/60 = 45%	GRANITIC GNEISS		
				2 min					
				2 min					
				2 min					
20		C-3 / 25	12-15	2 min		Hard, moderately weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 25/36 = 69% RQD 12/36 = 33%	GRANITIC GNEISS		
				2 min					
				2 min					
				2 min					
25						Boring Terminated at 15 feet.			
30						Boring Terminated at 15 feet.			

Notes:
 1. Accurate groundwater reading could not be obtained since water was used as a drilling fluid.
 2. Boring advanced using NQ2-sized core barrel.

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency		
VERY LOOSE	0-4	VERY SOFT <2
LOOSE	4-10	SOFT 2-4
MEDIUM DENSE	10-30	MEDIUM 4-8
DENSE	30-50	STIFF 8-15
VERY DENSE	>50	VERY STIFF 15-30
		HARD >30

Project: Brush Reservoir Dam Alternatives Analysis

Location: Stamford CT

Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors

Foreman: A. McKernan

T&B Rep.: B. Opp

Date Start: 06/28/22 End: 06/28/22

Location: See Exploration Location Plan

GS. Elev. 367' Datum: NAVD 88

	Casing	Sampler
Type	-	Coring
I.D./O.D.	-	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		C-1 / 60	0-5	3 min		3" Bituminous Concrete	0.3' ASPHALT		
				4 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE		
				4 min					
				4 min					
				4 min					
10		C-2 / 36	5-8	3 min		Portland Cement Concrete	8.5'		
				3 min					
				3 min					
15		C-3 / 31	8-11	3 min		Hard, moderately severe weathered, slightly to extremely fractured, medium to coarse grained, GRANITIC GNEISS REC 31/36 = 86% RQD 9/36 = 25%	GRANITIC GNEISS		
				3 min					
		C-4 / 48	11-15	2 min		Hard, moderately weathered, slightly fractured, medium to coarse grained, GRANITIC GNEISS REC 48/48 = 100% RQD 37/48 = 77%			
				2 min					
20				3 min			20'		
		C-5 / 59	15-20	3 min		Hard, moderately weathered, slightly fractured, medium to coarse grained, GRANITIC GNEISS REC 59/60 = 98% RQD 50/60 = 83%			
				3 min					
				3 min					
				4 min					
25						Boring Terminated at 20 feet			
30									

Notes:
 1. Groundwater observed at 15 feet after 24 hours.
 2. Boring advanced using NQ2-sized core barrel.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Project: Brush Pond Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Boring No. B-3
 Page 2 of 2
 File No. A1000-195
 Checked by: B. Opp

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
35				12 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE		
		C-9 / 46	31-35	5 min					
				5 min					
				5 min					
				7 min		Portland Cement Concrete	38'		
		C-10 / 36	35-38	4 min					
				13 min					
				12 min					
40		C-11 / 40	38-42	15 min		Hard, moderately to slightly weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, thickly bedded REC 40/48 = 83% RQD 23/48 = 48%	GRANITIC GNEISS		
				7 min					
				31 min					
				16 min					
45						Boring Terminated at 42 feet.	42'		
50									
55									
60									
65									

Note
 1. Accurate groundwater reading could not be obtained since water was used as a drilling fluid.
 2. Boring advanced using NQ2-sized core barrel.

Project: Brush Pond Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Boring No. B-4

Page 1 of 1

File No. A1000-195

Checked by: B. Opp

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Lee
 Date Start: 07/05/22 End: 07/06/22
 Location: See Exploration Location Plan
 GS. Elev. 367' Datum: NAVD 88

	Casing	Sampler
Type	-	Coring
I.D./O.D.	-	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
See Note 2 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		C-1 / 57	0-5	3 min		3" Bituminous Concrete	0.3' ASPHALT		
				3 min		Portland Cement Concrete			
				5 min					
				4 min					
				4 min					
10		C-2 / 48	5-9	4 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE	1	
				4 min					
				4 min					
				3 min					
		C-3 / 58	9-14	4 min		Portland Cement Concrete			
			3 min						
			3 min						
			4 min						
			3 min						
15		C-4 / 58	14-19	4 min		Portland Cement Concrete			
				4 min					
				4 min					
				5 min					
				9 min					
20		C-5 / 52	19-24	8 min		Portland Cement Concrete			
				10 min					
				8 min					
				12 min					
				10 min					
25		C-6 / 55	24-29	12 min		Hard, moderately weathered, moderate to extremely fractured, medium to coarse grained, GRANITIC GNEISS, medium bedding, thinly bedded REC 55/60 = 92% RQD 25/60 = 42%	24' GRANITIC GNEISS		
				16 min					
				30 min					
				26 min					
				26 min					
30						Boring Terminated at 29 feet.	29'		

Notes:
 1. Boulder encountered between 18' and 19'.
 2. Accurate groundwater reading could not be obtained since water was used as a drilling fluid.
 3. Boring advanced using NQ2-sized core barrel.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Project: Brush Pond Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Lee
 Date Start: 07/06/22 End: 07/06/22
 Location: See Exploration Location Plan
 GS. Elev. 357.5' Datum: NAVD 88

	Casing	Sampler
Type	HSA	Coring
I.D./O.D.	3 1/4" ID	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5							0.5' TOPSOIL		
						Brown, fine to coarse SAND, trace Gravel, trace Silt	FILL		
10									
15						Brown, fine to medium SAND, little Silt, moist	15'	1	
						Boring Terminated at 15'			
20									
25									
30									

Notes: 1. Soil sample moist at 15'. 2. Probe only, no soil samples obtained.	Proportions Used TRACE (TR.) 0 - <10% LITTLE (LI.) 10 - <20% SOME (SO.) 20 - <35% AND 35 - <50%	Density/Consistency VERY LOOSE 0-4 VERY SOFT <2 LOOSE 4-10 SOFT 2-4 MEDIUM DENSE 10-30 MEDIUM 4-8 DENSE 30-50 STIFF 8-15 VERY DENSE >50 VERY STIFF 15-30 HARD >30
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SECTION 01310

COORDINATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Project Management
 - 2. Coordination
 - 3. Project Meetings
- B. Related Requirements
 - 1. Section 01140 - Work Restrictions
 - 2. Section 01325 - Scheduling of Construction
 - 3. Section 01571 – Control of Water
- C. Related Work Not Included
 - 1. Operation of existing facilities will be performed by the Owner unless otherwise specified. The Owner will assist in arranging operation of any existing facilities or equipment required by the Contractor to connect to existing facilities, and the Contractor shall not operate existing valves or equipment. Only the Owner will operate Owner valves.

1.2 SUBMITTALS

- A. Incorporate the requirements of this Section, as well as Work which may impact the existing system operation, or the operations of any adjacent utility, in the project schedule submitted under Section 01325.
- B. Informational Submittals
 - 1. At the pre-construction conference, supply to the Owner the cell phone number of a responsible person who may be contacted during off-hours for emergencies 24 hours a day, seven days a week.
 - 2. Prepare a contact list of phone numbers, including cell phone numbers, and emails for all Project personnel and submit to the Engineer at the pre-construction conference. Include Contractor, Owner, Engineer, and local emergency personnel including police, fire, and ambulance.
 - 3. Submit to the Owner and Engineer, in writing, all requests for valve operations at least 2 weeks prior to commencing operation.

1.3 PROJECT MANAGEMENT

- A. Retain a full-time Superintendent, satisfactory to the Owner and Engineer. The Superintendent shall not be changed except with the consent of the Owner and Engineer. The Superintendent shall be in full charge of the Work.
- B. Complete the Work in a continuous uninterrupted operation. Use sufficient personnel and adequate equipment to complete the Work within the Contract Time.

1.4 COORDINATION

- A. Do not interfere with the operation of the existing facilities.
- B. Coordinate with appropriate utility companies, as well as with the Owner, where the Work crosses or is adjacent to existing utilities.

1.5 PROJECT MEETINGS

- A. Pre-Construction Conference
 - 1. The Contractor shall be prepared to discuss the following subjects at the Pre-Construction Conference. Documentation for these items is required to be submitted within the time frames included in individual specification sections.
 - a. Project scheduling
 - b. Sequencing of critical path Work items
 - c. Shop Drawing procedures
 - d. Project changes and clarification procedures
 - e. Use of sites, access to Work areas, office and storage areas, security and temporary facilities
 - f. Contractor safety plan and representative
 - g. Progress payments and procedures
 - h. Required documentation
 - i. Project personnel contact list
- B. Progress Meetings
 - 1. Progress meetings will be held every 2 weeks and at other times as requested by the Owner or as required by the Progress of the Work.
 - 2. The Contractor's Superintendent shall attend all progress meetings.
 - 3. At a minimum, progress meetings will review Work progress, schedule, Shop Drawing submission schedule, Applications for Payment, and other matters needing discussion and resolution.
 - 4. Review the schedule with all parties to be affected by upcoming work.
 - 5. Review the monthly construction report required under Section 01325.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL

- A. Notify Call Before You Dig at 1-800-922-4455 at least 72 hours prior to any digging, trenching, rock removal, demolition, borings, backfill, grading, landscaping, or any other earth moving operations.

3.2 COORDINATION WITH THE OWNER'S OPERATIONS

- A. Notify the Owner and Engineer, in writing, a minimum of 1 week in advance of commencing Work on site. Work on site shall not occur until all necessary permits are obtained.
- B. Notify the Owner and Engineer, in writing, a minimum of 1 week before commencing any work which may affect the Owner's operations.
- C. Perform all construction activities so as to avoid interference with operations of the facility and the work of others.
- D. Coordinate the following operations with the Owner and the Engineer:
 - 1. Lowering the level of the reservoir through active drawdown to allow work on the upstream face of the dam to commence.
 - 2. Mark trees to be cleared and grubbed and notify the Owner one week in advance of cutting to allow the Owner to review.
- E. The Owner has the authority to order the Work stopped which could unreasonably result in stopping the necessary functions of the dam. Any costs and/or delays associated with these work stoppages due to the Contractor's operation shall be borne by the Contractor.

3.3 COORINDATION WITH ENGINEER & OWNERS REPRESENTATION

- A. Contractor shall coordinate with Engineer and Owner's representative on a regular basis.
- B. Contractor shall coordinate with Engineer and Owner's representative for confirmation of quantities of unit price work, critical tie ins, and daily activities on site.
- C. Contactor shall provide equipment and services to allow Engineer and Owner's representative to perform visual inspections of the work and confirm unit price quantities. Contractor shall assist Engineer and Owner's representative with confirmation of unit price quantities as required.

3.4 SEQUENCE OF CONSTRUCTION

- A. Constructing the proposed improvements while maintaining existing operations will require a specific sequence of construction. The Contractor will be allowed reasonable flexibility in scheduling the construction activities. Provide a detailed construction schedule as required in Section 01325.

END OF SECTION

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SECTION 01320

CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Photographs taken at specified intervals before, during and after construction.

1.2 SUBMITTALS

A. Informational Submittals

1. Submit electronic files of each photograph on a USB flash drive.

PART 2 PRODUCTS

2.1 CONSTRUCTION PHOTOGRAPHS

A. Electronic files shall be in .jpg format.

PART 3 EXECUTION

3.1 PRE-CONSTRUCTION PHOTOGRAPHY

- A. The area to be photographed shall include, but not be limited to, the area within and adjacent to the proposed construction, including roadways, utilities, driveways, landscaping, trees, structures and buildings.
- B. Provide enough preconstruction photographs to document the preconstruction condition of the Site and adjacent properties.

3.2 PROGRESS PHOTOGRAPHY

- A. Take construction photographs of active work areas at least every 2 weeks throughout the life of the Contract. The photographs shall be indicative of the work that is currently in progress. A minimum of 3 photographs shall be taken at each scheduled interval at each location where Work is in progress.

3.3 POST-CONSTRUCTION PHOTOGRAPHY

- A. Provide post construction photography after all Work has been completed at each location. The areas to be photographed shall match those described in Paragraph 3.1 for the preconstruction photography.

END OF SECTION

<J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01320 - Construction Photographs.docx>

SECTION 01325

SCHEDULING OF CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Progress Schedule
 - 2. Anticipated Sequence of Construction
- B. Related Requirements
 - 1. Section 01140 - Work Restrictions
 - 2. Section 01310 - Coordination

1.2 REFERENCES

- A. The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry, an Associated General Contractors (AGC) of America publication.

1.3 PROGRESS SCHEDULE

- A. Network Analysis
 - 1. Prepare an electronic network analysis using the critical path method under concepts and methods outlined in the current edition of the AGC's "The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry."
- B. Graphically show the order and interdependence of activities, sequence of Work, how the start of a given activity depends on completion of preceding activities, and how completion of an activity may restrain the start of subsequent activities.
- C. The Work shall be planned by the Contractor and his Project field superintendent in coordination with all Subcontractors and Suppliers whose Work is shown on the Progress Schedule.
- D. Include, at a minimum, the following activities on the Progress Schedule:
 - 1. Project mobilization
 - 2. Submittal and approval of Shop Drawings
 - 3. Procurement of equipment and critical materials
 - 4. Installation of equipment and critical materials
 - 5. Fabrication of special equipment and material, and its installation and testing
 - 6. Final inspecting and testing
 - 7. Punchlist
 - 8. Final cleanup

9. Substantial and Final Completion dates
 10. Other activities that may be critical to the Progress Schedule
 11. All activities of the Owner and the Engineer which affect progress and/or affect required dates for completion of the Work
- E. Take into consideration Shop Drawing submittal and approval time, the delivery times of equipment and materials, Subcontractors' Work, availability and abilities of workmen, weather conditions, any restrictions in operations at the Work site, and all other items that may affect completion of the Work within the Contract Time.
 - F. The Progress Schedule shall reflect the requirements and constraints outlined in Section 01310, Coordination.
 - G. The Progress Schedule shall reflect Work restrictions outlined in Section 01140.
 - H. Show information in such detail that duration times of activities will range from one to 15 days. The selection and number of activities shall be subject to the approval of the Owner and Engineer.
 - I. The Progress Schedule should show preceding and following event numbers for each activity, description of each activity, and activity duration in calendar days.
 - J. Submit the Progress Schedule on maximum sheet size 30-inches high by the width required.

1.4 SUBMITTALS

- A. Informational Submittals
 1. Submit four prints of the preliminary Progress Schedule prepared in accordance with Article 2.05 of Section 00700 and the requirements of this section. Progress schedule must be submitted within 10 days after the Effective Date of the Agreement. Progress Schedule must be approved by the Owner and Engineer before the first progress payment will be made.
 2. Revised analyses - Within 10 days after receipt of the review comments, submit four prints of the Progress Schedule revised in accordance with those comments.
 3. Periodic reports - On the first progress meeting of each month, submit four prints of the updated Progress Schedule, as well as a report of construction activities in the prior month.
 4. Before initiating the Work, submit an estimated monthly rate of Contractor payments for the project. If the payment schedule deviates from the original projection, submit a revised rate of expenditure schedule.

1.5 ANTICIPATED SEQUENCE OF CONSTRUCTION

- A. Constructing the proposed improvements will require a specific sequence of construction. The Contractor will be allowed reasonable flexibility in scheduling the construction activities. The anticipated sequence of construction is outlined below and generally involves riprap buttress first, then the upstream face and dam crest, and followed by the spillway section. However, certain items presented in the anticipated

sequence of construction can occur concurrently or in a different order, other items must be completed in the order below.

- B. Contractor must install erosion control protection on the downstream slope before work on the dam crest.
1. Install construction access road.
 2. Establish a work surface connected to the temporary construction access road on the downstream face of the dam by means of matting.
 3. Drawdown reservoir impoundment.
 4. Demo existing spillway weir, training wall, and stone wall.
 5. Extend low-level outlet pipe.
 6. Install majority of downstream rip rap to stabilize the dam.
 7. Install control of water phase 1.
 8. Demo dam crest, shotcrete, and unsound concrete face.
 9. Pour concrete crest and repair concrete face.
 10. Install guide railing.
 11. Install control of water phase 2.
 12. Demo left side of dam concrete. Remove rock in spillway channel.
 13. Construct spillway, channel, and training wall. Install remaining downstream rip rap. Upstream grading and rip rap.
 14. Remove temporary infrastructure, site cleanup, and complete any remaining work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01330

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Action Submittals
 - 2. Informational Submittals

1.2 DEFINITIONS

- A. Action Submittals – includes written and graphic information submitted by Contractor that requires Engineer’s approval.
- B. Informational Submittals – includes information submitted by Contractor that does not require Engineer’s approval. The Engineer will acknowledge receipt of such documents and provide comments when the submittals lack the detail required by the Contract Documents.

1.3 ACTION SUBMITTALS

- A. Shop Drawings
 - 1. Shop Drawings as defined in the General Conditions, and as specified in individual work sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation drawings, schedule information, piece part drawings, actual shop work manufacturing instructions, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certification, as applicable to the Work.
 - 2. Shop Drawings shall be of standardized sizes to enable the Owner to maintain a permanent record of the submissions. Approved standard size drawings shall be
 - a. 24 inches by 36 inches
 - b. 22 inches by 34 inches
 - c. 11 inches by 17 inches
 - d. 8.5 inches by 11 inches
 - 3. Submit Shop Drawings at the proper time to prevent delays in delivery of materials. Coordinate submittals for related or interdependent equipment.
 - 4. Advise the Engineer in writing of any deviations from the requirements of the Contract Documents.
 - 5. Check all Shop Drawings regarding measurements, size of members, materials, and details to determine if they conform to the Contract Documents. Shop Drawings found to be inaccurate, not in compliance, or otherwise in error shall be returned to the Subcontractors or Suppliers for correction before submission to the Engineer. Drawings that are current shall be marked with the date, name, and approval stamp of the Contractor.

6. All details on Shop Drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the Shop Drawings before being submitted for approval.
 7. Detailed installation drawings (sewers, equipment, piping, electrical conduits and controls, HVAC work, and plumbing, etc.) shall be drawn to scale and fully dimensioned.
 8. No material or equipment shall be purchased or fabricated until the required Shop Drawings have been submitted and approved. Materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by the Shop Drawings.
 9. Until the necessary approval has been given, do not proceed with any portion of the work, the design or details of which are dependent upon the design or details of work, materials, equipment or other features for which approval is required.
 10. If submitted equipment requires modifications to the structures, piping, layout, or other details shown on the Drawings, details of the proposed modifications must also be submitted for approval. If such equipment and modifications are approved, perform all Work necessary to make such modifications at no additional cost to the Owner.
- B. Product Data: Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing, and printed product warranties, as applicable to the Work.
- C. Samples and color selection charts: Provide sample, when requested by individual Specification to establish conformance with the Specifications, and as necessary to define color, texture and pattern selections available.
- D. Product Substitutions: In accordance with Section 01630.
- E. Operation and Maintenance Manuals: In accordance with Section 01770.
- F. Schedule of Values: In accordance with Section 01295.
- G. Site Usage Plan: In accordance with Section 01140.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Schedule of Submittals
1. Submit a preliminary Schedule of Submittals within 10 days of the Effective Date of the Agreement in accordance with Article 2.05 of Section 00700.
- B. Schedule of Manufacturers and Suppliers

1. Submit a schedule of manufacturers and Suppliers within 7 days after Notice to Proceed including the names and addresses of the manufacturers and Suppliers of materials and equipment to be incorporated into the Work.
- C. Certificates of Compliance
1. General:
 - a. Submit sworn certificates from the manufacturer or material supplier that the materials and fabrications provided under the Specification section conform with the Contract Documents.
 - b. Certificates shall be signed by an officer of the manufacturer's corporation and witnessed by a Notary Public.
 2. Welding: Submit in accordance with individual Specification sections.
 3. Installer: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements as specified in individual Specification sections.
 4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
 5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency, or when specified in individual Specification sections.
 6. Manufacturer's Certificate of Compliance: In accordance with individual Specification sections.
- D. Application for Payment
1. Submit applications for payment in accordance with Section 01270, Measurement and Payment or Section 01290, Application and Certificate for Payment.
 2. Submit schedule of stored materials when requesting payment for materials not yet installed.
- E. Construction Photography and Videography: Provide preconstruction, progress, and post-construction photography and videography in accordance with Sections 01320 and 01321.
- F. Contract Closeout Submittals: In accordance with Section 01770.
- G. Contractor Design Data
1. Written and graphic information
 2. List of assumptions
 3. List of performance and design criteria
 4. Summary of loads or load diagram
 5. Calculations
 6. List of applicable codes and regulations

7. Name and version of software
 8. Information requested in individual Specification section
- H. **Manufacturer's Instructions:** Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification sections.
- I. **Schedules -** Submit construction progress schedules and schedule updates in accordance with Section 01325.
- J. **Statement of Qualifications:** Submit evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty subcontractor, trade, specialist, consultant, installer, and other professionals.
- K. **Submittals Required by Laws, Regulations, and Governing Agencies**
1. Submit promptly notifications, reports, certifications, payrolls, and other required information as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 2. Transmit to Engineer for Owner's records, one copy of correspondence and transmittals (including enclosures and attachments) between Contractor and governing agency.
- L. **Test and Inspection Reports**
1. Submit test and inspection reports as required by individual Specification sections.
 2. Test and inspection reports shall contain signature of person responsible for test or report.
 3. Reports shall include identification of product and Specification, project name, date and time of test, type of test, location, test results, corrective action required if report indicates test is not in compliance with Contract Documents, interpretation of test results, and other information as required in individual Specification sections.
- M. **Health & Safety Plans:** When specified in individual Specification sections, prepare and submit a Health and Safety Plan modified or supplemented to include job-specific considerations.
- N. **Submittals stamped by another Professional Engineer:** When specified in individual Specification sections, prepare and submit calculations and/or drawings stamped by a Professional Engineer licensed in the State where the work is being performed.
- O. **Coordination Drawings:** When specified in individual Specification sections, prepare and submit drawings to show how multiple system and interdisciplinary work will be coordinated. Examples are conduit routing diagrams, duct layouts, utility coordination drawings, sprinkler plans etc.
- P. **Work Plans:** When specified in individual Specification sections, prepare and submit copies of all work plans needed to demonstrate to the Owner that Contractor has adequately thought-out the means and methods of construction and their interface with existing facilities.

- Q. Erosion Control Plan: When specified in Contract Documents or required by local ordinances or regulations, prepare and submit copies of erosion control plans.

1.5 PROCEDURES

A. Coordination

1. Prepare and submit documentation in advance of fabrication and product manufacturer, so that the installation will not be delayed, other related work can be properly coordinated, and there is adequate time for review and resubmission, if required.
2. Provide no less than 30 days for review of submittals from the time received by the Engineer. For submittals of major equipment, that require more than 30 days to review, due to complexity and detail or those requiring review by multiple engineering disciplines, Engineer will notify Contractor of the circumstances and identify the anticipated date when the submittal will be returned.
3. Re-submittals will be subject to same review time.
4. No extension of time will be authorized due to failure to provide approvable submittals sufficiently in advance of the Work.

B. Review Shop Drawings, product data, and samples prior to submission and verify and determine:

1. Field measurements
2. Conformance with the Contract Documents. Advise the Engineer in writing of any deviations from the requirements of the Contract Documents.
3. Delete or strike out information that is not applicable to the Work.

C. Upload the electronic submittal files via Procore. Access to Procore will be provided by the Engineer. Files must be in .pdf format. The submittals will be returned in electronic .pdf format via Procore.

D. In addition to the electronic submission requirement, submit two hard copies of each submittal: one for Owner and one for Engineer's construction observer, if requested.

1. Samples – Provide one sample unless otherwise noted in the individual Specification section. Sample will be retained by Engineer in the field.

E. Numbering: Submissions shall be accompanied by a transmittal form referencing the project name and applicable Specification section. Submittals shall be numbered sequentially, with the applicable Specification section and a hyphen preceding the number. (e.g. Submittal number 11330-01). Resubmittals shall bear the same transmittal number with a revision number commencing with "1" (e.g. Submittal number 11330-01-1).

F. Provide a copy of the Submittal Certification Form (copy attached at the end of this section) which shall be attached to every copy of each submittal as required under Article 7.16 A.2 of Section 00700. Apply the Contractor's stamp and initials or signature certifying that the submission has been thoroughly reviewed for completeness, compliance with the Contract Documents, coordination with adjacent construction and dimensional compatibility. Items submitted without the stamp or that are incomplete will be returned by the Engineer for rework and resubmission.

- G. Provide a copy of the PE Certification Form (copy attached at the end of this section) which shall be attached to every copy of each submittal stamped by another Professional Engineer. Items submitted without the completed certification form will be returned by the Engineer for resubmission.
- H. Distribute copies of reviewed submittals along with the Engineer's transmittal to concerned parties with instructions to promptly report any inability to comply with the provisions or integrate the requirements with interfacing work.
- I. Partial and Incomplete Submittals
 - 1. Shop Drawings shall be submitted as a complete package by Specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials, and samples associated with each Specification section be included as a single submittal for the Engineer's review.
 - 2. Engineer will return entire submittals if preliminary review deems it incomplete including:
 - a. Missing or incomplete Submittal Certification Form
 - b. Insufficient number of copies
 - c. Missing content
 - 3. Partial submittals may be considered, at Engineer's option, only when necessary to expedite the Project.
 - 4. Partial submittals shall be clearly identified as such on the transmittal to identify missing components.
- J. Submittals not required by the Specification will be returned without review or action code.
- K. Resubmission
 - 1. Make corrections and modifications required by the Engineer and resubmit until approved.
 - 2. Clearly identify changes made to submittals and indicate other changes that have been made other than those requested by the Engineer.
 - 3. A maximum of two re-submissions of each shop drawing will be reviewed, checked and commented upon without charge to the Contractor (total of 3 submittals). Any additional submissions which are required by the Engineer to fulfill the stipulations of the Contract Documents will be charged to the Contractor as described in paragraph 7.16.E.2 of Section 00700.
- L. Distribution
 - 1. Distribute approved Shop Drawings and approved product data to the Project Site and elsewhere as required to communicate the information to Suppliers, Subcontractors, and field personnel.

1.6 ENGINEER'S REVIEW

- A. The Engineer will review submittals for design, general methods of construction and detailing. The Engineer's review and approval of submittals shall not be construed as a complete check nor does it relieve the Contractor from responsibility for any

departures or deviations from the requirements of the Contract Documents unless he has, in writing, called the Engineer's attention to such deviations at the time of submission. It will not extend to means, methods, technique, sequences, or procedures of construction (except where specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto.

- B. The Engineer's review of the submittals shall not relieve the Contractor from the responsibility for proper fitting of the Work, or the responsibility of furnishing any work required by the Contract Documents which may not be indicated on the submittals. The Contractor shall be solely responsible for any quantities shown on the submittals.
- C. If the Contractor considers any correction indicated on the submittals to constitute a change to the Contract Documents, the Contractor shall provide written notice to the Engineer at least 7 working days prior to release for manufacture.
- D. When the submittals have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- E. Action submittals as defined in paragraph 1.2 will be reviewed and returned under one of the following codes:
 - 1. Approved (Action Code 1) is assigned when there are no notations or comments on the submittal. Equipment or materials may be released for manufacture, provided that it complies with requirements of the Contract Documents.
 - 2. Approved as Noted (Action Code 2) is assigned when there are notations or comments on the submittal, but the equipment or materials may still be released for manufacture. All notations and comments must be incorporated in the final product. Resubmission is not necessary.
 - 3. Revise and Resubmit (Action Code 3) is assigned when there are notations and comments requiring a resubmittal of the package. Work cannot proceed until the submittal is revised and resubmitted for review.
 - 4. Not Approved (Action Code 4) is assigned when the submittal contains non-specified items or does not meet the requirements of the Contract Documents. It may also be assigned when there is a significant amount of missing material required for the Engineer to perform a complete review. The entire package must be resubmitted, revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the Contract Documents.
- F. Informational submittals as defined in paragraph 1.2 do not require approval by the Engineer. Such submittals will be returned under one of the following codes:
 - 1. Receipt Acknowledged (Action Code 5) is assigned when the submittal is provided for documentation purposes and is acknowledged as received. Comments may be noted using this action code.
 - 2. Revise and Resubmit (Action Code 6) is assigned when there are notations and comments requiring a resubmittal of the package.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SUBMITTAL CERTIFICATION FORM

PROJECT: _____
ENGINEER: _____ ENGINEER'S PROJECT NO.: _____
CONTRACTOR: _____ CONTRACTOR'S PROJECT
NO.: _____

TRANSMITTAL NO.: _____ SUBMITTAL NO.: _____
SPECIFICATION NO.: _____ DRAWING NO: _____
DESCRIPTION: _____
MANUFACTURER: _____

The above referenced submittal has been reviewed by the undersigned and I/we certify that the materials and/or equipment meets or exceeds the project specification requirements; that field measurements, dimensions, quantities, specified performance criteria, installation requirements, materials, catalog numbers and related materials have been verified; that all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the work has been determined and verified; that review includes all information related to the contractor's sole responsibility for means, methods, techniques, sequences, and procedures of construction and safety; and item has been coordinated with the overall project with:

- NO DEVIATIONS

- A COMPLETE LIST OF DEVIATIONS AS FOLLOWS:

SUBMITTED BY: _____ DATE: _____

GENERAL CONTRACTOR'S STAMP

PE CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of Connecticut and that he/she has been employed by

_____ to design
(Name of Contractor)

(Insert PE Responsibilities)

In accordance with Specification section _____ for the

(Name of Project)

The undersigned further certifies that he/she has performed the said design in conformance with all applicable local, state and federal codes, rules and regulations; and, that his/her signature and PE stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the

(Insert Name of Owner)

or Owner's representative within seven days following written request therefor by the Owner.

PE Name

Contractor's Name

Signature

Signature

Title

Title

Address

Address

SECTION 01350

HEALTH & SAFETY PLAN

PART 1 GENERAL

1.1 SUMMARY

A. The Contractor shall:

1. develop a site-specific Health and Safety Plan (HASP) specifically addressing the potential hazards that may be encountered at the work site. The HASP shall include the information described in this specification (as applicable) and meet all applicable OSHA requirements.
2. furnish all labor, equipment, materials, and employee training for effective implementation of the HASP and worker health and safety protection of all Contractor personnel.
3. furnish all labor, equipment, materials, and employee training to effectively complete any required air monitoring and/or decontamination.
4. review the requirements and data provided for the project and supplement the HASP with any additional measures deemed necessary to fully comply with applicable regulatory requirements and to adequately protect personnel on the site.
5. maintain a copy of the HASP at the worksite, accessible to employees working at the site.
6. post the emergency response plan section of the HASP, inclusive of emergency alerting and response procedures and directions to the nearest hospital, in a visible location for all workers to see.

B. Related Sections

1. 02220 – Demolition

1.2 SITE-SPECIFIC PROJECT CONDITIONS

A. The nature of the materials present at the site may require use of special protective clothing and the possible use of respiratory protective equipment, which is intended to help minimize worker exposure to known or suspected site hazards.

1. Levels of personal protection are established in reference standards and generally described for Levels C and D herein. It is anticipated that a majority of the Work to be performed on this project may be performed at Personnel Protection Level D.
2. The Contractor shall be responsible for determining if a higher level of personnel protection is required based on the criteria outlined in the Contractor's HASP. In the event that the Contractor determines that a level of protection higher than Level D is required, the Contractor's personnel shall take the necessary steps outlined in the Contractor's HASP.

3. The Contractor shall notify the Engineer and Owner in writing prior to implementing any upgrades in personal protection. The Engineer will review the Contractor's notification and determine the need to notify other applicable agencies.
4. Contractor will be subject to periodic safety inspections by the Owner's third party inspector.

1.3 REFERENCES

- A. OSHA 29 CFR Part 1910 (General Industry standards)
- B. OSHA 29 CFR Part 1926 (Construction Standards)
- C. OSHA Regulation 29 CFR §1926.62 (Lead)

1.4 DEFINITIONS

- A. CHMM: Certified Hazardous Materials Manager, as certified by the Institute of Hazardous Materials Management.
- B. CIH: Certified Industrial Hygienist, as certified by the American Board of Industrial Hygiene®.
- C. CSP: Certified Safety Professional, as certified by the Board of Certified Safety Professionals.
- D. Site Safety and Health Official (SSHO): The individual located at a job site who is responsible to the Contractor and has the authority and knowledge necessary to implement the HASP and verify compliance with applicable safety and health requirements.

1.5 SUBMITTALS

- A. On-site Work shall not begin until the HASP has been submitted by the Contractor and accepted by the Owner/Engineer.
- B. Informational Submittals
 1. Submit the following within thirty (30) days after the Effective Date of the Agreement.
 - a. A site-specific HASP, including the information described in this Specification as applicable.
 - 1) The HASP must be reviewed, approved, and signed by Contractor representative, with specific responsibility for safety for the Contracting company.
 - 2) The Engineer's review is only to determine if the HASP is consistent with the minimum requirements of this specification. Engineer has no control over contractor's health & safety and the means and methods of health & safety implementation. Engineer also does not perform health & safety monitoring of Contractor's Work.

- 3) The review will not determine the adequacy of the HASP to address all potential hazards, as that remains the sole responsibility of the Contractor.
- b. Documentation of qualifications and experience of the SSHO.
- c. Applicable health and safety training records.

1.6 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor is solely responsible for the health and safety of workers employed by the Contractor, any subcontractor, vendors/manufacturers, site visitors and anyone directly or indirectly employed by any of them.
- B. Provide a designated SSHO for the project.
- C. Pre-arrange emergency medical care services at a nearby hospital or medical clinic, including establishment of an emergency notification process and emergency routes of travel.
- D. Conduct pre-entry and weekly safety meetings with all site personnel, documenting attendance and topics covered.
- E. Develop and implement the site-specific HASP, inclusive of the elements in contained in this specification.
- F. For projects where contaminated media are known, likely, or suspected to be encountered:
 1. monitor air quality in and around the work area using appropriate air monitoring equipment.
 2. develop and implement a respiratory protection program per 29 CFR §1910.134 and 29 CFR §1926.103 for all workers authorized to wear respirators.
 3. record all air quality readings and maintain records on site.
 4. stop work and/or upgrade respiratory protection or personal protective equipment levels if action levels established in the HASP are exceeded.
 5. ensure that the degree and type of respiratory protection provided is protective for the monitored concentrations and individual chemical parameters.
 6. lawfully dispose of all personal protective equipment that cannot be decontaminated.

1.7 HEALTH & SAFETY PLAN (HASP) REQUIREMENTS

- A. The following items shall be included/addressed in the HASP:
 1. a safety and health risk or hazard analysis for each site task and operation in the workplan;
 - a. a physical hazard evaluation and hazard control plan shall be included covering, but not limited to the following, as applicable:
 - 1) equipment operation;

- 2) confined space entry;
 - 3) slips, trips, and falls;
 - 4) building collapse;
 - 5) falling debris;
 - 6) encountering unmarked utilities;
 - 7) cold and heat stress;
 - 8) hot work (cutting and welding);
 - 9) drum and container handling;
 - 10) trench and/or excavation entry.
2. the employee safety and health training program covering each site task and operation in the workplan.
 3. personal protective equipment to be used for each site task and operation in the workplan.
 4. site control measures to address visitors, delivery personnel, and to protect the worksite from unauthorized access.
 5. an emergency response plan for the safe and effective response to foreseeable emergencies;
 - a. including, but not limited to the following:
 - 1) a map indicating the route to a nearby hospital or medical clinic for emergency medical care;
 - 2) procedures for emergency medical treatment and first aid;
 - 3) site evacuation routes and procedures;
 - 4) emergency alerting and response procedures.

PART 2 PRODUCTS

2.1 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- A. All PPE must conform to the OSHA requirements, as indicated in the previous Reference Standards Section. Various PPE to be furnished by the Contractor under different levels of protection for their own personnel and subcontractor's personnel include, but are not limited to, the following:
 1. Level D Protection:
 - a. Coveralls or Tyvek
 - b. Gloves
 - c. Safety boots/shoes
 - d. Safety glasses

- e. Hearing protection (for high noise operations)
 - f. Hard hat with optional face shield
2. Level C Protection:
- a. Air-purifying respirator
 - b. Chemical protective overalls or Coveralls (e.g., Saran coated Tyvek)
 - c. Gloves, inner (disposable, surgical type)
 - d. Gloves, outer (Neoprene, Nitrile, Viton or Butyl)
 - e. Boots, chemical protective, steel toe and shank (Neoprene or Nitrile)
 - f. Booties, chemical protective (disposable PVC)
 - g. Hard hat
 - h. Face shield (if necessary)
3. Levels B and A represent increased levels of personal protection and are described in the Reference Standards.
4. Contractor is fully responsible for all PPE selection (including the various stages of protection), proper use, maintenance, and continuous monitoring.

PART 3 EXECUTION

3.1 HEALTH AND SAFETY PLANNING AND IMPLEMENTATION

- A. Implement the HASP throughout the execution of all applicable work.
- B. The Contractor shall perform all monitoring as detailed in the HASP.
- C. Contractor(s) shall implement routine health and safety meetings and any follow-up supplemental briefings.
- D. Provide applicable health and safety training for all personnel who may come in contact with or be exposed to various dangerous, hazardous, or changing site conditions.
- E. Personnel who have not received applicable training and who are not equipped with the required PPE, shall not be permitted access to the site by the Contractor during the course of the work that may result in potential exposures to unsafe or hazardous site conditions.

3.2 PERSONNEL AND EQUIPMENT DECONTAMINATION

- A. All equipment shall be provided to the work site free of contamination. Engineer may prohibit from the site any equipment which in his opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of Contractor's equipment prior to arrival at the site shall be at the expense of Contractor. Contractor is

prohibited from decontaminating equipment on the project site which is not thoroughly decontaminated prior to arrival.

- B. Contractor shall furnish labor, materials, tools, and equipment for decontamination of all personnel, equipment and supplies which are used to handle contaminated materials.
- C. Properly store and dispose of contaminated PPE and all other generated decontamination waste.

3.3 INCIDENT REPORTING

- A. The Contractor shall comply with all accident and/or incident reporting requirements, including the following:
 - 1. Should any unforeseen safety-related factor, hazard, or condition become evident during the course of the work, the Contractor must immediately take action to establish, maintain, and secure the site and working conditions. This shall be followed by immediate notice to the Owner and Engineer.
 - 2. If injury to any person on-site occurs, the Contractor shall immediately report the incident to the Owner and Engineer. Corrective actions shall be implemented.

END OF SECTION

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SECTION 01450

QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Quality assurance and control of the Work
 - 2. Testing and inspection services
 - 3. Product test reports
 - 4. Manufacturer's field service
- B. Related Requirements
 - 1. Section 01451 - Independent Testing Services
 - 2. Testing requirements are described in various Sections of the Project Manual.

1.2 SUBMITTALS

- A. Informational Submittals
 - 1. Product test reports

1.3 QUALITY ASSURANCE

- A. Monitor quality control over Suppliers, products, services, site conditions, and workmanship to produce Work of specified quality.
- B. Comply fully with manufacturer's instructions. Should these instructions conflict with the Specifications, request clarification from the Owner before proceeding.
- C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or requirements indicate higher standards or more precise workmanship.

1.4 TESTING SERVICES FURNISHED BY CONTRACTOR

- A. Furnish all testing services required for materials and equipment proposed to be used in the Work, and quality control tests made in the field including:
 - 1. Concrete materials and mix designs
 - 2. Concrete in place
 - 3. Modified proctor analyses for all borrow materials used on the Project
 - 4. Modified proctor analysis of all subgrade material to be compacted during surface preparation and fine grading and compaction work
 - 5. Sieve analyses for all borrow materials used on the Project
 - 6. Soil structure and nutrient analyses for all loam and topsoil used on the Project

7. Compaction tests performed during trench backfilling and compaction, rough grading and site preparation, fine grading and compaction of roadway and sidewalk subgrades, and placement of roadway and sidewalk subbase materials
 8. Design of asphalt mixtures
 9. Asphalt in place
 10. Field welded joints
 11. All other tests and engineering data as required in the Contract Documents.
- B. Testing agencies must meet the requirements of Section 01451.
 - C. An independent commercial testing laboratory, with current Connecticut certification, shall perform all tests that require the services of a laboratory to determine compliance with the Contract Documents. Independent testing laboratory requirements are defined under Section 01451.
 - D. Secure and deliver the required number of samples to the laboratory as required by the Contract Documents.
 - E. Notify Owner and Engineer of time, location and material being sampled.
 - F. Schedule necessary testing laboratory services.
 - G. Furnish written reports of each test within 48 hours of completion of testing.
 - H. Notify the Engineer 48 hours prior to operations requiring inspections and laboratory testing services so the Engineer may witness testing. All failed test areas shall be re-worked and re-tested until passing results are obtained.
 - I. The Owner may hire its own independent testing laboratory for quality control tests made in the field or laboratory on materials and equipment during and after their incorporation in the Work. Cooperate with the Owner and independent testing laboratory and furnish samples of materials, design, mix, equipment, tools, storage, and assistance as requested.
 - J. Re-work all failed test areas until passing results are obtained. All re-tests required as a result of the Contractor's failure to perform the work in accordance with the Contract Documents shall be at the Contractor's expense.
- 1.5 CODE COMPLIANCE TESTING
- A. Provide inspections and tests required by codes or ordinances, or by a legally constituted authority having jurisdiction over the Work.
- 1.6 PRODUCT TEST REPORTS
- A. Submit 2 copies of product test reports where required by the Contract Documents.
- 1.7 SUPPLIERS' FIELD SERVICE
- A. Provide qualified field service and installation personnel from material and equipment Suppliers to observe site conditions, installation techniques, quality of workmanship, equipment start-up, adjustment, and performance test where required by the Contract Documents. Observations are to be reported and incorporated in the Work procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01451

INDEPENDENT TESTING SERVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Independent testing services including geotechnical, concrete, grout and mortar, and welding inspection and testing
 - 2. Testing laboratory services
- B. Related Requirements
 - 1. Section 01450 - Quality Control
 - 2. Section 02315 - Excavation, Backfill, Compaction and Dewatering
 - 3. Section 02320 - Borrow Material
 - 4. Section 03300 - Cast-in-Place Concrete

1.2 REFERENCES

- A. General
 - 1. ASTM E329 – Standard Specifications for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction
- B. Soil Testing
 - 1. American Association of State Highway and Transportation Officials (AASHTO)
- C. Concrete Testing
 - 1. Cement and Concrete Reference Laboratory (CCRL)
- D. Welding Inspection
 - 1. AWWA D-100-96 or latest version - AWWA Standard for Welded Steel Tanks for Water Storage
 - 2. American Welding Society (AWS) B1.11 - Guide for the Nondestructive Examination of Welds
 - 3. AWS B5.1 - Specifications for the Qualifications of Welding Inspectors
 - 4. AWS B5.15 - Specifications for the Qualifications of Radiographic Interpreters
 - 5. AWS ARE - 6 Test Methods for Evaluating Welded Joints
 - 6. AWS ARE - 10 Monitoring and Control of Welding and Joining Processes

1.3 SUBMITTALS

- A. Informational Submittals

1. Qualifications, experience, and certifications of each proposed testing service
2. Certificate of calibration for testing equipment
3. Inspection and test reports

1.4 QUALITY ASSURANCE

A. General

1. Comply with the requirements of Section 01450, Quality Control, for testing and inspection requirements.
2. Testing services shall have the following general qualifications:
 - a. Minimum five years as a firm with the type of testing specified.
 - b. Ability to provide timely field testing services to minimize the impact of the testing requirements on construction progress.
 - c. Certification to perform the specified services in the state in which the Work is to be performed.
3. Testing services proposed by the Contractor shall be subject to review by the Owner and Engineer. Any testing firm not acceptable to the Owner or Engineer will be rejected.

B. All testing agencies and laboratories must meet the requirements of ASTM E329.

C. Testing company shall have been in business for a minimum of the last 5 years providing applicable testing services.

D. Testing equipment shall be calibrated at maximum 12 month intervals by devices of accuracy traceable to National Bureau of Standards. Submit copy of certificate of calibration made by accredited calibration agency.

E. Testing shall be in accordance with applicable codes and regulations referenced in individual Specification Sections, and with selected standards of the American Society for Testing and Materials.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 TESTING SERVICES – GENERAL

A. Provide testing services meeting the following:

1. Provide qualified personnel promptly on notice.
2. Perform inspections required by the Contract Documents. Sample and test materials and observe methods of construction to determine compliance with applicable standards and with the requirements of the Contract Documents.
3. Take specimens and samples for testing, as required in individual Specification Sections. Provide all sampling equipment and deliver all specimens and Samples.
4. Promptly notify the Owner and the Engineer of irregularities or deficiencies in the Work which are observed during performance of services.

5. Promptly submit 2 copies of reports of inspections and tests to the Owner, and one copy to the Engineer including:
 - a. Date issued
 - b. Project title and number
 - c. Testing laboratory or agency name and address
 - d. Name and signature of inspector
 - e. Date of inspection or sampling
 - f. Record of temperature and weather
 - g. Date of test
 - h. Identification of product and Specification Section
 - i. Location of Project
 - j. Type of inspection or test
 - k. Results of tests and observations regarding compliance with Contract Documents

B. Perform additional tests and services as required to assure compliance with the Contract Documents.

C. Obtain Owner's approval of testing laboratory before performing testing services.

D. Coordinate with testing laboratory.

3.2 GEOTECHNICAL TESTING

A. Provide field testing and laboratory services for geotechnical soil testing required in Sections 02315 and 02320.

3.3 CONCRETE TESTING

A. Provide qualified independent field and laboratory testing service to perform the concrete testing required in Division 3 of the specifications.

B. The concrete testing laboratory shall have been inspected by the CCRL within the past five years.

C. The testing laboratory shall be licensed by the State of Connecticut.

D. Field testing technicians shall have a Grade 1 concrete field technician license as issued by the American Concrete Institute (ACI).

3.4 WELDING INSPECTION AND TESTING SERVICES

A. Provide qualified independent welding inspection services as required in Section 13200 of the specifications.

B. The welding inspector(s) shall be qualified under the requirements of AWS B5.1. Radiographic interpretation shall be performed by persons qualified under AWS B5.15.

3.5 COORDINATION WITH TESTING LABORATORY

A. Provide testing laboratory personnel access to site and manufacturer's operations.

- B. Provide laboratory with representative samples of materials to be tested in required quantities.
- C. Furnish labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To facilitate inspections and tests.
 - 3. For laboratory's exclusive use for storage and curing of test samples.
 - 4. to provide forms for preparing concrete test beams and cylinders.
- D. Notify laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests.
- E. Arrange with laboratory and pay for additional inspections, samples, and tests required for Contractor's convenience.

END OF SECTION

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SECTION 01520

CONSTRUCTION FACILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Field office
 - 2. Temporary sanitary and first-aid facilities

1.2 QUALITY ASSURANCE

- A. Maintain temporary construction facilities in proper and safe condition throughout the progress of the Work.

1.3 FIELD OFFICE

- A. Provide and maintain for the duration of the Work at a location approved by the Owner and the Engineer, a separate field office trailer or equivalent, for the exclusive use of the Resident Project Representatives. The plans and construction of the office shall be approved by the Engineer and shall be not less than 250 square feet.
- B. Trailer shall be equipped with two exterior doors with screens, and at least 3 screened and lockable windows. The trailer shall be weather tight and insulated in the walls, floor and ceiling. Doors shall be equipped with cylinder locks and two keys shall be supplied for the Engineer's use.
- C. Each office shall be equipped with the following:
 - 1. 1, flat top, 30" x 60" desks with a minimum of 3 drawers each
 - 2. 1, standard desk arm chairs on rollers
 - 3. 2, desk lamps
 - 4. 1, drafting table at least 48" x 60" with a vinyl lined work surface
 - 5. 1, swivel top drawing stool with padded seat and back
 - 6. 1, drafting table lamp
 - 7. 1, table at least 3 feet wide x 6 feet long with sufficient chairs to seat 6
 - 8. 1, metal four drawer, standard size vertical filing cabinets with lock and keys
 - 9. 1, 3' wide bookcases or equivalent built in shelf space
 - 10. 2, interior door mats.
 - 11. Overhead lighting (75 foot candles minimum)
 - 12. CO₂ fire extinguisher
 - 13. 1, large waste baskets, 1 broom, and dust pan

14. A supply of drinking water with one automatic cooler
 15. Optimal high speed internet connection with unlimited service and wireless router paid through the term of the work.
 16. 1, multifunction printer/scan/copy machine with 11”X17” capabilities, with supplies and a maintenance plan for the duration of the work.
- D. Thermostatically controlled heating units or central system of adequate capacity to maintain 70°F under all cold weather conditions. Thermostatically controlled refrigerant type air conditioners of adequate capacity to maintain a maximum temperature of not more than 68°F under all hot weather conditions.
 - E. Provide daily janitor service.
 - F. Provide paper cups, paper towels, soap, toilet paper and suitable dispensers and holders for each of these items.
 - G. Maintain the office during construction of the Work. The cost for operation of the field office shall be the responsibility of the Contractor.
 - H. Remove all field offices and temporary facilities from the site after the completion of the Work. The premises shall be restored to a condition equivalent to that which existed prior to installation of the facilities, as determined by the Engineer.

1.4 TEMPORARY SANITARY AND FIRST AID FACILITIES

- A. Provide suitably enclosed chemical or self-contained toilets for the use of the labor force employed on the Work. Toilets shall be located near the Work sites and secluded from observation insofar as possible. Toilets shall be serviced weekly, kept clean and supplied throughout the course of the Work.
- B. Contractor shall enforce proper use of sanitary facilities.
- C. Provide a first aid station at the site.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

<J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01520 - Construction Facilities.docx>

SECTION 01570

TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Dust control
 - 2. Drainage and erosion control
 - 3. Compost filter tubes and siltation fence
 - 4. Mulch
- B. Related Requirements
 - 1. Section 02920 – Lawns and Grasses

1.2 SUBMITTALS

- A. Informational Submittals
 - 1. Materials proposed for use in dust control
 - 2. Compost filter tubes, siltation fence, mulch, and temporary diversion piping.

PART 2 PRODUCTS

2.1 COMPOST FILTER TUBES

- A. Compost filter tubes required for siltation control shall consist of a 100% biodegradable sock/tube of cotton, burlap, jute, or similar material, containing a porous compost media designed to filter pollutants from stormwater. Nominal diameter shall be 12-inches and the effective height shall be 9.5 inches.
- B. ‘Photodegradable’ mesh casings shall not be allowed.

2.2 FILTER FABRIC

- A. Filter fabric siltation fencing shall be a woven filter fabric having a weight of at least 2.5 ounces per square yard, a thickness of at least 17 mils, a coefficient of permeability of not less than 0.0009 centimeters per second and allows a water flow rate of a minimum 40 gallons per minute per square yard. The material shall have a high sediment filtration capacity, high slurry flow and minimum clogging characteristics. The material shall be equal to FW-300 as manufactured by Mirafi, Inc., Charlotte, North Carolina; Amoco 2130 by Nilex, Inc., Centennial, CO; MISF 180 by Mutual Industries, PA; or equal.

2.3 MULCH

- A. Hay mulch shall consist of mowed cured grass, clover, alfalfa, timothy, oats, or wheat. No salt hay shall be used.

2.4 EROSION CONTROL BLANKET

- A. Burlap type matting shall be provided meeting requirements of specification section 02075 Geosynthetics. No photodegradable mesh will be allowed.

PART 3 EXECUTION

3.1 DUST CONTROL

- A. Control dust during the Work.
- B. Prevent dust from becoming a nuisance or hazard. During construction, excavated material and open or stripped areas are to be policed and controlled to prevent spreading of the material.
- C. Control dust during the work on-site using calcium chloride and/or water; however, calcium chloride shall not be used within the reservoir watershed.
- D. During the Work on-site, all paved road and driveway surfaces shall be scraped and broomed free of excavated materials on a daily basis. The surfaces shall be hosed down or otherwise treated to eliminate active or potential dust conditions and the natural road or wearing surface shall be exposed.
- E. Ensure that the existing equipment, facilities, and occupied space adjacent to or nearby areas of the work do not come in contact with dust or debris as a result of concrete demolition, excavation or surface preparation for coatings.
- F. Submit for approval materials proposed for use for dust control, prior to start of the Work.

3.2 DRAINAGE AND EROSION CONTROL

- A. Control erosion and siltation during the construction through mulching, erosion control matting, siltation fencing, diversion and control of storm water run-off, ponding areas and similar methods.
- B. Provide and maintain sediment trapping systems.
- C. Discharge surface runoff from any disturbances to the site into silt containment basins. Utilize siltation prevention measures including haybale and geotextile fences before discharge to drainage systems.

3.3 COMPOST FILTER TUBES AND SILTATION FENCE

- A. Place and maintain both compost filter tubes and a staked filter fabric siltation fence where shown on the Drawings or required by permit.
- B. Install compost filter tubes by anchoring tubes butted together to existing ground with stakes placed 4 to 5 feet on center. The stake shall be a minimum of 2-inch square cross section and shall be long enough to penetrate 12 inches into the ground. Replace deteriorated compost filter tubes. Remove and dispose of the compost filter tubes following the successful growth of vegetation in the areas disturbed by the construction. Compost filter tubes shall not be removed until their removal is approved by the Engineer.
- C. Install a filter fabric siltation fence prior to construction and remove after full surface restoration has been achieved. Install the siltation fence as shown on the Drawings. Install as follows:
 - 1. Hand shovel excavate a small trench on the upstream side of the desired fence line location.

2. Unroll the siltation fence system, position the post in the back of the trench (downhill side), and hammer the post into the ground.
3. Lay the bottom 6 inches of the fabric into the trench to prevent undermining by storm water run-off.
4. Backfill the trench and compact.

3.4 RESTORATION

- A. Provide erosion control, seed and mulch and netting for surface restoration of areas disturbed during construction activities.
- B. Provide temporary stabilization of disturbed areas that remain inactive greater than 14 consecutive days to minimize erosion. Methods to minimize erosion may include but are not limited to:
 1. Spreading straw and/or providing temporary planting stabilization.
 2. Installing erosion control matting.
 3. Preparing surfaces to increase the runoff flow path, reduce the runoff flow velocity, or create small storage pockets to retain surface flows. Methods of accomplishing this include using mechanical devices such as track equipment or sheep's foot rollers.
- C. Restore the ground surface in brush and/or woodland areas by machine spreading of existing stripped surface soils (loam and humus), liming, fertilizing, seeding and mulching, as well as installing jute netting where required by steep slopes.
- D. Salvage existing loam and topsoil and stockpile this material for re-spreading where originally removed. On backfilling, grading shall be returned to preconstruction contours and the stockpile of loam shall be spread over areas disturbed during construction activities.
- E. Place mulch on seeded areas. Use erosion control matting on areas having a slope greater than 3 horizontal to 1 vertical, to anchor the mulch until a satisfactory growth is obtained. If seeding is not possible because of the time of the year, apply mulch and matting to stabilize the area until such time as seed can be sown.
- F. Provide grading, refertilizing, reseeding, remulching and/or matting to maintain the restored areas until the Work is accepted by the Owner.
- G. Seed shall be as specified under Section 02920.

3.5 CLEANING

- A. Compost Filter Tubes
 1. Remove accumulated sediment once it builds up to 1/2 of the height of the tube or install a second tube directly on top of the first tube.
 2. Replace damaged tube, or patch with a 3-ft minimum overlap.
 3. Make other repairs as necessary to ensure that the compost filter tube is filtering all runoff directed toward it.
- B. Remove any sediment that builds up around the siltation fence.

- C. Clean sediment trapping devices periodically during the Work. Devices shall be cleaned on a weekly basis, or more frequently if the devices become clogged.

END OF SECTION

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SECTION 01571

CONTROL OF WATER

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes requirements for the control of surface water, including
 - 1. Cofferdams
 - 2. Surface Water Diversion
 - 3. Flood Contingency Plan
- B. Related Requirements
 - 1. Section 00300 – Geotechnical Data
 - 2. Section 01570 – Temporary Controls
 - 3. Section 02315 – Excavation, Backfill, Compaction and Dewatering

1.2 SUBMITTALS

- A. Informational Submittals
 - 1. The following may be separate documents or combined into one plan and should be signed and stamped by a Professional Engineer registered in the state where the work is performed.
 - a. Water Control Plan, including description of approach, plans, location, materials, size, methods, phasing, calculations, and specifications for the control of water, dewatering of/removal of water from enclosed areas.
 - b. Cofferdam designs, including materials, location, construction methods and details, design criteria planned, calculations demonstrating the adequacy of the system, and other items required for the construction of the system.
 - c. Flood Contingency Plan, which shall include:
 - 1) Plans for monitoring for potential flooding conditions and responses to be undertaken if flooding is forecast or occurs.
 - 2) Methods to be implemented for protection of the Work and preventing potential discharges of sediment to the impoundment or downstream resource areas during flooding conditions.
 - 3) Ensure that structures, materials, and equipment will be anchored or restrained to prevent displacement or flotation or will be removed from the floodplain prior to a flood.
 - 4) Identify the storm events that will adversely affect construction activities.
 - 5) Identify the name, address and telephone number of the person(s) responsible for implementing this plan, and contact information

for the Contractor’s superintendent, project manager, local emergency services, and other parties that can be reachable 24/7 in the event of an emergency.

1.3 PROJECT CONDITIONS

A. Bathymetric Data

1. A bathymetric survey was performed by D’Andrea Surveying & Engineering, P.C. in May 2022 and is included in the Drawings. The Contractor is responsible for verifying water depths and sediment thickness as part of planning and design.

B. Estimated Flood Characteristics

1. The following flood flow and elevation information has been obtained from hydrologic and hydraulic modeling performed by Tighe & Bond.

Flow Statistic / Storm Event	Flow Into Reservoir (cubic feet per second)	24-Hour Precipitation Depth (inch)
1-year flood flow	310	3.00
2-year flood flow	420	3.62
10-year flood flow	760	5.47
25-year flood flow	980	6.63
50-year flood flow	1,150	7.50
100-year flood flow	1,320	8.42

2. The following flood elevation immediately upstream of Brush Reservoir Dam has been obtained from hydrologic and hydraulic modeling performed by Tighe & Bond.

Summary for existing dam:

Flow Statistic / Storm Event	Peak Water Level (feet, NAVD88)	Outflow (cfs)
1-year flood flow	367.1	300
2-year flood flow	367.3	420
10-year flood flow	367.7	760
25-year flood flow	367.9	980
50-year flood flow	368.1	1,150
100-year flood flow	368.2	1,320

Summary of dam with Low Level Outlet Open and Existing Spillway Blocked (water surface elevation begins at elevation 341):

Flow Statistic / Storm Event	Peak Water Level (feet, NAVD88)	Outflow (cfs)
1-year flood flow	360.2	38
2-year flood flow	365.7	43
5-year flood flow	367.4	220
10-year flood flow	367.7	440
25-year flood flow	368.0	700
50-year flood flow	368.2	870
100-year flood flow	368.3	1,040

Summary of dam with proposed spillway:

Flow Statistic / Storm Event	Peak Water Level (feet, NAVD88)	Outflow (cfs)
1-year flood flow	361.9	310
2-year flood flow	362.4	420
10-year flood flow	363.5	760
25-year flood flow	364.0	980
50-year flood flow	364.4	1,150
100-year flood flow	364.8	1,320

These flows were calculated using HEC-HMS (v.4.9) using a methodology based on the United States Department of Agriculture’s Technical Release 20 Program (TR-20).

C. Design Criteria

1. Elevations and Flood Events

- a. Provide a suitable temporary cofferdam or water control system sized adequately to control water for normal flows and rainfall events that are likely to occur during construction. Contractor shall be responsible for selection and design of the cofferdam and water control system. Using a two phased approach as shown on Drawings:
 - 1) Minimum elevation for the top of cofferdam in Phase 1 shall be 350 feet.
 - 2) Minimum elevation for the top of cofferdam in Phase 2 shall be 366 feet.
- b. No additional payment shall be made to the Contractor for any damages to the work caused by a flood event up to a 50-year flood; for off-site damages caused by a flood event up to the 50-year flood; or if the cofferdam fails unexpectedly during its design flood or a lesser flood.

- c. The basis for determination of the flood return frequency shall be the measured or calculated flow at the site relative to the flow information presented in this section and not total rainfall or other factors.

PART 2 PRODUCTS

2.1 TEMPORARY COFFERDAM SYSTEM

- A. Provide an efficient temporary cofferdam system to allow safe execution of the work under this contract. Cofferdams constructed of uncontained fill material (e.g. earth, rock systems) will not be acceptable. Examples of acceptable systems are as follows:
 - 1. A steel frame with membrane system such as the one utilized by Portadam Inc., 107 Drivers Lane, Laurel Springs, NJ 08021, Tel. (609) 784-2208
 - 2. 4'x4' Supersacks constructed of polypropylene (filled with sand) and with lifting straps, provided a properly-installed waterproof membrane on the upstream side is included
 - 3. Precast concrete blocks provided a properly-installed waterproof membrane on the upstream side is included
 - 4. Water filled cofferdam, such as the one utilized by Water Structures Unlimited (Aquadam ®)
 - 5. Sheeting, appropriately braced
- B. The Contractor is solely responsible for the design and stability of cofferdams.

PART 3 EXECUTION

3.1 TEMPORARY COFFERDAM SYSTEM

- A. Furnish, install, and remove a safe temporary cofferdam system.
- B. Cofferdam locations will be approximately as shown on the Drawings but may deviate based on actual needs at the site for construction with the Owner's approval. It will be the Contractor's responsibility to obtain any permit revisions associated with deviation of the cofferdam locations.

3.2 DEWATERING

- A. The areas within the cofferdam shall be dewatered and maintained in a dry condition to the extent required to construct the work in accordance with all applicable provisions in other sections of the specifications.

3.3 RESERVOIR DRAWDOWN

- A. Active drawdown by pumps, siphon, or low-level outlet of Brush Reservoir (Gray's Pond) shall be allowed to control the water level.
- B. Contractor shall visually monitor discharge on a regular basis during drawdown looking for discolored water leaving the project site. If discolored water leaving the project site lasts longer than one hour, the Contractor shall perform incident monitoring at their own expense in accordance with the applicable permit requirement.

3.4 DIVERSION

- A. Prevent impacts to upstream and downstream areas (e.g., increased water levels or flow velocities) that may result from temporary flow constrictions as a result of cofferdams and diversions.
- B. Provide scour protection and erosion controls at diversion inlets and discharges so that diversions do not cause scour, erosion, sedimentation, or cause unacceptable levels of turbidity.
- C. Inlets and outlets shall be monitored and maintained free of debris and obstructions.

3.5 MAINTENANCE

- A. Continuously monitor the cofferdam for evidence of movement, deterioration, and excessive seepage throughout use. The cofferdam shall be maintained in good working order as necessary for the safety of workers and the protection of the permanent work.

3.6 FLOODING

- A. Monitor weather and weather related events to anticipate if flood control activities are anticipated. If flooding is anticipated, suspend construction operations, remove equipment which could be damaged, and take such actions and perform such additional work as approved by the Engineer to protect the work and prepare the area for flooding.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Products and Materials
 - 2. Product Delivery Requirements
 - 3. Packaging, Handling and Storage Requirements
 - 4. Inspection of Offsite Work

1.2 QUALITY ASSURANCE

- A. Review all contract Drawings and Specifications with respect to specific system characteristics, applicability of materials and equipment for the intended purposes, sizes, orientation, and interface with other systems, both existing and proposed, and certify that the materials and equipment proposed will perform as specified prior to submitting shop drawings.
- B. Provide sworn certificates as to quality and quantity of materials where specified or requested by the Engineer.
- C. Obtain concurrence of the Engineer prior to processing, fabricating, or delivering material or equipment.

1.3 PRODUCTS AND MATERIALS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by a single manufacturer unless specified otherwise.
- B. Use only new and first quality material in the Work. Material shall conform to the requirements of these Specifications and be approved by the Engineer. If, after trial, it is found that sources of supply that have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved materials from other approved sources.
- C. Immediately remove defective materials and equipment from the site, at no additional cost to the Owner. The Contractor may be required to furnish sworn certificates as to the quality and quantity of materials before materials are incorporated in the Work.
- D. Engineer has the right to approve the source of supply of all material prior to delivery.

1.4 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

- D. Progressively deliver materials and equipment to the Site so there will be neither delay in progress of the Work nor an accumulation of material that is not to be used within a reasonable time.
- E. Deliver products to the Site in their manufacturer's original container, with labels intact and legible.
 - 1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 - 2. The Engineer may reject as non-complying such material and products that do not bear identification satisfactory to the Engineer as to the manufacturer, grade, quality, source, and other pertinent information.

1.5 PACKAGING, HANDLING AND STORAGE REQUIREMENTS

- A. Provide storage and handling of all materials and equipment required for the Work.
- B. Except as otherwise indicated in the Contract Documents, determine and comply with the manufacturer's recommendations on product storage, handling, and protection. Provide manufacturer's documentation on recommended storage procedures when requested by the Engineer.
- C. Properly store and protect all equipment immediately upon its arrival.
- D. Familiarize workmen and subcontractors with hazards associated with materials, equipment, and chemicals specified herein and take all necessary safety precautions.
- E. Areas available on the construction site for storage of material and equipment shall be as shown on the Drawings or approved by the Owner.
- F. Materials and equipment to be incorporated in the Work shall be handled and stored by the manufacturer, fabricator, supplier, and Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft, or damage of any kind to the material or equipment.
- G. Promptly remove materials from the site of the Work which have become damaged or are unfit for the use intended or specified. The Contractor will not be compensated for the damaged materials or their removal costs.
- H. Handle, haul, and distribute all materials and all surplus materials on the different portions of the Work, as necessary or required. Provide suitable and adequate storage room for materials and equipment during the progress of the Work, and be responsible for the protection, loss of, or damage to materials and equipment furnished, until the final completion and acceptance of the Work.
- I. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.
- J. Do not store material or equipment in any wetland or environmentally sensitive area. Stockpile sites shall be level, devoid of mature stands of natural vegetation, and removed from drainage facilities and features, wetlands, and stream corridors.
- K. Contractor shall be fully responsible for loss or damage to stored materials and equipment.
- L. No item judged rusty, corroded or otherwise damaged during storage will be accepted.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

<J:\A\A1000 AWC\195 - Brush Reservoir Dam\Design\Specifications\Division 1\Current\01600 - Product Requirements.docx>

SECTION 01630

PRODUCT SUBSTITUTION DURING CONSTRUCTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Product substitution procedures

1.2 CONTRACTOR'S OPTIONS

- A. For materials or equipment (hereinafter products) specified only by performance or reference standard, select product meeting that standard, by any Supplier. To the maximum extent possible, provide products of the same generic kind from a single source.
- B. For products specified by naming several products or manufacturers, select any one of the products or Suppliers named, which fully complies with the Drawings and Specifications. Another "or-equal" product can also be considered by the Engineer if it complies with the provisions of Article 7.04, Section 00700. If a product proposed by the Contractor does not qualify as an "or-equal" item, then it can be considered as a proposed substitute item, and the Contractor must comply with the requirements of Article 7.05, Section 00700.
- C. For products specified by naming products or manufacturers and followed by words indicating that no "or-equal" item or substitution is permitted, there is no option and no substitution will be allowed.
- D. Where more than one choice is available as a Contractor's option, select product that is compatible with other products already selected or specified.

1.3 SUBSTITUTIONS

- A. If in the Engineer's sole discretion a product proposed by the Contractor does not qualify as an "or-equal" item under the provisions of Article 7.04 of Section 00700, it can be considered a proposed substitute item. Submit information required under Article 7.05, Section 00700 for proposed substitutes.
- B. The Engineer will consider written requests from the Contractor for substitutions within 30 days after the Notice to Proceed. After this period, requests will be considered only in case of unavailability of product or other conditions beyond control of the Contractor.
- C. Submit 5 copies of request for substitutions. Submit a separate request for each proposed substitution. In addition to the submittal requirements outlined in Article 7.05 of Section 00700, include the following in each substitution request:
 - 1. For products or Suppliers:
 - a. Product identification, including Supplier & manufacturer's name and address.
 - b. Manufacturer's literature with product description, performance and test data, and reference standards.
 - c. Samples, if appropriate.

- d. Name and address of similar projects on which product was used, and date of installation.
 2. For construction methods (if specified):
 - a. Detailed description of proposed method.
 - b. Drawings illustrating method.
 3. Such other data as the Engineer may require to establish that the proposed substitution is equal to the product, Supplier or method specified.
- D. The substitution request shall include written certification and statements that are outlined in Article 7.05 of Section 00700.
- E. A request constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 2. Will provide same or better guarantees, warranties or bonds for proposed substitution as for specified product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives all claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities having jurisdiction.
- F. A proposed substitution will not be accepted if:
1. Acceptance will require changes in the design concept or a substantial revision of the Contract Documents.
 2. It will delay completion of the Work.
 3. It is intended or implied on a Shop Drawing and is not accompanied by a formal request for substitution from the Contractor.
- G. The Contractor is responsible for all costs relating to substitution requests.
- H. Approval of a substitution does not relieve the Contractor from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

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SECTION 01720

FIELD ENGINEERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Establishment of lines, benchmarks, and elevations required to layout and construct the Work
2. Property line survey and delineation

1.2 SUBMITTALS

A. Informational Submittals

1. Submit the qualifications of the Registered Professional Engineer and/or Registered Land surveyor to be hired to perform various portions of the Work, as applicable.
2. Submit documentation verifying the accuracy of field engineering work.
3. Submit 4 copies of final record drawings of field engineering layouts and as-built survey.
4. Submit certificate signed by registered (licensed) engineer or surveyor certifying that elevations and locations of Work are in conformance with Contract Documents. Explain deviations.
5. Before starting any work, the Contractor's surveyor shall submit a letter of certification stating that the property boundary, land takings, and/or easements have been laid out in accordance with the recorded property boundary, land taking, and/or easement plans. If any deviations or changes exist, these changes must be fully explained in the letter.

1.3 RECORDS

- A. Maintain a complete, accurate log of control and survey work as it progresses.

1.4 QUALITY ASSURANCE

- A. Employ a qualified engineer, registered with the State of Connecticut as a Professional Engineer or a competent surveyor, registered with the State of Connecticut as a Land Surveyor, as required for the particular characteristics of the work being performed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROCEDURES

- A. The Registered Professional Engineer or Land Surveyor provided shall establish and maintain lines, elevations and reference marks needed during the progress of the Work and shall re-establish stakes and marks placed by the Engineer that are lost or destroyed through the course of the Work. Verify such work by instrument or other appropriate means.

- B. The Engineer shall be permitted at all times to check the lines, elevations and reference marks, set by the Contractor, who shall correct any errors disclosed by such check. Such a check shall not be construed to be an approval of the Contractor's work and shall not relieve or diminish the responsibility of the Contractor for the accurate and satisfactory construction and completion of the entire Work.
- C. Make, check, and be responsible for measurements and dimensions necessary for the proper construction of and the prevention of misfittings in the Work.
- D. Furnish all protective stakes and temporary structures for marking and maintaining points and lines for the building of the Work, and give the Engineer such facilities and materials for verifying said lines and points as he may require.
- E. Revisions to the layout and elevations of the Work as defined by the Contract Documents shall be approved by the Engineer.
- F. Maintain and prepare final record drawings of field engineering layouts and as-built survey conducted after completion of the Work.
- G. Submit the pre-construction letter of certification as outlined in Part 1 above.
- H. Property boundary, land takings, temporary rights, and easements shown on the Drawings shall be staked out prior to construction and permanently pinned upon completion of the proposed work.

END OF SECTION

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SECTION 01725

PRESERVATION AND RESTORATION OF PROJECT FEATURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Protection and replacement of trees, shrubs, signs, property markers, fences, and related project features.
2. Taking precautions, providing programs, and taking actions necessary to protect public and private property and facilities that are outside the demolition scope from damage.

1.2 DEFINITIONS

A. Underground Structures

1. Underground structures are defined to include, but not be limited to, sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels and other existing subsurface work located within or adjacent to the limits of the Work.
2. Underground structures known to the Engineer are shown on the Drawings to the extent that locations are available. This information is shown for the assistance of the Contractor in accordance with the best information available, but is not guaranteed to be correct or complete. The Contractor shall be responsible for checking on the actual locations of water, sewer, gas, electric, and telephone service connection lines to avoid potential interferences.

B. Surface Structures

1. Surface structures are defined as existing buildings, structures and other facilities above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, poles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 REPAIR/RESTORATION

- A. Trees, shrubs, and similar items shall not be removed except where indicated on the drawings or as necessary to access the required demolition work, as approved by the Engineer. Items to be removed shall be clearly marked as directed by the Engineer. If objects not to be removed are damaged or removed, they shall be repaired or replaced to their original condition.
- B. Trees and shrubs on private property, which are removed or damaged by the Contractor shall be replaced in kind.

- C. Signs, fences, property markers, walls, guard rails and other public or private property that are outside the demolition scope shall be replaced in kind if damaged. Supports and protective devices required shall be provided.
- D. Underground and Surface Structures
 - 1. In the event of damage, injury or loss to existing utilities and structures that were not indicated to be removed or abandoned, whether shown on the Drawings or not, make all reasonable efforts to facilitate repairs and to mitigate the impact of such events upon the utility or structure owner's normal operations. Restore the existing utility or structure to the condition required by the owner of the utility or structure or at least to the condition found immediately prior to the Work. In the event that the utility owner elects to make the repairs, provide all reasonable access and assistance, and reimburse the utility owner for the cost of repairs. If utility service is interrupted due to damage to facilities, alternate facilities shall be provided.
 - 2. All other existing surface facilities, including but not limited to, guard rails, posts, guard cables, signs, poles, markers and curbs which are temporarily removed to facilitate the Work shall be replaced and restored to their original condition at the Contractor's expense unless otherwise indicated in other sections of these specifications.
 - 3. Wherever water, sewer, gas or petroleum mains, electric or telephone lines, cables or other utilities and structures are encountered and may be in any way interfered with, inform the Engineer and the appropriate utility company. Cooperate with the Engineer and utility company in the protection, removal, relocation, and replacement of structures and facilities.
 - 4. Prior to proceeding with any demolition or construction, notify in writing owners of utilities and structures within the vicinity of the proposed Work.
 - 5. Materials used for relocation or replacement of utilities and structures shall be of an equivalent material, type, class, grade and construction as the existing or as approved by the respective owners thereof, unless otherwise shown or specified.
 - 6. When any survey monument or property marker, whether of stone, concrete, wood or metal, is in the line of any trench or other demolition or construction work and may have to be removed, notify the Engineer in advance of removal. Under no circumstances shall any monument or marker be removed or disturbed by the Contractor or by any of his Subcontractors, employees or agents, without the permission of the Engineer. Monuments or markers removed or disturbed shall be reset by a land surveyor licensed in the State where the Work is located at the Contractor's expense. Should any monuments or markers be destroyed through accident, neglect or as a result of the Work under this Contract, the Contractor shall, at his own expense, employ a land surveyor licensed in the State where the Work is located to re-establish the monument or marker.

3.2 PROTECTION

- A. The construction of certain portions of the project may require excavation within the root systems of trees. Roots with a diameter of 2 inches or more within the excavation shall not be cut. If necessary, excavation shall be made with small powered equipment or by hand to comply with this requirement. It may be necessary to excavate from more than one direction to avoid damage to the roots.

- B. The trunks of trees that are to remain and are within the swing radius of the excavating machine bucket when fully extended shall be wrapped with burlap and 2 inch by 4 inch protective wood slats (8 inch spacing maximum) wired around the circumference of the trees to protect them from damage.
- C. Tree limbs shall not be cut except upon written approval of the Owner and the Engineer. Tree limbs cut shall be painted with approved forestry paint manufactured specifically for that purpose.
- D. Underground and Surface Structures
 - 1. Sustain in their places and protect from direct or indirect injury underground and surface structures designated to remain within or adjacent to the limits of the Work. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure. Before proceeding with the work of sustaining and supporting such structure, satisfy the Engineer that the methods and procedures to be used have been approved by the party owning same.
 - 2. Pay utility service company charges related to the temporary support of utility poles if required to complete the Work.
 - 3. Assume risks associated with the presence of underground and surface structures within or adjacent to the limits of the Work. The Contractor shall be responsible for damage and expense for direct or indirect injury caused by his Work to any structure. Immediately repair damage caused by the Work to the satisfaction of the owner of the damaged structure.

END OF SECTION

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SECTION 01770

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Documentation required for the transfer of the completed Work to the Owner
 - 2. Final Cleaning

1.2 SUBMITTALS

- A. Closeout Submittals
 - 1. As-built drawings
 - 2. Evidence of payment and release of liens
 - 3. List of Subcontractors, service organizations, and principal vendors

1.3 SUBSTANTIAL COMPLETION

- A. Refer to Article 15.03 in 00700, General Conditions, for procedures relating to obtaining Substantial Completion. Refer to 00520, Agreement, for Contract Times.

1.4 PROJECT CLOSEOUT DOCUMENTS

- A. As-Built Drawings - Submit as-built drawings for review, approval, or comment. The as-built drawings shall show the completed work, including all deviations from the original Drawings. As-built drawings shall depict the location of all new structures, toe of slope, piping and valves installed under this Contract, as well as field changes.
 - 1. Take swing ties to all underground work from a minimum of two horizontal locations. Vertical dimensions to all below grade work shall also be obtained. All fittings, bends, valves and other appurtenances shall be shown. At a minimum, the following information shall be shown on the as-built drawings.
 - a. Invert and rim elevation of all gravity pipelines and structures including the low-level outlet pipe.
 - b. Depth of ledge at changes in profile but not more than 25-foot intervals.
 - c. Changes to pipe size and materials.
 - 2. Locate all utilities and appurtenances concealed in construction. Provide detail not shown on Contract Documents. Use colored pencils or felt tipped pens to record all revisions to the as-built drawings.
- B. Provide evidence of payment and release of liens.
- C. As specified in Article 15.06.A of Section 00700, provide evidence that all Work, materials and equipment will pass to Owner free and clear of any Liens or other title defects upon final payment. Such evidence may take the form of receipts or releases from all Subcontractors and Suppliers and an affidavit from Contractor as to the

completeness of the receipts and releases as described in Section 00700 Article 15.06.A.3.

- D. Provide list of Subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.

1.5 FINAL PAYMENT

- A. Refer to Article 15.05 and 15.06 in 00700, General Conditions, for procedures relating to final inspection and payment.
- B. The Contract shall be considered complete and final payment made, only when:
 - 1. All provisions of the Contract Documents have been strictly adhered to.
 - 2. All damage to adjoining areas caused by the Work has been repaired.
 - 3. The project and premises have been left in good order, including removal of all temporary construction, Contractor-owned and extraneous materials.
 - 4. All as-built drawings as required by the Contract Documents have been submitted to the Owner.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CLEANING

- A. Clean, remove, and properly dispose of material or debris in the existing and proposed portions of the low-level outlet pipe.
- B. Remove and entirely dispose of material or debris that has washed, flowed or has been placed in existing watercourses, ditches, gutters, drains, pipe, or structures, for work done under the Contract work limits. Leave ditches, channels, drains, pipes, structures, and watercourses in a clean and neat condition upon completion of the Work.
- C. On or before the completion of the Work, tear down and remove all temporary buildings and structures, remove all temporary works, tools, and machinery or other construction equipment, remove all rubbish from any grounds which has been occupied and leave the roads and all parts of the premises and adjacent property in a neat and satisfactory condition.
- D. Restore or replace any public or private property damaged or removed during the course of the Work. Property shall be returned to a condition at least equal to that existing immediately prior to the beginning of operations. Complete all highway or driveway, walk, and landscaping work using suitable materials, equipment and methods. Perform restoration of existing property, walls, signs or structures promptly as work progresses; do not leave restoration work until the end of the Contract Time.

END OF SECTION

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DIVISION 2 - SITE WORK

SECTION 02075

GEOSYNTHETICS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Woven geotextiles
 - 2. Temporary 100% degradable erosion control blankets

1.2 REFERENCES

- A. Data Sheet DS1 - Non-Woven Geotextiles
- B. Data Sheet DS2 - Woven Geotextiles
- C. ASTM D4218 - Test Method for Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- D. ASTM D4491 - Test Methods for Water Permeability of Geotextiles by Permittivity
- E. ASTM D4533 - Test Method for Trapezoid Tearing Strength of Geotextiles
- F. ASTM D4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles
- G. ASTM D4751 - Test Method for Determining the Apparent Opening Size of a Geotextile
- H. ASTM D4833 - Test Method for Index Puncture Resistance of Geotextiles Geomembranes and Related Products
- I. ASTM D5261 - Test Method for Measuring Mass per Unit Area of Geotextiles
- J. ASTM D5262 – Standard Test Method for Evaluating the Unconfined Tension Creep Behavior of Geosynthetics

1.3 SUBMITTALS

- A. Product samples and data for all geosynthetics proposed for use on this project.
- B. Manufacturer-approved construction quality assurance/quality control manual for all of the geosynthetics proposed for use on this project.
- C. Manufacturing quality control testing data specified. Submit certification of required performance testing on all geosynthetics by an independent laboratory and label and identify all geosynthetic products delivered to the site.
- D. Manufacturer's recommended installation and fastening details for the erosion control blankets and turf reinforcement matrices. The following details are required:
 - 1. Typical stapling pattern and spacing. List staple density in terms of staples per square yard.
 - 2. Anchoring details for channels and slopes.

3. Transverse blanket lap splice details, as well as longitudinal lap splice details if parallel blankets are to be installed.
4. Termination details for the origin and termination of the channels and slopes.

1.4 QUALITY ASSURANCE

- A. Obtain from the geosynthetic product manufacturers a warranty that their products are free from defects in materials and workmanship at the time of delivery to the project site.
- B. Material found to be defective or which does not conform to these specifications will be rejected.

1.5 DELIVERY, STORAGE AND PROTECTION

- A. The Engineer reserves the right to reject and require replacement of any damaged materials delivered to the site, at no additional cost to the Owner.
- B. Stockpile and store the materials in accordance with the manufacturer's recommendations.
- C. Label and bag all geosynthetic rolls in packing that is resistant to photo degradation by ultraviolet (UV) radiation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Group 1 Woven Geotextile
 1. "2000" as manufactured by Amoco Fabrics and Fibers
 2. "FX-44" as manufactured by Carthage Mills
 3. "100X" as manufactured by Mirafi Inc.
 4. Or equal
- B. Group 4 Woven Geotextile – for Construction Entrance
 1. "600X" as manufactured by Tencate Mirafi
 2. Or equal
- C. Group 4 Woven Geotextile – for Rip Rap
 1. "FW700" as manufactured by Tencate Mirafi
 2. Or equal
- D. Temporary 100% Degradable Erosion Control Blankets
 1. "LANDLOK ENC2" as manufactured by SI Geosolutions, Inc.,
 2. "C125 BN" as manufactured by North American Green,
 3. Or equal

2.2 MATERIALS

- A. Woven geotextiles shall be composed of high-tenacity monofilament polypropylene yarns, which are woven into a stable network such that the yarns retain their relative position. Woven geotextiles shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.
- B. Temporary, degradable erosion control blankets (ECBs) shall be composed of a core of 100% coconut fiber and two external confining meshes of degradable material.
 - 1. As a minimum, 100% degradable ECBs shall be recommended by the manufacturer for use on 2:1 slopes.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect all products prior to the installation for any defects that may have been the result of storage and handling. The Engineer reserves the right to reject and require replacement of any damaged product, at no additional cost to the Owner.

3.2 INSTALLATION

- A. Install geosynthetic products in accordance with the approved manufacturer's QA/QC manuals, project details, and pertinent sections of these Specifications.

3.3 QUALITY CONTROL

- A. The Engineer may remove a sample (i.e. a strip that is 3 feet long by the entire roll width) from a maximum of 1 roll of each 10 rolls of all geosynthetic materials delivered to the project, and submit the samples to an independent laboratory for analysis of the product to ensure that the geosynthetics meet the specifications herein.

END OF SECTION

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SECTION 02120

TRANSPORTATION AND DISPOSAL OF CONTAMINATED SOIL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Transportation and disposal of Contaminated Soil or materials collected, consolidated, excavated, and generated during performance of the Work.
 - 2. Coordination, loading, transportation and disposal of contaminated materials.
- B. Related Sections
 - 1. Section 02315 – Excavation, Backfill, Compaction, and Dewatering

1.2 DEFINITIONS

- A. Disposal: The discharge, deposit, injection, dumping, spilling, leaking, incineration or placing of any contaminated material or otherwise hazardous substance into or on any land or water so that such hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.
- B. Generator: Any person, by site, whose act or process produces hazardous waste, or whose act first causes an oil or hazardous material to become subject to regulation.
- C. Regulated Waste: Non-Resource Conservation and Recovery Act (RCRA) hazardous wastes such as oils, petroleum products or residuals, chemical liquids, chemical gases or vapors, non-Toxic Substances Control Act (TSCA) polychlorinated biphenyls (PCBs), waste chemical solids, including soils, and other contaminated material wastes not defined as RCRA Hazardous, TSCA-regulated, or Special Waste.
- D. Manifest: An approved form used as a shipping document to identify the quantity, composition, and the origin, routing, and destination of regulated or hazardous waste from the site of generation to the point of disposal, treatment, storage, or use.
- E. Shipping Paper: An invoice, bill of lading, or other shipping document serving a similar purpose; other than a hazardous waste manifest used to document the conveyance of materials between different locations, including regulated wastes when applicable.
- F. Treatment: Any method, technique or process, including neutralization, incineration, stabilization or solidification, designed to change the physical, chemical or biological character or composition of any hazardous waste so as to neutralize such waste or so as to render such waste less hazardous, non-hazardous, safer to transport, amenable to storage, or reduced in volume, except such method or technique as may be included as an integral part of a manufacturing process at the point of generation.
- G. TSCA/RCRA Landfill: This type of landfill is permitted to accept soil that contains PCB at levels of 50 ppm to 500 ppm, acceptable for landfill disposal as defined in 40 CFR Part 761; soil that is classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261 but meets the treatment standards established in 40 CFR Part 268 - Land Disposal Restrictions; and all other soil classified as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations.

This type of landfill shall be approved to operate under a Federal Part B operating permit and shall be permitted to accept material with PCB concentrations up to 500 ppm under TSCA. The landfill shall be designed with a double composite liner meeting minimum RCRA design requirements. The landfill shall operate a leachate collection system and shall also operate a leak detection well system. The landfill shall be capable of stabilizing soils for meeting requirements of the USEPA's present rules required under the 1984 amendments to RCRA, banning the land disposal of hazardous material.

- H. RCRA Landfill: This type of landfill is permitted to accept soil that contains PCBs levels below 50 ppm; soil that is classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261 but meets the treatment standards established in 40 CFR Part 268 - Land Disposal Restrictions and all other soil classified as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations. This type of landfill shall be approved to operate under a Federal Part B operating permit. The landfill shall be designed with a double composite liner meeting minimum RCRA design requirements. The landfill will operate a leachate collection system and will also operate a leak detection well system. The landfill shall be capable of stabilizing soils for meeting requirements of the land ban.
- I. Non-RCRA Out-of-State Lined Landfill: This type of landfill shall be state approved or permitted to accept soil that is defined as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations, but is not classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261; soil containing PCBs below 50 ppm; and all other soil not permitted or unsuitable for in-state disposal or recycling.
- J. Out-of-State Recycling Facility: This type of facility shall be state approved or permitted to accept soil that is defined as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations, but is not classified as either a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261; soil containing PCBs below the facility's permitted level; and all other soil not permitted or unsuitable for in-state disposal or recycling.
- K. In-State Recycling Facility: This type of facility shall be approved by the State of Connecticut to accept soil that is classified as petroleum contaminated soil, that would be classified as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations if not managed under CGS Section 22a-113 to 22a-134z Hazardous Waste Regulations; and is not classified as a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261.
- L. In-State Landfill Facility (Reuse as Cover Material): This type of facility shall be approved by the State of Connecticut to accept soil that is classified as petroleum contaminated soil, that would be classified as a hazardous material in CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations if not managed under CGS Section 22a-114 to 22a-134z Hazardous Waste Regulations; and is not classified as a RCRA characteristic waste or RCRA listed waste as defined in 40 CFR Part 261.

1.3 SUBMITTALS

- A. Submit all pertinent information relating to the transport and disposal of materials specified herein, within 14 days after issuance of the Notice to Proceed and prior to transport and disposal. The information submitted be in one package and shall include the following, as a minimum:

1. Information for proposed treatment/disposal facility or facilities including the following:
 - a. General Information
 - 1) Facility Name
 - 2) Facility Address
 - 3) Name of Contact Person
 - 4) Title of Contact Person
 - 5) Telephone Number of Contact Person
 - 6) Permit Number
 - b. The facility shall specify the volume of material that can be accepted from the Project on a weekly and a total basis.
 - c. The facility shall provide written confirmation that they are permitted to accept and will accept the classified contaminated materials the general quality and quantity described by these specifications.
 - d. The facility shall provide a listing of all current and valid permits, licenses, letters of approval, and other authorizations to operate that they hold, pertaining to the receipt and treatment/disposal of the contaminated materials described by these specifications.
2. Connecticut Department of Transportation Transporter Identification Number and expiration date.
3. Name and address of all hazardous material transporters to be used to transport materials including proof of permit, license, or authorization to transport hazardous material in all affected states.
- B. Upon receipt of final approval from treatment/disposal facility to accept contaminated materials, submit copy of said approval.
- C. Within ten (10) working days after the off-site transportation of contaminated materials, submit copies of all paperwork related to transportation of contaminated materials. Such paperwork may include, but not be limited to receipts, weight tickets, and disposal certificates.
 1. Provide certified tare and gross weight slips for each load received at the designated treatment/disposal facility which shall be attached to copy of related manifest or bill of lading.
- D. Prior to receiving progress payment, submit documentation certifying that all materials were transported to, accepted, and disposed of, at the selected treatment/disposal facility. The documentation shall include the following, as a minimum.
 1. Documentation for each load from the site to the disposal facility, including all manifests and any other applicable transfer documentation.
 2. All documentation for each load shall be tracked by the original manifest or bill of lading document number assigned at the project site at time of signature by authorized Engineer.

1.4 REGULATORY REQUIREMENTS

- A. Obtain all Federal, State and local permits, approvals, or authorizations required for the transport and disposal of contaminated materials. Adhere to all requirements of such permits, approvals, or authorizations.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL

- A. Sample, test, or analyze contaminated material for approval of final disposal.
- B. Contaminated materials to be disposed of include, but are not limited to contaminated soil, rock, miscellaneous contaminated debris, petroleum fuels, petroleum residuals, concrete, and other materials from remediation, demolition and decontamination operations.
- C. All contaminated materials excavated, consolidated, or otherwise managed during the course of the work will require special handling in accordance with these specifications, the Contractor's Health and Safety Plan, and all applicable permits, approvals, authorizations, and regulations.
- D. Dispose of contaminated materials at facilities approved by Owner or Engineer.
- E. All Contractor personnel shall wear personal protective equipment and protective clothing consistent with the levels of protection for this Work as indicated in the Site Health and Safety Plan.
- F. Contractor shall select treatment/disposal facilities to receive contaminated materials from the Project which are established, fully operational, and in full compliance with all applicable Federal, State, and local regulations.
- G. Perform collection of characterization (except soils) samples and laboratory analyses to satisfy the acceptance criteria for selected receiving facility(s).
- H. Remove all contaminated materials from the project site and legally dispose of materials.

3.2 CHARACTERIZATION FOR DISPOSAL-CONTAMINATED SOIL

- A. Contaminated soil characterization sampling will be conducted by the Engineer.
- B. The Engineer will collect soil samples. Such samples may be collected from within Excavation Areas, or following deposition of Contaminated Soil in the Temporary Controlled Stockpile Area.

3.3 DISPOSAL COORDINATION AND TRANSPORT

- A. Contractor is solely responsible for coordinating treatment/disposal facility approval, scheduling, loading, transport, and ultimate disposal of contaminated materials at treatment/disposal facility. No claim for delay will be considered based upon Contractor's facility failing to meet Contractor's production schedule. No payments will be made for rejected loads.

3.4 MANIFESTS AND SHIPPING PAPERS

- A. Owner is designated as the “Generator” and will sign all Manifests and Shipping Papers. Manifests and Shipping Papers shall be prepared by Contractor twenty four (24) hours in advance of shipment of contaminated materials. Authorized Owner’s representative will sign as “Generator” as each load of contaminated material leaves the Project Site. Contractor shall forward appropriate original copies of Manifests or Bills of Lading to Engineer on the same day the contaminated materials leave the Project Site.

3.5 TRANSPORT OF CONTAMINATED MATERIAL

- A. Transport contaminated materials off-site after all treatment/disposal facility documentation has been completed and the material accepted by said facility.
- B. Transport contaminated materials from the site to treatment/disposal facility in accordance with all United States Department of Transportation (DOT), USEPA, Connecticut regulations and other regulations of all affected states.
- C. The Hauler(s) shall be licensed in all states affected by transport.
- D. Provide to Engineer copies of all weight slips, both tare and gross, for every load weighed and disposed of at the accepted disposal facility. The slips shall be tracked by the original manifest document number that was assigned by Engineer at the site. Owner will only make progress payments upon receipt of these weight slips.
- E. Minimize the potential for development of free liquid during transport. Do not load wet soils for transport. If free liquid does develop during transport, Contractor shall be responsible for proper collection and disposal of same.

END OF SECTION

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SECTION 02200

SITE PREPARATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes
 - 1. Clearing and grubbing
 - 2. Grading
 - 3. Stripping and stockpiling of soil and sod

1.2 SUBMITTALS

- A. Submit construction methods and equipment that will be utilized for the clearing, grubbing, and waste material disposal specified within this Section.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 CLEARING AND GRUBBING

- A. Coordinate clearing and grubbing activities with the Owner and Engineer prior to commencing work. Trees to be removed shall be flagged for Owner and Engineer review.
- B. Except as otherwise directed, cut, grub, remove and dispose of all trees, stumps, brush, shrubs, roots and any other objectionable material within the limits of the Work on the site and where required to construct the work.
- C. Protect trees or groups of trees, unless specifically noted to be removed on the Drawings, from damage by all construction operations by erecting suitable barriers, or by other approved means. Conduct clearing operations to prevent falling trees from damaging trees designated to remain.
 - 1. All damage done to the trees by the Contractor's operation shall be trimmed and painted where cut as directed or as necessary to provide adequate vertical clearance for construction activities. The dressing or paint shall be applied no later than two days after the cuts are made.
 - 2. Use all necessary precautions to prevent injury to other desirable growth in all areas. Contractor shall assume full responsibility for any damage.
- D. Trees with trunks less than four (4) inches in diameter shall be cut flush to the ground surface. Trees with trunks greater than four (4) inches in diameter shall be cut down and the root balls removed entirely. Root balls shall be removed so that all roots one-half (1/2) inch or larger in diameter are taken out. The resulting excavation shall be backfilled with granular fill, see section 02320.
- E. Protect areas outside the limits of clearing from damage. No equipment or materials shall be stored in these areas.
- F. No stumps, trees, limbs, or brush shall be buried in fills or embankments.

3.2 DISPOSAL OF MATERIALS

- A. Remove all tree trunks, limbs, roots, stumps, brush, foliage, other vegetation and objectionable material from the site and dispose of in a legal manner.
- B. Burning or direct burial of cleared and grubbed materials on-site will not be permitted.

3.3 GRADING

- A. In preparation for placing fill materials, perform grading to the lines, grades and elevations shown on the Drawings, and otherwise directed by the Engineer and perform in such a manner that the requirements for formation of embankments can be followed. All material encountered, regardless of its nature, within the limits indicated, shall be removed and disposed of as directed. During the process of grading, maintain the subgrade in such condition that it will be well drained at all times. Install temporary drains and drainage ditches to intercept or divert surface water that may affect the work when necessary.
- B. If at the time of grading it is not possible to place material in its final location, stockpile material in approved areas for later use. No extra payment will be made for the stockpiling or double handling of excavated material.
- C. The right is reserved to make minor adjustments or revisions in lines or grades if found necessary as the work progresses.
- D. Stones or rock fragments larger than 4 inches in their greatest dimensions will not be permitted in the top 12 inches of the finished subgrade of all fills or embankments except along the rip-rap where shown on the Drawings.
- E. In cuts, loose or protruding rocks on the excavated slopes shall be barred loose or otherwise removed to line or finished grade of slope. Cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as directed by the Engineer.

3.4 DUTCH ELM WOOD

- A. Dutch Elm diseased wood shall be disposed of in accordance with any local regulations.
- B. Where the work includes the removal of elm trees or the limbs of elm trees, such trees or limbs thereof shall be disposed of immediately after cutting or removal and in such a manner as to prevent the spread of Dutch Elm disease. This shall be accomplished by covering them with earth to a depth of at least 6 inches in areas outside the right-of-way locations where the Contractor has arranged for disposal.
- C. Where the work includes the removal and disposal of stumps of elm trees, such stumps shall be completely disposed of immediately after cutting in the manner specified above.

END OF SECTION

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SECTION 02220

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Demolition of dam section within limits of proposed spillway.
2. Demolition of dam crest and upstream shotcrete facing.
3. Demolition of spillway training wall and overflow weir.

B. Related Sections

1. Section 01320 - Construction Photographs
2. Section 01350 - Health & Safety Plan
3. Section 02315 - Excavation, Backfill, Compaction and Dewatering

1.2 DEFINITIONS

- A. Demolish – To tear down, segregate waste streams and lawfully recycle or dispose of all debris generated in the process including structure contents.
- B. Limit of Work – Area delineated on Drawings that defines the extent of demolition work under the Contract.

1.3 SUBMITTALS

A. Informational Submittals

1. Methods of demolition and equipment proposed to demolish structures. This submittal should be sufficient to demonstrate a thorough understanding of the Work to be completed and the means that will be implemented to safely complete the demolition within the Contract Time without damage to surrounding structures or resources. The Engineer will review the submittal for completeness and reasonableness for the project conditions, but will not “Approve” the means and methods.

1.4 REGULATORY REQUIREMENTS

- A. Contractor is solely responsible for obtaining permits or approvals which may be required to perform the work of this section, including all costs, fees and taxes required or levied, except for the following permits that will be obtained by the Owner:
 1. Connecticut Department of Energy and Environmental Protection (CTDEEP) Section 401 Water Quality Certification and Dam Construction Permit.
 2. U.S. Army Corps of Engineers General Permit
 3. Connecticut Department of Public Health (DPH) Water Company Land Permit
 4. Connecticut Department of Energy and Environmental Protection (CTDEEP) Individual Permit for Dam Safety

- B. Comply with all applicable federal, state, and local environmental, safety and health requirements regarding the demolition of structures and other site features and recycling or disposal of demolition debris, as applicable.
- C. Conform to procedures identified in Section 01350 – Health and Safety Plan if hazardous or contaminated materials are discovered.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 PROJECT MANAGEMENT

- A. Provide a full-time Project Superintendent, who shall serve as a direct communication among the Contractor, subcontractors, and the Owner.
- B. Require all subcontractors to provide a foreman or superintendent. That individual must be on site at all times that the subcontractor is working.

3.2 EXAMINATION

- A. Verify site conditions before proceeding with demolition work. Field check the accuracy of the Drawings and inspect structures and utilities prior to start of work and notify the Engineer in writing, of any hazardous conditions and/or discrepancies. Primary structures and other site features are shown on the Drawings.

3.3 HAZARDOUS MATERIALS

- A. Oil and Hazardous Material Contamination
 - 1. In the event that contaminated soil is encountered, handle such material in accordance with Section 02120 – Transportation and Disposal of Contaminated Soil.

3.4 DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated.
- B. Demolish the structures by methods that will not cause damage to surrounding structures, underground, and overhead, or other existing items and structures that are to remain in place.
- C. Promptly and properly manage all debris as the demolition progresses. Construct and/or prepare material staging/stockpile areas at locations approved by the Engineer or shown on the Drawings. In the event that contaminated soil is encountered, handle such material in accordance with Section 01350 – Health and Safety Plan.
- D. Contractor's personnel shall be appropriately trained, as required under Section 01350,
- E. Contractor's Site Safety Officer shall monitor the work area in accordance with Section 01350.
- F. Structures
 - 1. Demolish or selectively demolish structures within the Limits of Work as indicated on the Drawings.

2. Barricade work area as necessary to protect workers and general public from falling debris.
3. Do not leave unstable structures unattended. Plan the workday so that all structures are stable at the end of each workday.

G. Miscellaneous Site Structures and Features

1. Trees – Trees are an important resource and shall be treated as such. Unless specifically noted to be demolished, protect all trees and obtain approval of the Engineer prior to removing or pruning any other trees. Refer to Sections 01725 and 02200.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR CONCRETE

A. Concrete:

1. Small Sections - Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
 - A. Maximum weight of any chipping hammers is 30 pounds.
2. Large Sections – Cut full depth at junctures with construction to remain and at regular intervals using power-driven, diamond blade, track-mounted, wall saw for horizontal and vertical cuts, or wire saw, and then remove concrete between saw cuts.

3.6 DISPOSAL

- A. Legally dispose of or recycle all materials from demolition as well as equipment and other materials that are within the buildings. The disposal site shall be permitted to accept the waste stream by the applicable State Agency. Perform the loading of demolition materials in a manner that prevents materials and activities from generating excessive dust and ensures minimum interference with roads both onsite and offsite.

3.7 SITE RESTORATION

- A. Prior to any backfilling, document the location of any structures that remain in place through construction photographs (Section 01320) and by obtaining swing ties to and elevations of any structures to be buried. Progress payments may be withheld if current documentation is not maintained.
- B. Restore damaged areas of the site or neighboring properties in accordance with Sections 01725 and stabilize slopes in accordance with the erosion and sedimentation control requirements of the Contract and the stormwater permit.
- C. Loam and seed all disturbed areas in accordance with Sections 02921 and 02922.

END OF SECTION

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SECTION 02280

PIPELINE ABANDONMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Abandonment of pipe

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods required for proper performance of the work in this section.
- B. Use equipment of adequate size, capacity and quantity to accomplish the work of this Section in a safe timely manner.
- C. Comply with the directions of the Engineer and the requirements of governmental agencies having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete shall have a 28-day compressive strength of 3000 psi and a maximum stone size of 1½ inches.

PART 3 EXECUTION

3.1 ABANDONING PIPE

- A. Abandon existing pipelines upon completion of installation and successful testing of the new pipelines.
- B. Seal the upstream end of the pipe to be abandoned with a concrete plug the not less than the width of the dam at the pipe section, long in the barrel of the pipeline. For example, if the width is 10 feet, a 10-foot-long plug shall be installed. Seal the downstream end of the pipe to be abandoned with a concrete plug not less than 1½ times the pipe diameter long in the barrel of the pipeline. For example, a 18-inch diameter pipe will require that a minimum 27-inch long plug be installed.
- C. Approval for the abandonment of the pipe shall be by the Engineer or Owner.

3.2 REPAIR/RESTORATION

- A. Match surface repairs to its immediate surrounding area. Complete this work in accordance with the applicable specification section.

END OF SECTION

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SECTION 02315

EXCAVATION, BACKFILL, COMPACTION AND DEWATERING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Excavation, backfill and compaction
 - 2. Removal, handling and disposal of rock not covered under Section 02410
 - 3. Earth retention systems
 - 4. Temporary dewatering systems
- B. Related Sections
 - 1. Section 01570 - Temporary Controls
 - 2. Section 01571 – Control of Water
 - 3. Section 02320 - Borrow Materials
 - 4. Section 02410 - Rock Excavation

1.2 REFERENCES

- A. ASTM D1557-07 12e1 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- B. ASTM D1556-07 15e1 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- C. ASTM D2487-06e1 11- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- D. ASTM D6938-08a 17 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- E. 29 CFR Part 1926 Subpart P - OSHA Excavation Regulations 1926.650 through 1926.652 including Appendices A through F

1.3 DEFINITIONS

- A. Benching - A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- B. Earth Retention Systems - Any structural system, such as sheeting and bracing or cofferdams, designed to retain in-situ soils in place and prevent the collapse of the sides of an excavation in order to protect employees and adjacent structures.
- C. Excavation - Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

- D. Protective System - A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include earth retention systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- E. Registered Professional Engineer - A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.
- F. Shield System - A structure that is designed to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 29 CFR 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."
- G. Sloping - A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.
- H. Temporary Dewatering System – A system to lower and control water to maintain stable, undisturbed subgrades at the lowest excavation levels. Dewatering shall be provided for all pipelines, structures and for all other miscellaneous excavations.
- I. Trench - A narrow excavation (in relation to its length) made below the surface of the ground, of at least three feet in depth. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m).

1.4 SUBMITTALS

- A. Drawings and calculations for each Earth Retention System if required by the Work. The submittal shall be in sufficient detail to disclose the method of operation for each of the various stages of construction required for the completion of the Earth Retention Systems.
 - 1. Submit calculations and drawings for Earth Retention Systems prepared, signed and stamped by a Professional Engineer registered in the state where the work is performed.
 - 2. If sheeting is utilized in an Earth Retention System Design, the design shall include means and methods to prevent disturbance to adjacent structures, and to prevent liquefaction and consolidation of underlying soils.
- B. Performance data for the compaction equipment to be utilized.
- C. Construction methods that will be utilized for the removal of rock..
- D. Modified Proctor Test (ASTM D1557) results and soil classification (ASTM D2487) for all proposed backfill materials at the frequency specified below:

1. For suitable soil materials removed during Excavation, perform one test for every 500 cubic yards of similar soil type. Similarity of soil types will be as determined by the Engineer.
 2. For borrow materials; perform tests at frequency specified in Section 02320, Borrow Materials.
- E. Compaction test results (i.e. ASTM D6938 or ASTM D1556) at a frequency of one test for every 100 cubic yards of material backfilled or at a minimum of one test per lift. The Engineer will determine the locations and lifts to be tested. The Contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.
1. Methods and equipment proposed for compaction shall be subject to prior review by the Engineer. Compaction generally shall be done with vibrating equipment. Static rolling without vibration may be required by the Engineer on sensitive soils that become unstable under vibration. Displacement of, or damage to existing utilities or structure shall be avoided. Any utility or structure damaged thereby shall be replaced or repaired as directed by the Engineer.
 2. Additional compaction testing may be required when there is evidence of a change in the quality of moisture control or the effectiveness of compaction.
 - a. Any costs associated with correcting and retesting as a result of a failure to meet compaction requirements shall be borne by the Contractor.
 3. If all compaction test results within the initial 25% of the total anticipated number of tests indicate compacted field densities equal to or greater than the project requirements, the Engineer may reduce frequency of compaction testing. In no case will the frequency be reduced to less than one test for every 500 cubic yards of material backfilled.
 4. The Contractor is cautioned that compaction testing by nuclear methods may not be effective where trenches are so narrow that trench walls impact the attenuation of the gamma radiation, when adjacent to concrete that impacts the accuracy of determining moisture content, or where oversize particles (i.e. large cobbles or coarse gravels) are present. In these cases, other field density testing methods may be required.
- F. Dewatering plan if necessary for the excavation locations. Design shall include calculations and drawings stamped and signed by a Professional Engineer registered in the State of Connecticut.

1.5 QUALITY ASSURANCE

- A. All Excavation, Trenching, and related Earth Retention Systems shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P), and other State and local requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

1.6 PROJECT CONDITIONS

- A. Notify Connecticut's Call Before You Dig system a minimum of 2 full working days but not more than 30 days before excavation can occur.
- B. Notify utility owners in reasonable advance of the work and request the utility owner to stake out on the ground surface the underground facilities and structures. Notify the Engineer in writing of any refusal or failure to stake out such underground utilities after reasonable notice.
- C. Make explorations and Excavations to determine the location of existing underground structures, pipes, house connection services, and other underground facilities in accordance with Paragraph 3.2.D of this Section.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Fill material is subject to the approval of the Engineer and may be either material removed from excavations or borrow from off site. Fill material, whether from the excavations or from borrow, shall be of such nature that after it has been placed and properly compacted, it will make a dense, stable fill.
- B. Satisfactory fill materials shall include materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, SW, and SP. Additional requirements are included in Section 02320.
- C. Satisfactory fill materials shall not contain trash, refuse, vegetation, masses of roots, individual roots more than 18 inches long or more than 1/2 inch in diameter, or stones over 6 inches in diameter. Unless otherwise stated in the Contract Documents, organic matter shall not exceed minor quantities and shall be well distributed.
- D. Satisfactory fill materials shall not contain frozen materials nor shall backfill be placed on frozen material.

2.2 DEWATERING MATERIALS

- A. Provide temporary erosion and sediment controls in accordance with Section 01570.
- B. Provide silt filter bags (Dandy Dewatering Bag, Dirtbag, JMP Environ-Protection Filter Bag, or equal) of adequate size to match flow rate.
- C. Provide dewatering equipment and materials for engineered dewatering systems.

PART 3 EXECUTION

3.1 PREPARATION

- A. Public Safety and Convenience
 - 1. Take precautions for preventing injuries to persons or damage to property in or about the Work.
 - 2. Provide safe access for the Owner and Engineer at site during construction.
 - 3. Do not obstruct site drainage, natural watercourses or other provisions made for drainage.

3.2 CONSTRUCTION

A. Earth Retention Systems

1. Provide Earth Retention Systems necessary for safety of personnel and protection of the Work, adjacent work, utilities and structures.
2. Maintain Earth Retention Systems for the duration of the Work.
3. Remove earth retention system, unless designated to be left in place, in a manner that will not endanger the construction or other structures. Backfill and properly compact all voids left or caused by the withdrawal of sheeting.

B. Excavation

1. Perform excavation to the lines and grades indicated on the Drawings. Backfill unauthorized over-excavation in accordance with the provisions of this Section.
2. Excavate with equipment selected to minimize damage to existing utilities or other facilities. Hand excavate as necessary to locate utilities or avoid damage.
3. Perform excavation in such a manner as to prevent disturbance of the final subgrade. The Engineer or Owner may require the final six inches of excavation be performed by hand, with the use of a smooth-faced bucket, or other means acceptable to the Engineer or Owner, at no additional cost if subgrade disturbance is considered excessive as judged by the Engineer or Owner.
4. During excavation, material satisfactory for backfill shall be stockpiled in an orderly manner at a distance from the sides of the excavation equal to at least one half the depth of the excavation, but in no case closer than 2 feet.
 - a. Excavated material not required or not suitable for backfill shall be removed from the site.
 - b. Perform grading to prevent surface water from flowing into the excavation.
 - c. Pile excavated material in a manner that will endanger neither the safety of personnel in the excavation nor the Work itself. Avoid obstructing sidewalks and driveways.
5. Grade or create berms or swales to direct surface water from excavations to appropriate structures designed to accommodate storm water. If no structures exist, direct water to areas that minimize impacts to adjacent structures and properties.
6. If satisfactory materials are not encountered at the design subgrade level, excavate unsatisfactory materials to the depth directed by the Engineer and properly dispose of the material. Backfill the resulting extra depth of excavation with satisfactory fill materials and compact in accordance with the provisions of this Section.

C. Backfill and Compaction

1. Unless otherwise specified or indicated on the Drawings, use satisfactory material removed during excavation for backfilling trenches. The Engineer may

require stockpiling, drying, blending and reuse of materials from sources on the Project.

2. Spread and compact the material promptly after it has been deposited. When, in the Engineer's judgment, equipment is inadequate to spread and compact the material properly, reduce the rate of placing of the fill or employ additional equipment.
3. Prior to backfilling or placement of structures, excavated subgrades shall be proof compacted with either 10 passes of a 10-ton vibratory drum roller for open excavations or 6 passes of a large, reversible, walk behind vibratory compactor capable of exerting a minimum force of 2,000 pounds in trench or pit excavations. Soft or weak spots shall be over-excavated and replaced with compacted Granular Fill or other approved appropriate fill based on the location, as directed by the Owner or their representative. If proof compaction will prove detrimental to the subgrade due to the presence of groundwater, static rolling may be allowed at the discretion of the Engineer or Owner.
4. Soil bearing surfaces shall be protected against freezing and the elements before and after concrete placement. If construction is performed during freezing weather, structures shall be backfilled as soon as possible after they are constructed. Insulating blankets or other means shall be used for protection against freezing at the discretion of the Engineer or Owner.
5. When excavated material is specified for backfill and there is an insufficient amount of this material at a particular location on the Project due to rejection of a portion thereof, consideration will be given to the use of excess material from one portion of the Project to make up the deficiency existing on other portions of the Project.
 - a. Use borrow material if there is no excess of excavated material available at other portions of the Project.
6. Backfilling and compaction methods shall attain 95% of maximum dry density at optimum moisture content as determined in accordance with ASTM D1557.
7. Do not place stone or rock fragment larger than six inches in greatest dimension in the backfill.
8. Maximum loose lift height for backfilling existing or borrow material shall be 12 inches, unless satisfactory compaction is demonstrated otherwise to the Engineer through field-testing. In no case shall loose lift height for backfilling exceed 3 feet.

D. Dewatering

1. Obtain construction dewatering permits, as required.
2. Provide, operate and maintain adequate pumping, diversion and drainage facilities in accordance with the approved dewatering plan to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. Locate dewatering system components so that they do not interfere with construction under this or other contracts.

3. Conduct operations so as to prevent at all times the accumulation of water, ice and snow in excavations or in the vicinity of excavated areas so as to prevent water from interfering with the progress or quality of the work.
4. Take actions necessary to ensure that dewatering discharges comply with permits applicable to the Project. Dispose of water from the trenches and excavations in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
5. Repair any damage resulting from the failure of the dewatering operations and any damage resulting from the failure to maintain all the areas of work in a suitable dry condition.
6. Exercise care to ensure that water does not collect in the bell or collar holes to sufficient depth to wet the bell or collar of pipes waiting to be jointed.
7. Take precautions to protect new work from flooding during storms or from other causes. Control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, provide temporary ditches for drainage. Upon completion of the work, all areas shall be restored to original condition.
8. Brace or otherwise protect pipelines and structures not stable against uplift during construction.
9. Do not excavate until the dewatering system is operational and the excavation may proceed without disturbance to the final subgrade.
10. Unless otherwise specified, continue dewatering uninterrupted until the structures, pipes, and appurtenances to be installed have been completed such that they will not float or be otherwise damaged by an increase in groundwater elevation.
11. Temporarily lower the groundwater level at least two feet below excavations to limit potential “boils,” loss of fines, or softening of the ground. If any of these conditions are observed, submit a modified dewatering plan to the Engineer within 48 hours. Implement the approved modified plan and repair any damage incurred.
12. When subgrades are soft, weak, or unstable due to improper dewatering techniques, remove and replace the materials in accordance with Section 02320 at no cost to the Owner.
13. Notify the Engineer immediately if any settlement or movement is detected of survey points adjacent to excavations being dewatered. If settlement is deemed by the Engineer to be related to the dewatering, submit a modified dewatering plan to the Engineer within 24 hours. Implement the approved modified plan and repair any damage incurred to the adjacent structure at no cost to the Owner.
14. Dewatering discharge:
 - a. Install sand and gravel, or crushed stone, filters in conjunction with sumps, well points, and/or deep wells to prevent the migration of fines from the existing soil during the dewatering operation.

- b. Transport pumped or drained water without interference to other work, damage to pavement, other surfaces, or property. Pump water through a silt filter bag or other approved sedimentation device prior to discharge to grade of drainage system.
 - c. Discharge to an upland area, as shown on the Drawings.
 - d. Do not discharge water into any sanitary sewer system.
 - e. Provide separately controllable pumping lines.
 - f. The Engineer reserves the right to sample discharge water at any time.
15. Install erosion/sedimentation controls for velocity dissipation at point discharges onto non-paved surfaces.
16. Removal
- a. Do not remove dewatering system without written approval from the Engineer.
 - b. Backfill with compacted Granular Fill or other approved appropriate fill based on the location, as directed by the Owner or their representative.
 - c. Remove well points and deep wells. Backfill abandoned well holes with cement grout having a water cement ratio of 1 to 1 by volume.

3.3 PROTECTION

A. Protection of Existing Structures

- 1. All existing foundations, conduits, wall, pipes, wires, poles, fences, property line markers and other items which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the Contractor. Should such items be damaged, they shall be restored by the Contractor to at least as good condition as that in which they were found immediately before the Work began.

B. Accommodation of Traffic

- 1. Streets and drives shall not be unnecessarily obstructed. The Contractor shall take such measures at his own expense to keep the street or road open and safe for two-way traffic unless otherwise indicated.
- 2. All traffic controls shall be in accordance with the Manual on Uniform Traffic Control Devices for Streets and Highways, latest edition.

C. Erosion and Sedimentation Control

- 1. Take all necessary steps to prevent soil erosion per the Drawings, Section 01570, Section 01571, CTDEEP Guidelines for Soil Erosion and Sediment Control (latest edition), and permit requirements
- 2. Plan the sequence of construction so that only the smallest practical area of land is exposed at any one time during construction.
- 3. Temporary vegetation and/or mulching shall be used to protect critical areas exposed during construction as judged by the Engineer.

END OF SECTION

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SECTION 02320

BORROW MATERIALS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Processed Gravel Borrow
 - 2. Granular Fill
 - 3. Stone Borrow
- B. Related Sections
 - 1. Section 02315 – Excavation, Backfill, Compaction and Dewatering

1.2 REFERENCES

- A. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- B. ASTM C117 - Standard Test Method for Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- D. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb./ft³)
- E. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head)
- F. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- G. ASTM D6913 – Standard Test Method for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
- H. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- I. AASHTO – Standard Specification for Transportation Materials and Methods of Sampling and Testing, 1986 Edition as amended
- J. State of Connecticut Department of Transportation, “Standard Specification for Roads, Bridges, Facilities and Incidental Construction, Form 818,” 2020 Edition, as supplemented.

1.3 SUBMITTALS

- A. Representative Samples of borrow materials taken from the source. Tag, label, and package the Samples as requested by Engineer. Provide access to the borrow site for field evaluation and inspection.

- B. Provide sieve analysis (ASTM C136 or ASTM D6913) from certified soils testing laboratory for all borrow materials. Take and test a sample, at no additional cost to the Owner for each 500 c.y. of borrow material placed.
- C. Provide modified proctor analysis (ASTM D1557) from certified soils testing laboratory for all borrow materials.
- D. The Engineer reserves the right to require more frequent testing than that which is specified above should the borrow characteristics change.

1.4 QUALITY ASSURANCE

- A. No borrow shall be placed prior to the approval of Samples by the Engineer.

1.5 PROJECT/SITE CONDITIONS

- A. Existing Conditions
 - 1. Comply with any environmental requirements and restrictions.
 - 2. Keep all public and private roadway surfaces clean during hauling operations and promptly and thoroughly remove any borrow or other debris that may be brought upon the surface before it becomes compacted by traffic. Frequently clean and keep clean the wheels of all vehicles used for hauling to avoid bringing any dirt upon the paved surfaces.

PART 2 PRODUCTS

2.1 PROCESSED GRAVEL BORROW

- A. The compacted Processed Gravel Borrow to be used for gravel access roads and pavement subbase, or other area where a firm, free-draining subgrade is needed shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.
- B. Processed Gravel Borrow shall conform to the State of Connecticut Department of Transportation, Form 818, Section M.5.01.
- C. Stockpile the processed materials in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

2.2 GRANULAR FILL

- A. Granular Fill to be used as fill material to achieve gravel base grade beneath structures, pavement, or other area requiring structural fill shall consist of inert material that is hard, durable stone and sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.
- B. Gradation requirements for Granular Fill shall conform to the following:

Percent by Weight Passing Through		
Sieve Size	Minimum	Maximum
2/3rds loose lift thickness	100	--
No. 10	30	95

No. 40	10	70
No. 200	0	15

2.3 STONE BORROW

A. Crushed Stone Borrow

1. Crushed stone borrow shall consist of one of the following materials:
 - a. Durable crushed rock consisting of the angular fragments obtained by breaking and crushing solid or shattered natural rock, and free from a detrimental quantity of thin, flat, elongated or other objectionable pieces. A detrimental quantity will be considered as any amount in excess of 15% of the total weight. Thin stones shall be considered to be such stones whose average width exceeds 4 times their average thickness. Elongated stones shall be considered to be stones whose average length exceeds 4 times their average width.
 - b. Durable crushed gravel stone obtained by artificial crushing of gravel boulders or fieldstone with a minimum diameter before crushing of 8 inches.
2. The crushed stone shall be free from clay, loam or deleterious material and not more than 1.0% of satisfactory material passing a No. 200 sieve will be allowed to adhere to the crushed stone.
3. The crushed stone shall have a maximum percentage of wear as determined by the Los Angeles Abrasion Test (AASHTO-T-96) as follows:
 - a. For Class 1 Bit. Conc. 30%**
 - b. For Cement Concrete Aggregate 45%***
 - c. Crushed Stone for Subbase 45%

**Crushed stone for this use shall consist of crushed or shattered natural rock only. Crushed gravel stone will not be permitted.

***Except for 5000 psi or greater cement concrete and prestressed concrete which shall be 30%.
4. The crushed stone shall conform to the grading requirements shown in the following grading Table.

Sieve Size	Percent by Weight Passing Through	
	Minimum	Maximum
1 ½" Crushed Stone		
2"	100	--
1 ½"	95	100
1"	35	70
¾"	0	25

B. Stone Riprap

1. Stone Riprap shall consist of hard, durable, and sound angular stone which is resistant to weathering. Rounded stones, boulders, elongated, thin or flat pieces whose breadth or thickness is less than one-third its length will not be allowed. The parent rock for riprap stones shall be igneous or metamorphic rock. Sedimentary rock types such as shale, sandstone, or similar soft stone will not be allowed. The stone shall be free of ice, snow, overburden, spoil, silt, clay, loam, organics and other deleterious matter.
2. Riprap stone shall have a minimum dry unit weight of 165 pounds per cubic foot.
3. Gradations of riprap stone material shall be based upon the thickness of the riprap layer as shown on the plans. Riprap layer thickness shall be defined as the typical layer thickness as measured perpendicular to the ground surface or slope. In all cases, no more than 5 percent by weight shall pass a 2-inch sieve. Diameter refers to the equivalent-volume spherical stone diameter as defined by the U.S. Army Corps of Engineers in EM 1110-2-1601.

a. Riprap Type 1

Percent of Stones Smaller	Diameter (in.)	Percentage of Stones Weighing Less Than	Weight (lbs.)
D ₁₀₀	36	100	2,330
D ₅₀	24	50	690
D ₁₅	18	15	345

b. Riprap Type 2

Percent of Stones Smaller	Diameter (in.)	Percentage of Stones Weighing Less Than	Weight (lbs.)
D ₁₀₀	24	100	690
D ₅₀	16	50	200
D ₁₅	12	15	100

4. Riprap material shall be well graded as a material without gaps in the gradation curve. The uniformity ratio (D₈₅/D₁₅) shall be between 1.5 to 3.0.
5. All riprap stone placed at the site shall be of the same parent rock from the same quarry and shall be visually similar.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Prior to the placement of borrow material, site preparation shall be completed as required by the Contract Documents, and approved by the Engineer.
- B. Ensure that all materials are properly stockpiled on site to prevent contamination by other materials.

- C. Place borrow material over the entire area in uniform lifts and compact in accordance with Section 02315.
- D. Utilize on-site soils prior to using off-site borrow provided on-site soils meet the requirements of the specifications.
- E. Utilize processed gravel borrow in all locations where a surface treatment has not been specified but requires a firm finish surface.
- F. Processed gravel for pavement subbase is intended to provide a stable foundation for driveways and roadway repair where a gravel base has been specified.
- G. Borrow shall be used as a replacement for unsuitable materials where poor soil conditions are encountered during the progress of the work, where approved by the Engineer. Borrow type will be determined by the Engineer. Borrow material used as a replacement for unsuitable soil is not intended to be an aid to dewatering.
- H. Shape borrow used for pipe foundation material so that it supports the pipe properly and will not damage the pipe, bells, collars, or the pipe fittings.
- I. Place all borrow to keep it free of other materials and to prevent segregation.
- J. Carry out compaction testing in accordance with ASTM D1556 (sand cone), or D6938 (Nuclear Methods), as specified in Section 02315.
- K. Maintain and repair all eroded areas during the life of this contract at no additional cost to the Owner.

END OF SECTION

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SECTION 02410

ROCK EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Rock excavation for trenches and structures.

B. Related Sections

1. Section 02315 – Excavation, Backfill, Compaction and Dewatering

1.2 DESCRIPTION

- A. Removal of boulders greater than 1 cubic yard in volume is included under this Section of work. Removal of boulders under 1 cubic yard in volume is not considered part of this work and is considered a part of the work specified under Section 02315.
- B. Rock excavation shall mean solid ledge rock or solid concrete which in the opinion of the Engineer requires for its removal, drilling and blasting, wedging, sledging, firing, or breaking up with power operated hand tools.
- C. Material removed solely with a power-operated excavator or loose, previously blasted ledge, broken stone, weathered rock, cemented gravel, hardpan, glacial till, concrete, asphalt or masonry which may be encountered during trenching operations is not considered rock excavation.

1.3 SUBMITTALS

- A. Construction methods that will be utilized for the removal of rock on the project.
- B. Provide continuous vibration monitoring within acceptable limits at the concrete dam structure throughout the duration of the rock removal.
- C. If blasting is proposed for rock removal, qualifications of professional blasting Consultant and a pre-blast survey.
- D. If blasting is proposed for rock removal, a description of the proposed method for blasting, prior to beginning any blasting operations, detailing the proposed methods of blasting including the type of information to be included in the blasting monitoring seismograph reports.
 1. Seismograph reports shall include plan of drilling, amount and type of loadings, kind and distribution of blasting caps, delays used and amount of explosive per day, order of firing, distance and direction of recording station from blast area, type of ground at recording station, time of readings displacements and frequency, copy or record, and brief discussion on vibratory effects.
- E. Conduct pre-blast structure survey prior to start of blasting.
 1. Conduct pre-blast structure survey on structures within areas affected by work that may be damaged by blasting. Include aboveground structures within at least 200 feet of areas to be blasted. This includes the Brush Reservoir Dam itself.

2. The purpose of the survey is to document existing conditions of structures prior to blasting. The survey is intended to be used as evidence in ascertaining whether and to what extent damage may have occurred as a result of blasting.
 3. Record information for each structure surveyed:
 - a. Age and type of construction
 - b. Location and character of cracks
 - c. Evidence of settlement and leakage
 - d. Other pertinent information
 4. Record pre-blast survey information on forms prepared specifically for pre-blast surveys.
 5. Supplement written records with photographs or videotape recording.
 6. Submit copies of written records and photographs or videotapes to respective property owner, as well as to the Engineer with the property owner's permission, prior to the start of blasting.
- F. Blasting records - For each blast, document the following:
1. Location of blast in relation to Project Stationing or coordinate systems and elevation.
 2. Date and times of loading and detonation of blast.
 3. Name of person in responsible charge of loading and firing.
 4. Details of blast design, as previously specified.
 5. Vibration records including location and distance of seismograph geophones to blast and to nearest structure and measured peak particle velocity. Report peak particle velocity in units of inches per second.
 6. Air-blast records. Report peak air blast values in units of pounds per square inch overpressure above atmospheric or in decibels at linear response.
 7. Comments by blaster in charge regarding damage to existing facilities, adjacent property, or completed work, misfires, fly rock occurrences, unusual results, or unusual effects.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 BLASTING

- A. Comply with OSHA, State and Local regulations when blasting and handling explosives.
 1. Stamford Fire Department approval is required for all blasting operations. A pre-blast survey must be completed. The Fire Chief or his designated representative must witness the survey.
- B. Assume full responsibility for the safety of the blasting operations and perform the work in a manner that will ensure the safety of personnel and that of existing structures,

adjacent buildings, and completed new construction. The Contractor will be held responsible for claims for damage to property and underground structures.

- C. Comply with current OSHA regulations as well as engage the services of a qualified, professional blasting Consultant who will design, review, evaluate and modify the blasting operations. Design the initial blasts and conduct test blasts (minimum four tests) until regular production-controlled blast patterns are developed that produce the desired rate of excavation while meeting the requirements for vibration and air blast control specified. Periodically, or when requested by the Engineer, review the blasting operations and make such changes in the blasting operations as are required to produce a controlled blasting operation meeting the requirements of these specifications. Review by the Engineer of the Contractor's blast design shall not relieve the responsibility for obtaining adequate rock breakage.
- D. Provide adequate notice to residents that may be affected by the use of explosives. In residential areas, provide the following:
 - 1. Certificate of Insurance to cover a blasting operation.
 - 2. Evidence that residential homes have been reviewed to satisfy all parties that pre-construction conditions are well documented.
- E. Blasting Design Criteria
 - 1. Exercise care in the drilling and blasting operations so that the remaining rock remains stable and to reduce overbreak to a minimum.
 - 2. Control blasting by limiting the charge per delay to that which produces limited levels of ground vibrations as herein specified. Hire a qualified testing agency to measure the radial particle velocities using a seismograph. Peak radial particle velocity shall be the measure of the level of vibration.
 - 3. The charge weight per delay used in blasting shall be such that the peak radial particle velocity shall not exceed 2.0 inches per second measured on the foundation material, rock, or overburden at the nearest structure. The Contractor shall modify the size and type of explosives used to meet this criteria or other limiting criteria.
 - 4. For areas where controlled blasting is required, the charge weight per delay shall be such that the peak radial particle velocity shall not exceed 1.0 inch per second.
 - 5. Air blast overpressures from blasting operations shall not exceed 0.02 psi.
 - 6. The maximum depth of lift to be removed at any one time shall not exceed 6 feet.
 - 7. Use blasting mats, chained logs, warning signs, guards, etc., in accordance with the best practice.
 - 8. All blasting operations shall be done by electronic or non-electric detonation.
 - 9. Restrict blasting to daylight hours. In no case will blasting operations be permitted before 8:00 AM or after 5:00 PM.
 - 10. These criteria may be adjusted by the Owner, if the blasting procedures based on monitoring results or in the opinion of the Owner are likely to be disruptive to the existing Brush Reservoir Dam, nearby residences, people, or to cause damage to structures. These changes may require the Contractor to revise blast design and reduce the size of charges.

- F. In areas where the Contractor is allowed to pre-drill and blast ledge or rock formations without first removing the over-burden, the Contractor shall be required to firmly establish a profile of the solid ledge or rock that cannot be ripped free by the excavating machine. The actual pay quantities will be based on the inspector's determination of the actual profile and extent of the rock formations drilled and blasted by the Contractor and his verification of the rock formations once the trench has been opened.
- G. Minimum excavation and clearance within rock trenches shall be per Section 02315.
- H. The use of perchlorate containing explosives is prohibited.

3.2 BACKFILL

- A. Backfill must be with material from the excavation or where the excavated material is considered unsuitable for backfill, with material wasted from other area of the job or, when directed by the Engineer in writing, with granular fill. No stones, rocks, or boulders shall be used as backfill.

END OF SECTION

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SECTION 02514

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Ductile iron pipe and fittings, direct buried
 - 2. Restrained joints and fittings
- B. Related Sections
 - 1. Section 02315 – Excavation, Backfill, Compaction and Dewatering

1.2 REFERENCES

- A. Pipe and fittings shall conform to the latest edition of the following standards unless otherwise specified:
 - 1. ANSI/AWWA C104/A21.4, Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
 - 2. ANSI/AWWA C110/A21.10, Ductile Iron and Grey Iron Fittings 3" through 48" for Water and Other Liquids.
 - 3. ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
 - 4. ANSI/AWWA C150/A21.50, Thickness Design of Ductile Iron Pipe.
 - 5. ANSI/AWWA C151/A21.51, Ductile Iron Pipe, Centrifugally Cast, for Water.
 - 6. ANSI/AWWA-C153/A21.53, Ductile Iron Compact Fittings Water Service.
 - 7. ANSI/AWWA C600, Installation of Ductile Iron Water Mains and their Appurtenances.
 - 8. ANSI/AWWA C800, Underground Service Line Valves and Fittings.
 - 9. ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 10. ASTM A536, Standard Specification for Ductile Iron Castings
 - 11. Ductile Iron Pipe Research Association, "Thrust Restraint Design for Ductile Iron Pipe" (Current Edition).

1.3 SUBMITTALS

- A. Administrative Submittals
 - 1. Detailed description of proposed pipe handling and installation methods along with the manufacturer's approval of those methods.
- B. Shop Drawings

1. Manufacturer's drawings and catalog cuts, including descriptive literature indicating product characteristics and conformance with specifications and code requirements. Submit shop drawings for ductile iron pipe; fittings; couplings; filling rings; linings and coatings; and all accessories.
 2. Location for each type of restrained joint or device to prevent joint separation along with installation, assembly and disassembly instructions.
- C. Quality Control Submittals
1. Certificates of compliance on pipe materials.
 2. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM and ANSI/AWWA Standards specified herein.
 3. Manufacturer of pipe and Manufacturer of fittings on the project shall have an established, annually audited and certified, quality control procedure for manufacturing of pipe and manufacturing of fittings respectively. Manufacturer shall be certified by an independent, third party auditor for compliance with all requirements of the AWWA standards. The manufacturer shall submit a current certificate of compliance for the plant facility where the pipe or fittings are to be made. Certificate of compliance shall be submitted for each additional year of manufacturing during the duration of the Project. The manufacturer shall not change the plant manufacturing the pipe or fittings during the duration of the Work.

1.4 QUALITY ASSURANCE

- A. Pipe and fittings shall be inspected at the foundry as required by the standard specifications to which the material is manufactured. In addition, the Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service, or by the Engineer, at either the manufacturer's plant or other testing laboratory at their own expense.
- B. Ductile iron pipe shall be from a single manufacturer. Fittings shall be from a single manufacturer, not necessarily the pipe manufacturer.
- C. The Engineer will inspect the pipe and fittings after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the Specification requirements. Pipe rejected after delivery, or at any point during the progress of the Work, shall be marked for identification and shall immediately be removed from the job site and replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. American Cast Iron Pipe Company
- B. U.S. Pipe
- C. or equal

2.2 PIPE AND FITTINGS - GENERAL

- A. Ductile iron pipe shall be designed in accordance with AWWA C150 and shall be manufactured in accordance with AWWA C151. Fittings and other materials referenced

in this section shall conform to the latest edition of the references listed in Paragraph 1.2 of this section.

- B. Unless otherwise indicated or specified in the Contract Documents, buried ductile iron pipe and fittings shall be Class 52 with push on joints.
- C. Unless otherwise indicated or specified, buried pipe shall have an asphaltic exterior coating in accordance with AWWA C110, C151 or C153, as applicable.
- D. Unless otherwise indicated or specified in the Contract Documents, buried fittings shall be ductile iron or gray iron with mechanical joints.
- E. Pipe and fittings shall be cement mortar lined and seal coated on the interior in accordance with AWWA C104. Cement mortar lining shall be twice the standard thickness; tolerance shall be minus 0 inches, plus 1/8 inch.

2.3 PIPE AND FITTING JOINTS

- A. Push-on-joints and mechanical joints shall conform to ANSI/AWWA C111/A21.11.
- B. Provide restrained joints for the entire length of the proposed low-level outlet pipe. Gaskets shall meet the material requirements of ANSI/AWWA A21.11/C111 for mechanical joint gaskets.
- C. Restrained gasketed joints for rubber push-on joint pipe shall be Fast-Grip® by American Cast Iron Pipe Company, Field Lok 350® by US Pipe and Foundry Co., or equal. Contractor is to supply the Owner with four new gasket disassembly drive shims as a part of the project.

2.4 FITTINGS

- A. Fittings shall be ductile iron or gray iron.
- B. Fittings greater than 12 inches in size shall conform to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have the following pressure ratings:
 - 1. Fittings greater than 12 inches and less than or equal to 24 inches - 350 psi
- C. Mechanical joint retainer glands shall be installed on all mechanical joints. Retainer glands shall be specifically designed to fit standard mechanical joint bells with corrosion resistant, high strength, low-alloy T-head bolts conforming to ANSI/AWWA A21.11/C-111 and ANSI/AWWA A21.53/C-153. Retainer glands shall be manufactured of ductile iron conforming to ASTM A536-80, grade 60-42-10. Wedges shall be of hardened ductile iron and require the same torque in all sizes. These devices shall have a minimum 250 psi pressure rating with a minimum safety factor of 2:1 and shall be EBAA IRON, Inc., Megalug® series 1100 or equal. Glands shall be listed with Underwriters Laboratories and/or approved by Factory Mutual.

2.5 COUPLINGS

- A. Solid sleeves shall have long body type (12 inches min.) and mechanical joints with retainer glands. Sleeves shall be ductile iron meeting or exceeding ASTM A536 and shall be suitable for making connections between cast iron pipe and ductile iron pipe and operated up to a working pressure of 350 PSI.
- B. Couplings and transitional couplings for pipe greater than 12 inches in diameter shall consist of a steel sleeve with gaskets suitable for the pipe being joined. The bolts and nuts shall be corrosion resistant high strength, low alloy steel such as Cor-Ten steel or

an approved equal. Couplings shall be Dresser Style 38, Smith Blair Style 311, Romac Style 400, or equal. Transition couplings for pipe greater than 12 inches in diameter shall be Dresser Style 62, Smith Blair Style 413, Romac Style TC400, or equal.

- C. Provide couplings with an exterior epoxy coating.

2.6 GASKETS, GLANDS, NUTS, AND BOLTS

- A. Gaskets, glands, nuts, bolts and accessories shall conform to ANSI/AWWA C111/A21.11 or C153/A21.53, as appropriate.
- B. Gaskets shall be of plain tipped rubber, suitable for exposure to the liquid within the pipe.
- C. Lubricants must be suitable for the type of fluid to be carried by the pipeline, and shall be NSF approved for water service.
- D. Glands shall be ductile or cast iron.
- E. Bolts shall be high strength, low alloy.

PART 3 EXECUTION

3.1 GENERAL

- A. Deliver, handle, store and install ductile iron pipe in accordance with ANSI/AWWA C600.

3.2 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Pipe and Fittings
 1. Coordinate delivery of pipe and fittings with installation and unload along the line of work outside the trench near as practicable to the point of final placement, and properly wedged secure. Give minimum 24 hour notice to the Engineer prior to pipe deliveries. Notice shall include the method of unloading.
 2. Unload and handle pipe and fittings with a crane or backhoe of proper capacity outfitted with a steel cable sling, belt sling or other specially designed attachment to protect the pipe coating.
 3. All excess pipes are to be stockpiled at an approved staging yard in accordance with AWWA C600.
- B. Storage of Materials
 1. Store pipe in a manner to keep pipe interior free from dirt and foreign matter. Store pipe on wood blocking, rails or other suitable materials. Pipe shall not be stored on stones.
 2. Pipe may be stored on top of each other to the maximum stacking height specified by AWWA C600.
 3. Protect materials subject to corrosion in accordance with manufacturer's recommendations.
 4. If pipe or project materials are stored at the Contractor's approved staging yard, the Engineer shall be permitted reasonable access to the staging yard for inspection of the pipe and materials.

5. Pipe ends shall be sealed tight using polyethylene bags and tape immediately after unloading, regardless of the storage time length, in order to keep foreign matter and wind blown debris out.
6. All fittings are to be stored off of the ground on wooden pallets.

C. Handling Materials

1. Handle materials in such a manner so as to prevent damage to the concrete or mortar coating or lining.
2. Materials are to be handled using methods approved by the pipe manufacturer.
3. Materials damaged during handling will be rejected and shall be replaced at the Contractor's expense.
4. Ensure that no foreign materials enter the pipe and fittings during handling.

3.3 COORDINATION

- A. Existing pipe may have to be shut down to complete the connections.

3.4 DEFECTIVE PIPE

- A. Defective pipe or fittings will be rejected for use on this project. Defective pipe is classified as follows:
1. Damage to interior lining
 2. Insufficient lining thickness
 3. Pipe out of round
 4. Damaged pipe barrel area
 5. Damaged pipe bells or spigots
 6. Missing, misplaced or illegible marking and identification
 7. Outside pipe diameter exceeding allowable tolerance
- B. If defective pipe is discovered after it has been installed, it shall be removed and replaced with sound pipe, at no additional cost to the Owner.

3.5 JOB CONDITIONS

A. Environmental Requirements

1. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.
2. Equipment for pipe laying shall be maintained in good operating order.
3. Job site shall be kept clean of debris and organized.

B. Work Affecting Existing Pipes

1. Work on Existing Pipes:
 - a. Prior to any work on existing pipelines, remove soils, rust and other debris from the exterior wall of the pipe a minimum of 12 inches beyond the work area.

- b. Cut pipes as shown or required with machines specifically designed for this work.
- c. Install temporary plugs to keep out all mud, dirt, water and debris.
- d. Provide necessary adapters, fittings, pipe and appurtenances required.
- e. Cut or tap existing mains at the mid span of a pipe barrel. In no case shall a pipe be cut or tapped within 24 inches of a pipe joint.

3.6 CLEANING PIPE AND FITTINGS

- A. Clean and remove foreign matter from the interior of each existing pipe segment to remain at the completion of work on the dam.
- B. Clean and remove foreign matter from the interior of each pipe and fitting before placing in the trench. Remove pipe and fittings whose interior has been contaminated with oil, gasoline or kerosene and replace at no additional cost to the Owner. Should foreign material or contaminants be observed in previously installed pipe, cease work until foreign material or contaminated pipe is decontaminated or removed.
- C. Remove all lumps, blisters, and excess asphaltic coating from the bell and spigot ends of each pipe or fitting. The outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and be dry and free from oil and grease before the pipe or fitting is laid.
- D. On all ductile iron pipe or fittings, the bell of the pipe and the spigot of the adjacent pipe or fitting shall be wire-brushed and cleaned of rust and dirt. The bell of the pipe or fitting and the spigot of the adjacent pipe shall then be lubricated with the joint lubricant furnished with the pipe, and used in accordance with the manufacturer's directions.

3.7 ALIGNMENT AND GRADE

- A. Lay and maintain the pipe at the required lines and grades as shown on the Drawings. Fittings shall be at the locations indicated on the Drawings with joints centered, and spigots properly fitted. No deviation shall be made from the line and grade indicated on the Drawings, except with the approval of the Engineer.
- B. Joint Openings and Deflection:
 1. The maximum allowable joint openings and deflection for push-on joint pipe and restrained joint pipe shall be one-half the manufacturer's maximum allowable opening and deflection.
- C. Where underground conditions indicate a change of alignment or grade, such change shall be made only with the written consent of the Engineer.

3.8 PIPE INSTALLATION

- A. Laying Pipe
 1. Prevent foreign material from entering the pipe while it is being placed in the line. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.
 2. When laying pipe, the spigot end shall be centered in the bell, the pipe forced home and the joint completely assembled. The pipe shall be adjusted to correct

line and grade and secured in place with approved backfill material, properly tamped under and around the pipeline.

B. Cutting Pipe

1. Furnish pipe in full lengths. Cut ductile iron pipe without damage to the pipe or cement lining. The cutting shall be done to leave a smooth end at right angles to the axis of the pipe.
2. Cut ductile iron pipe either by the use of compression-type chain cutters which exert an even continuous force on the wall of the pipe or by power driven abrasive wheels.
3. On ductile iron pipe using rubber joints, the outside edge of the cut end must be tapered back approximately ¼ inch at an angle of about 30 degrees so as to provide for the proper assembly of this joint.

3.9 PUSH-ON JOINTS

- A. Push-on joints shall be made in accordance with the manufacturer's instructions. Install gaskets in the pipe bell after lowering the pipe into the trench for installation. Thoroughly clean the bell and spigot of dirt and tar blisters in the trench utilizing a wire brush or bristle brush. Insert rubber gasket in the groove of the bell end of the pipe beginning at the bottom of the bell and working to the top of the bell. Apply lubricant per the manufacturer's recommendations utilizing a paint brush to the pipe gasket and the pipe spigot to be joined. Place a clean rag under the joint to protect the joint from dirt caused by unintentional grounding of the pipe during jointing. Upon completion, remove the rag. Align the plain end of the pipe to be laid and insert in the bell of the pipe to which it is to be joined and push home with a jack or by other means. After joining the pipe use a metal feeler to make certain that the rubber gasket is correctly located.

3.10 MECHANICAL JOINTS

- A. Mechanical joints shall be made in accordance with Appendix A of ANSI A21.11/AWWA C111 and the manufacturer's instructions. Thoroughly clean and lubricate the joint surfaces and rubber gasket before assembly. Tighten bolts to the specified torques. Under no conditions shall extension wrenches or an extended handle ratchet wrench be used to secure greater leverage.

3.11 RESTRAINED JOINTS

- A. Install restrained joint pipe where indicated on the Drawings. Make the joint assemblies in accordance with the manufacturer's recommendations.

END OF SECTION

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SECTION 02921

VEGETATIVE SUPPORT MATERIAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Topsoil

1.2 SUBMITTALS

- A. Provide representative samples of borrow materials taken from the source. Tag, label, and package the samples as requested by the Engineer. Provide access to the borrow site for field evaluation and inspection.
- B. Provide analytical test results at the rate specified. All samples shall be representative and analyzed for the following:
 - pH
 - Nitrogen
 - Phosphorus
 - Potash
 - Grain size
 - Organic content

PART 2 PRODUCTS

2.1 MATERIALS

- A. Vegetative Support Material
 - 1. Vegetative support material shall consist of fertile, friable, natural topsoil typical of the locality without admixture of subsoil, refuse or other foreign materials and shall be obtained from a well-drained arable site. It shall be such a mixture of sand, silt and clay particles as to exhibit sandy and clayey properties in and about equal proportions. It shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter. Topsoil as delivered to the site or stockpiled shall have pH between 6.0 and 7.0 and shall contain not less than 5 percent or more than 8 percent organic matter as determined by loss of ignition of moisture-free samples dried at 100 degrees Celsius. The topsoil shall meet the following mechanical analysis:

	Percentage Finer
1-in screen opening	100
No. 10 mesh	95 to 100
No. 270 mesh	35 to 75
0.002 mm*	5 to 25

*Clay size fraction determined by pipette or hydrometer analysis.

2. Prior to stripping, the topsoil shall have demonstrated; by the occurrence upon it of healthy crops, grass or other vegetative growth; that it is reasonably well drained and that it does not contain toxic amounts of either acid or alkaline elements.

2.2 EQUIPMENT

- A. Earth Moving Equipment
- B. Adequate types and number of equipment shall be used to ensure that the vegetative support material is spread evenly and at the proper depth to all areas intended to be covered without damaging underlying soil layers or structures.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Vegetative support material shall be placed over approved areas to a depth sufficiently greater than required so that after natural settlement and light rolling, the complete work will conform to the lines, grades and elevations indicated. No loam shall be spread in water or while frozen or muddy.
- B. The vegetative support material shall be hauled, deposited, spread, compacted, tracked and raked to the lines and grades shown on the Plans or as directed by the Engineer. After the vegetative support material has been spread, it shall be carefully prepared for seeding by spading or harrowing, and raking. All large, stiff clods, lumps, stones, brush, roots, stumps, litter, and other foreign material shall be removed.
- C. The compaction shall be equivalent to that produced by a hand roller weighing from 75 to 100 pounds per foot of width. The compaction may be obtained by rolling, dragging or any method that produces satisfactory results. All depressions caused by settlement or rolling shall be filled with additional materials and the surfaces shall be regraded and rolled until it presents a reasonably smooth and even finish and is up to the required grade.
- D. During hauling operations, all public and private roadway surfaces shall be kept clean and any topsoil or other dirt which may be brought upon the surface shall be removed promptly and thoroughly before it becomes compacted by traffic. If necessary, the wheels of all vehicles used for hauling shall be cleaned frequently and kept clean to avoid bringing any dirt upon the surface.

3.2 QUALITY CONTROL

- A. The responsibility for satisfactory results on work carried out under this item rests entirely on the Contractor regardless of the prior approval of the materials and methods on the part of the Engineer.
- B. The Contractor shall provide laboratory test results for the vegetative support material intended for use as specified herein, at a frequency of 1 round per 1,000 cy of material.

- C. The Engineer shall randomly sample the borrow material and have a certified analytical laboratory perform testing as described herein. The testing shall be a verification of the results submitted by the Contractor and shall be entirely at the Contractor's expense.

END OF SECTION

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SECTION 02922

HYDROSEEDING & MULCHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Lime
 - 2. Fertilizer
 - 3. Seed
 - 4. Bonded Fiber matrix
 - 5. Water
- B. Related Sections
 - 1. Section 02921 – Vegetative Support Material

1.2 SUBMITTALS

- A. Results of vegetative support material nutrient analysis and recommendation for limestone and fertilizer application rates.
- B. Product data and specifications for the Bonded Fiber Matrix.
- C. Product data and specifications for the fertilizer and lime.
- D. Product data for seed mixtures.
- E. Based on results of vegetative support material nutrient analysis, submit recommendation for limestone and fertilizer application rates.

1.3 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging. Damaged packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Deliver lime in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.4 TESTS

- A. Provide vegetative support material structure and nutrient analysis made by an independent laboratory approved by the Engineer in accordance with Section 02921, and provide limestone and fertilizer in accordance with the types and rates specified by said laboratory.
- B. A certified statement shall be furnished to the Engineer by the Contractor prior to the start of work, stating the number of pounds of limestone, fertilizer, seed, and mulch, per

100 gallons of water and shall also specify the number of square yards of seeding that can be covered with the solution specified above.

PART 2 PRODUCTS

2.1 LIME

- A. Lime shall consist of pulverized limestone obtained by grinding either calcareous or dolomitic limestone so that 100% of the material will pass a No. 1 sieve, 80% shall pass a 100-mesh sieve and 45% shall pass a 200-mesh sieve. The ground limestone shall have a neutralizing value satisfactory to the Engineer. Lime as herein described shall be applied at the rate of not less than 50 pounds per 1,000 square feet, or higher, depending upon soil requirements as determined above.

2.2 FERTILIZER

- A. Fertilizer shall be a commercial grade, chemical fertilizer for lawns, the elements of which are derived from organic sources and shall contain the percentages by weight recommended in the laboratory analyses.
- B. The availability of the various elements shall conform to the standards of the "Association of Official Agricultural Chemists". A minimum of 50% of the nitrogen content by weight shall be derived from organic materials.
- C. All fertilizer shall arrive on the job site in standard size bags, bearing the manufacturer's name, the content, weight and guaranteed analysis.
- D. The Contractor shall be responsible in every respect for the fertilizer, and it shall be stored in a weatherproof enclosure on dunnage in such a manner that its effectiveness will not be impaired.
- E. Fertilizer shall be applied to areas acceptable to the Engineer as ready for seed at a rate recommended by a state and/or federally supported soil experiment lab.

2.3 SEED

- A. Seed shall be of the previous year's crop.
- B. Required ranges:
 - 1. Purity > 90%
 - 2. Germination > 80%
 - 3. Crop < 0.5%
 - 4. Weed < 0.3%
 - 5. Noxious Weed – 0%
 - 6. Inert < 8%
- C. The seed mixture for restoration of upland areas shall be "New England Erosion Control/Restoration Mix for Dry Sites," as manufactured by New England Wetland Plants, Inc., or approved equal and shall be applied at a rate of 35 pounds per acre.
- D. The seed mixture for restoration of wetland areas shall be "New England Wet Mix," as manufactured by New England Wetland Plants, Inc., or approved equal and shall be applied at a rate of 1 pound per 2,500 square feet.

- E. All seed shall comply with State and Federal seed laws.
- F. A sworn certificate indicating each variety of seed, weed content, germination of seed, net weight, date of shipment and manufacturer's name shall accompany each seed shipment. Regardless of approval by the Engineer to sow the seed, complete responsibility for satisfactory results shall rest entirely on the Contractor.

2.4 BONDED FIBER MATRIX

- A. Bonded fiber matrix shall be a hydraulically applied system of long strand residual wood fibers produced by thermo-mechanical defibration of wood chips and joined together by a high-strength non-toxic adhesive to create a continuous three dimensional blanket that adheres to the soil surface to form a bonded fiber matrix. The system shall be applied to the soil as a viscous mixture, which upon drying creates a high-strength, porous and erosion resistant mat. Upon drying, the matrix shall not inhibit the germination and growth of plants in and beneath the layer. The matrix shall retain its form despite rewetting.
- B. The bonded fiber matrix shall be hydraulically applied at the rate of 4,000 pounds per acre, or in accordance with the manufacturer's recommendations and application requirements/specifics. The resultant coverage must be at least 1/8 inch thick over the entire surface area. The bonded fiber matrix shall be applied from alternate directions to alleviate shadowing. Bonded fiber matrix shall not be applied within 24 hours of an expected rainfall.
- C. Production Specifications:
 - 1. Composition: Refined wood fiber 90% by weight, blended hydrocolloidal based binder 10% by weight
 - 2. Color: Natural
 - 3. Moisture: 9%-15%
 - 4. Application: Conventional hydraulic seeding equipment with mechanical agitation at a rate of 4,000 pounds per acre
 - 5. Thickness: 1/8-1/4 inch after application
 - 6. Mixing: 40 pounds of fiber per 100 gallons of water

2.5 WATER

- A. Provide water for hydroseeding.

2.6 MULCH

- A. Mulch shall be virgin wood fiber mulch applied at a rate of 1,500-lbs/acre or hay mulch applied at a rate of 3,500-lbs/acre.

PART 3 EXECUTION

3.1 HYDROSEEDING & MULCHING

- A. Tracking of the vegetative support layer prior to hydroseeding shall be completed in accordance with Section 02921 and Part 3.1(I) below.
- B. Lime, fertilizer, seed, and mulch shall be simultaneously applied in one operation by the use of an approved spraying machine. The materials shall be mixed with water in

the machine and kept in an agitated state in order that the materials may be uniformly suspended in water. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of limestone, fertilizer, seed, and mulch shall be equal in quantity to those specified above.

- C. Bonded fiber matrix shall be applied to all seeded areas on slopes steeper than 7%, except for those designated to receive erosion control blankets. The thickness of the matrix after application shall be 1/8 inch to ¼ inch thick.
- D. All areas to be seeded that have a slope of 7% or less shall receive wood fiber or hay mulch in lieu of bonded fiber matrix.
- E. Seed shall be sown only between the periods from April 15th to June 1st, and from August 15th to October 1st.
- F. If as a result of rain, the prepared seedbed becomes eroded, the Contractor shall rework the topsoil until it is smooth and re-hydroseed such reworked areas.
- G. No seeded area will be acceptable until it is covered with a satisfactory, healthy stand of quality grass of the variety specified. A satisfactory stand of grass, as determined by the Engineer, shall consist of a uniform stand of at least 60% established permanent grass species, with a uniform count of at least 100 plants per square foot. If the results of the spray operation are unsatisfactory, the Contractor will be required to repeat the hydroseeding process as needed to achieve a thick stand of grass.
- H. The Contractor shall protect seeded areas from damage and shall repair and maintain all areas at his own expense at no additional cost to the Owner until a certificate of final acceptance is issued by the Engineer. The Contractor shall repair and reseed all defective or non-growth grass areas during the following season.
- I. After side slopes have received vegetative support material, they shall be traversed by a bulldozer to create ridges running perpendicular to the slope to impede the travel of stormwater runoff. The tracking shall be done prior to hydroseeding.
- J. The Contractor is fully responsible for providing adequate amounts of water to the seeded areas to provide an adequate growth.
- K. All areas to be seeded shall be hydroseeded. Hand seeding will not be allowed.

3.2 MAINTENANCE AND PROVISIONAL ACCEPTANCE

- A. Keep all planted areas watered and mowed and in good condition, all areas if and when necessary until a good, healthy, uniform growth is established over the entire area and shall maintain all these areas in an approved condition until final acceptance.
- B. The Engineer will inspect all work for provisional acceptance at the end of the 10 week maintenance period, upon the written request received at least 10 days before the anticipated date of inspection. The maintenance period must occur during the growing season between March 31 and October 1 and shall include a minimum of three mowings.
- C. A satisfactory turf will be defined as:
 - 1. No bare spots larger than 2 sq. ft.
 - 2. No more than 10 percent of total area with bare spots larger than 1 sq. ft.
 - 3. No more than 15 percent of total area with bare spots larger than 6-in. square.

- D. After the inspection has occurred but prior to provisional acceptance, a soil test shall be performed to determine if additional soil fertilization should occur. If necessary additional fertilized not to exceed 30 lbs/1,000 sq. ft. of 20-10-10 shall be applied as directed by the Engineer.
- E. Furnish full and complete written instructions for maintenance of the planted areas to the Owner at the time of provisional acceptance.
- F. The inspection by the Engineer will determine whether maintenance shall continue. Continue maintenance until all areas of the site meet the minimum requirements specified above.
- G. After all necessary corrective work and clean-up has been completed, and maintenance instructions have been reviewed by the Owner, the Engineer will certify in writing the provisional acceptance of the turf areas. Maintenance of all turf areas shall cease on receipt of provisional acceptance.

3.3 GUARANTEE PERIOD AND FINAL ACCEPTANCE

- A. All seeded areas shall be guaranteed for not less than 1 full year from the time of final acceptance.
- B. At the end of the guarantee period, inspection will be made by the Engineer upon written request submitted at least 10 days before the anticipated date. Seeded areas not demonstrating satisfactory stands as outlined above, as determined by the Engineer, shall be renovated, reseeded and maintained meeting all requirements as specified herein.
- C. After all necessary corrective work has been completed, the Engineer shall certify in writing the final acceptance of the seeded areas.

END OF SECTION

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SECTION 02955

CLEANING OF UNDERGROUND PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Removal of dirt, rocks, sand and other material within underground piping

1.2 SUBMITTALS

A. Proposed cleaning procedures

B. Proposed cleaning equipment

1.3 QUALITY ASSURANCE

- A. Contractor shall have at least 5 years experience cleaning underground piping.

PART 2 PRODUCTS

2.1 CLEANING EQUIPMENT

A. High-Velocity Jet (Hydrocleaning) Equipment

1. All high-velocity pipe cleaning equipment shall be constructed for ease and safety of operation.
2. The equipment shall have a selection of two or more high-velocity nozzles.
3. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.
4. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

B. Vacuum-Operated Equipment

C. Other cleaning equipment approved by the Engineer

PART 3 EXECUTION

3.1 CLEANING OF PIPES

- A. Clean the piping listed on the Drawings by hand; by using hydraulically propelled, high-velocity jet; vacuum-operated equipment; mechanically powered equipment; or other methods/equipment approved by the Engineer. The methods used shall be capable of removing dirt, rocks, sand, roots, and other materials and obstructions from the piping.
- B. If cleaning of an entire pipe length cannot be completed from one end, set up the equipment at the other end of the pipe and then again attempt to clean the pipe section.
- C. Restore pipes to a minimum of 95% of their original hydraulic capacity, as measured with the low level outlet control valve full open and a full head on the upstream inlet to the pipe.

- D. Remove and dispose of all dirt, rocks, sand, roots, and other materials within the piping to be cleaned.
- E. During pipe cleaning operations, take precautions in the use of equipment to prevent damage to public and private property.

END OF SECTION

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DIVISION 3 - CONCRETE

SECTION 03100

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Wood Form Material
 - 2. Prefabricated Forms
 - 3. Formwork Accessories
- B. Related Sections
 - 1. Section 03300 - Cast-in-Place Concrete
 - 2. Section 05500 – Miscellaneous Metals

1.2 REFERENCES

- A. American Concrete Institute (ACI)
 - 1. ACI 301 - Specifications for Structural Concrete for Buildings
 - 2. ACI 318 - Building Code Requirements for Reinforced Concrete
 - 3. ACI 347 - Guide to Formwork for Concrete
- B. American Society for Testing and Materials (ASTM)
 - 1. D4 - Standard Test Method for Bitumen Content
 - 2. D6 - Standard Test Method for Loss on Heating of Oil and Asphaltic Compounds
 - 3. D71 - Standard Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)
 - 4. D217 - Standard Test Method for Cone Penetration of Lubricating Grease
 - 5. D1056 - Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
 - 6. D1751 - Standard Specifications for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - 7. D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
 - 8. D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications
- C. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing

- D. National Institute of Standards and Technology (NIST)
 - 1. Voluntary Product Standard PS 1-95 - Construction and Industrial Plywood

1.3 SUBMITTALS

- A. Drawings showing schedule of placement, location of all construction joints and all control joints with methods of forming. Show the location and elevation of all sleeves, wall pipes and embedded items.
- B. Drawings showing sizes and materials for forms, form bracing, and form ties.
- C. Product Data on form release agent, permanent formwork and inserts.
- D. Samples for the following materials:
 - 1. Form ties (including cones) and spreaders
 - 2. Waterstops
 - 3. Compressible filler
 - 4. Other materials requested by the Engineer

1.4 DESIGN REQUIREMENTS

- A. Design formwork and shoring at the Contractor's expense by a Professional Engineer registered in the State where the work will be performed to conform to all design and code requirements in ACI 301, ACI 318 and ACI 347 and other applicable regulations and codes. The design shall consider any special requirements that may result due to the use of super plasticized and/or retarded set concrete.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Plywood: Class I High Density Overlay plyform, exterior grade, not less than 5 ply nor less than 5/8 inches thick conforming to Voluntary Product Standard PS 1-95
- B. Lumber: Douglas Fir species, No. 1 grade S4S with grade stamp clearly visible

2.2 PREFABRICATED FORMS

- A. Manufacturers:
 - 1. Symons Corporation, DesPlains, Illinois
 - 2. HICO Corporation, Bronx, NY
 - 3. Or equal
- B. Preformed Steel Forms: Minimum 16 gage (1.5 mm), tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearances of finished concrete surfaces; with clean, warp free, undented, ungouged, undamaged surfaces.
- C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearances of finished concrete surfaces.

2.3 FORMWORK ACCESSORIES

- A. Form Ties:
1. Ties for foundation walls shall be metal and designed with removable setback cones so that after removal of the projecting part, no metal shall remain within 1½ inches of the face of the concrete.
 2. Form ties for spillway concrete, upstream facing wall, and training wall shall have a neoprene waterstop washer placed on each form tie, or on the inside tie rods for systems which use she bolts, and shall have setback cones.
 3. Flat bar snap ties for panel forms shall have plastic or rubber inserts with 1½ inch minimum depth to allow patching of tie hole after removal.
 4. Setback cones shall be wood or plastic tapered cones 1 inch diameter and 1½ inches deep to allow filling and patching of the concrete surface after removal.
 5. Common wire ties shall not be used.
- B. Form Release Agent:
1. Form release agent for structures shall be vegetable oil based and shall be NSF approved for use with potable water.
- C. Corners:
1. Chamfered No. 1 Poplar wood strips; ¾ inch by ¾ inch; maximum possible lengths
- D. PVC Waterstops:
1. Virgin polyvinyl chloride, minimum 2000± 50 psi tensile strength, minus 50°F to plus 170°F working temperature range, 6 inches wide, 3/8 inches thick, factory made corner sections, heat welded jointing; manufactured by Paul Murphy Plastics, Greenstreak, Vinylex or equal
 2. Exceed the requirements set forth in the U.S. Army Corps of Engineers waterstop specification (CRD-C572-84)
 3. Must exhibit zero water leakage when tested in accordance with the American Concrete Institute (ACI) standard test method for waterstop
 4. Heat fused field splices shall be tested for a complete seal by use of a corona discharge unit.
 5. Multi-rib design with center bulb shall be used for all expansion joints as noted on Drawings and proposed for the work.
 6. Ribbed flat heavy duty design shall be used for all construction joints as noted on Drawings and proposed for the work.
- E. Hydrophilic Strip Waterstop:
1. Hydrophilic waterstop shall be Hydrotite as supplied by Greenstreak or equal.
 2. The waterstop shall be composed of chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.
 3. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.

4. The hydrophilic waterstop shall have the following performance requirements:

CHLOROPRENE RUBBER

Property	Test Method	Required Limits
Tensile Strength	ASTM D 412	1300 PSI min.
Ultimate Elongation	ASTM D 412	400% min.
Hardness (Shore A)	ASTM D 2240	50 +/- 5
Tear Resistance	ASTM D 624	100 lb/inch min.
Tensile Strength	ASTM D 412	350 PSI min.
Ultimate Elongation	ASTM D 412	600% min.
Hardness (Shore A)	ASTM D 2240	52 +/- 5
Tear Resistance	ASTM D 624	50 lb/inch
Expansion Ratio	Volumetric Change - Distilled Water @ 70° F	3 to 1 min.

5. The hydrophilic waterstop shall be adhered to the concrete surface in accordance with the manufacturer’s requirements.
6. For irregular substrate surfaces use Leakmaster LV-Z or equal between existing rock or concrete and hydrophilic waterstop.
7. Irregular rock surfaces may require the use of a leveling course of epoxy prior to installation of the hydrophilic waterstop, see manufacturer’s installation recommendations.
- F. Compressible Filler:
1. Closed cell expanded neoprene, ASTM D1056, Grade No. 2C1, ozone and weather resistant.

PART 3 EXECUTION

3.1 GENERAL

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Review all work prepared by others to receive work of this Section and correct any defects affecting installation. Commencement of work by the Contractor will be construed as complete acceptance of preparatory work by others.
- C. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing frozen material. Remove improper and rejected materials immediately from point of use. Cover materials and accessories during construction period.

3.2 EARTH FORMS

- A. Earth forms are not permitted.

3.3 FORM PREPARATION

- A. Coat contact surfaces of forms with a form release agent prior to form installation.

- B. Thoroughly clean steel forms between uses using high pressure water or jet or sand blasting to remove all mill scale, concrete laitance or other ferrous deposits from the contact surfaces of the forms.
- C. Before re-use of wood forms, thoroughly clean form contact surfaces, repair damaged areas and remove projecting nails. A partial or complete steel lining on wood sheathing or plywood will not be allowed.

3.4 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements of ACI 301 and the following additional requirements:
 - 1. Variation from plumb in the lines and surfaces of columns, piers, and in walls
 - a. In any 10 feet of length $\frac{1}{4}$ inch
 - b. Maximum for entire length $\frac{1}{2}$ inch
 - 2. Variation of the linear building lines from established position in plan and related positions of columns, walls and partitions:
 - a. In any bay $\frac{1}{4}$ inch
 - b. In any 20 foot of length $\frac{1}{4}$ inch
 - c. Maximum for the entire length $\frac{1}{2}$ inch
 - 3. Variation in cross-sectional dimensions of columns and beams and in thickness of slabs and walls:
 - a. Minus $\frac{1}{8}$ inch
 - b. Plus $\frac{1}{4}$ inch

3.5 JOINTS

- A. Construction and expansion joints indicated on the Drawings are mandatory and shall not be omitted.
- B. Form construction and expansion joints with a keyway and waterstop unless otherwise shown on the Drawings. The depth of the keyway shall be approximately 3 inches, and the minimum width of keyway shall be one-third the width of the wall or floor section unless otherwise shown on the Drawings. The maximum width of any key at a joint with waterstop shall be 1-1/2 inches. Construction and expansion joints are to be formed in place prior to notifying the Engineer for inspection of formwork.
- C. Where joints other than those shown are required, obtain approval prior to installation.
- D. For structural slabs reinforced with deformed bars where construction joints are not shown on the Drawings, the maximum area will be approximately 900 square feet. Slab dimensions between construction joints for floor areas shall be as "square" as possible, but the length shall not exceed 1.5 times the width under any circumstances.
- E. Joints shall be straight and true. Brace all slab bulkheads adequately to keep joints straight. Construction joints in slabs exceeding 5 inches in thickness shall be keyed using a keyway nominally 3-5/8 inches by 1/3 of the slab thickness but not greater than 3 inches wide.

- F. Wall construction joints shall be placed as shown on the Drawings, or the maximum spacing of vertical construction joints in walls shall not exceed 40 feet where construction joints are not shown.

3.6 INSERTS, EMBEDDED ITEMS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work in conformance with requirements of ACI 318, paragraph 6.3, “Conduits and pipes embedded in concrete.”
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, wall pipes, anchor bolts and other inserts. Wall pipes and sleeves shall conform to the requirements of Section 15050.
- D. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed or damaged during placement of concrete.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at the bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so that joints will not be apparent in exposed concrete surfaces after concrete placement.

3.7 WATERSTOPS

- A. Install PVC waterstops in all construction and expansion joints in walls and slabs unless otherwise noted on the Drawings. Position waterstop in the center of the joint and extend the entire length of the joint. Securely fasten waterstop to reinforcing steel or formwork on both sides at 12 inch maximum spacing. Provide 2 inch minimum clearance between waterstop and reinforcing steel.
- B. Heat and splice PVC waterstop with a thermal splicing unit designed for that specific purpose. Only properly mitered, straight butt splices shall be made in the field. All field splices shall be tested for a complete seal by use of a corona discharge unit.
- C. No holes will be permitted in the PVC waterstop. Nail holes or other penetrations in the waterstop shall be repaired prior to placement of concrete.
- D. Hydrophilic waterstop shall be installed in accordance with the manufacturer's recommendations.
- E. The Engineer shall approve of the proposed location, concrete cover and steel reinforcement prior to the installation of any hydrophilic waterstop.
- F. The hydrophilic waterstop ends shall be cut square or mitered at corners. In addition, all waterstop splices shall be sealed in accordance with the manufacturer's requirements.

3.8 ACCESSORIES

- A. Neoprene waterstop washers are to be placed along the form ties or inside ties so they are in the middle third of the thickness of the structural element.

3.9 FORM REMOVAL

- A. The Contractor shall be responsible for damage resulting from form removal. Forms and shoring for structural slabs or beams shall remain in place in accordance with requirements in ACI 301. Form removal shall also conform to the requirements specified in Section 03300.

3.10 INSPECTION

- A. The Engineer shall be notified when the forms are complete and ready for inspection at least thirty-six hours prior to the proposed concrete placement.
- B. Failure of the forms to comply with the requirements specified herein, or to produce concrete complying with requirements of these Specifications, shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced at no additional cost to the Owner. Such repair or replacement shall be subject to the requirements of these Specifications and approval of the Engineer.

END OF SECTION

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SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Reinforcing Steel Bars
 - 2. Reinforcing Accessories
- B. Related Sections
 - 1. Section 03100 - Concrete Forms and Accessories
 - 2. Section 03300 - Cast-in-Place Concrete

1.2 REFERENCES

- A. The Connecticut State Building Code, latest edition.
- B. American Concrete Institute (ACI)
 - 1. ACI 117 - Standard Tolerance for Concrete Construction and Materials
 - 2. ACI 301 - Specifications for Structural Concrete for Buildings
 - 3. ACI 315 - Details and Detailing of Concrete Reinforcement
 - 4. ACI 318 - Building Code Requirements for Reinforced Concrete, American Concrete Institute
 - 5. ACI 350R - Environmental Engineering Concrete Structures
 - 6. ACI SP-66 - Detailing Manual
- C. American Society for Testing and Materials (ASTM)
 - 1. A185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 2. A615 - Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement
 - 3. A675 - Specifications for Steel Bars, Carbon, Hot Wrought, Special Quality, Mechanical Properties
- D. American Welding Society (AWS)
 - 1. D1.4 Structural Welding Code - Reinforcing Steel
- E. Concrete Reinforcing Steel Institute (CRSI)
 - 1. CRSI 63 - Recommended Practice for Placing Reinforcing Bars
 - 2. CRSI 65 - Recommended Practice for Placing Bar Supports, specifications and nomenclature

1.3 SUBMITTALS

- A. Provide shop drawings in accordance with the recommendations of ACI 315, "Details and Detailing of Concrete Reinforcement" and show the following: elevations, dimensions of concrete work with specified reinforcement clearances; ledges, brackets, openings, sleeves or other items furnished by other Sections, where interference with reinforcement may occur; bending diagrams; assembly diagrams; splices and laps of reinforcement; temperature and shrinkage reinforcement; construction joint reinforcement and shape; dimensions, grade designations, and details of reinforcement and accessories. Show dowels with concrete work to be placed first. Shop drawings shall be drawn to scale.
- B. Bar Bending Details - The bars shall be referenced to the same identification marks shown on the placement drawings. Bars to have special coatings and/or to be of special steel or special yield strength are to be clearly identified.
- C. Prior to delivery of reinforcing steel or concrete to job site, submit certified mill test reports of reinforcing steel and cement (including names and locations of mills and shops, and analyses of chemical and physical properties), properly correlated to concrete to be used in this project.

1.4 DELIVERY, HANDLING AND STORAGE

- A. Reinforcing steel shall be substantially free from mill scale, rust, dirt, grease, or other foreign matter.
- B. Reinforcing steel shall be covered and stored off the ground, protected from moisture, and kept free from dirt, oil, or other foreign matter.

PART 2 PRODUCTS

2.1 REINFORCING STEEL BARS

- A. Reinforcing steel bars shall be newly rolled billet steel conforming to ASTM A615, Grade 60.
- B. Minimum yield strength shall be 60,000 psi.
- C. Where reinforcing steel bars are called for to be grouted into existing concrete, the anchorage shall develop an allowable bond strength equal to 24,000 psi times the cross section area of the bar, or an ultimate strength equal to the tensile strength of the bar.
 - 1. For installations in non-submerged concrete with an ambient temperature greater than or equal to 40 degrees Fahrenheit, the epoxy adhesive shall be, Hilti HIT_HY 200, Simpson SET-XP, Dewalt AC Gold 200 or approved equal.
 - 2. For installation in wet or submerged concrete with an ambient temperature greater than or equal to 40 degrees Fahrenheit, the epoxy adhesive shall be Hilti HIT RE-500SD, Simpson ET-HP, Dewalt AC Gold 200 or approved equal.
 - 3. For installation in concrete below 45 degrees Fahrenheit the epoxy adhesive shall be Hilti HIT ICE, Simpson AT-XP or equal.

2.2 REINFORCEMENT ACCESSORIES

- A. Reinforcement accessories shall conform to Product Standard PS7-766, National Bureau of Standards, Department of commerce, Class C, as produced by Dayton Superior Corporation; R.K.L. Building Specialties Co., Inc. or equal approved by the Engineer.

- B. Reinforcement accessories shall include spacers, chair ties, slab bolsters, clips, chair bars, and other devices for properly assembling, placing, spacing, supporting, and fastening reinforcement.
- C. Tie wire shall be of sufficient strength for all intended purpose, but not less than No. 18 gauge. Metal supports shall be of such type as not to penetrate surface of formwork and show through surface of concrete.
- D. Accessories touching interior formed surfaces exposed to view shall have not less than 1/8 inch of plastic between metal and concrete surface. Plastic tips shall extend not less than 1/2 inch up on metal legs.
- E. Individual and continuous slab bolsters and chairs shall be of type to suit various conditions encountered and must be capable of supporting 300 pound load without damage or permanent distortion.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Review all work prepared by others to receive work of this Section. Commencement of work will be construed as complete acceptance of preparatory work by others.

3.2 PREPARATION

- A. Notify the Engineer prior to the start of any phase of the reinforcing work so as to provide the opportunity to inspect the work. Such notification shall be made at least 24 hours in advance of reinforcement placements and at least 36 hours in advance of other inspections (forms, etc.).

3.3 REINFORCING BAR FABRICATION

- A. Fabrication of reinforcement shall be in accordance with the recommendations of CRSI.
- B. Reinforcing bars shall be cold bent and shall not be straightened or re-bent. Bars shall not be field bent unless approved by the Engineer.
- C. Reinforcing bars shall be bent around a revolving collar having a diameter of not less than that recommended by the CRSI.
- D. Reinforcing bar ends that are to be butt spliced or threaded, shall have the applicable end saw-cut. Such ends shall terminate in flat surfaces at a right angle to the axis of the bar.
- E. Where reinforcing bars are called for to be welded, the welding shall conform to AWS D1.4 Structural Welding Code - Reinforcing Steel.

3.4 INSTALLATION

- A. Reinforcement shall be placed in accordance with requirements of CRSI 63 "Recommended Practice for Placing Reinforcing Bars" and CRSI 65, "Recommended Practice for Placing Bar Supports" and with further requirements below.
- B. Reinforcement shall be accurately placed in accordance with Contract Documents and shall be firmly secured in position by wire ties, chairs, spacers, and hangers, each of type approved by the Engineer. For slabs, grade beams, etc. where concrete is poured on grade, use additional setup bars and concrete brick to provide required cover over reinforcement.

- C. Bending, welding or cutting reinforcement in field in any manner other than as shown on Drawings, is prohibited, unless specific approval for each case is given by the Engineer.
- D. Reinforcement shall be continuous through construction joints unless otherwise indicated on Drawings.
- E. Reinforcement shall be spliced only in accordance with requirements of Contract Documents or as otherwise specifically approved. Splices of reinforcement at points of maximum stress shall generally be avoided.
- F. Proceed with installation of embedded items, and reinforcement, but do not place concrete into or around such items until the Engineer has approved work.

3.5 FIELD QUALITY CONTROL

- A. The Engineer shall have the right to postpone or stop concrete operations when in his judgment, reinforcement and embedded item installation has not been properly completed or the quality of construction will impair strength and durability or desired finished product. Costs arising from delays due to noncompliance will not be considered.
- B. Any material or workmanship that is rejected, either at the batch plant or at the site, shall be replaced promptly at no additional cost to the Owner.
- C. Before concrete is placed, reinforcement shall be free of excessive rust, dirt, oil, scale or other foreign matter that will destroy or reduce bond requirements. Reinforcement expected to be exposed to weather for a considerable length of time shall be painted with a heavy coat of cement grout. Protect stored materials so as not to bend or distort bars in any way. Bars that become damaged will be rejected.
- D. Before concrete is placed, check all installed reinforcement to ensure that it conforms to Contract Documents and approved Shop Drawings. Such checking shall be done only by qualified experienced personnel. In addition, the Engineer shall be notified at least 36 hours prior to concrete placement and given opportunity to inspect completed reinforcement. Prior approval of Shop Drawings shall in no way limit the Engineer's right to require modifications or additions to reinforcement or accessories.

3.6 ADJUSTING

- A. Carry out corrections without delay as directed by the Engineer when construction operations indicate that requirements of Contract Documents or prudent construction practices are being or are about to be violated.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Concrete Materials
 - 2. Admixtures
 - 3. Concrete Mixes
 - 4. Miscellaneous Concrete Materials
 - 5. Demonstration Panel
- B. Related Sections
 - 1. Section 03100 - Concrete Forms and Accessories
 - 2. Section 03200 – Concrete Reinforcement

1.2 REFERENCES

- A. The Connecticut State Building Code, latest edition.
- B. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. T 104 – Standard Method of Test for Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
- C. American Concrete Institute (ACI)
 - 1. ACI 301- Specifications for Structural Concrete for Buildings, (included as part of this specification)
 - 2. ACI 305 - Hot Weather Concreting
 - 3. ACI 306.1- Standard Specifications for Cold Weather Concreting
 - 4. ACI 318-19 - Building Code Requirements for Reinforced Concrete
- D. American Society for Testing and Materials (ASTM)
 - 1. C33 - Standard Specification for Concrete Aggregates
 - 2. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete specimens
 - 3. C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
 - 4. C42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 5. C78 - Standard Test Method for flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

6. C87 - Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar
7. C94 - Standard Specification for Ready-Mixed Concrete
8. C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)
9. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
10. C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
11. C150 - Standard Specification for Portland Cement
12. C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete
13. C260 - Standard Specification for Air-Entraining Admixtures for Concrete
14. C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)
15. C330 - Standard Specification for Lightweight Aggregates for Structural Concrete
16. C494 - Standard Specification for Chemical Admixtures for Concrete
17. C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
18. C535 - Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
19. C567 - Standard Test Method for Determining Density of Structural Lightweight Concrete
20. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
21. C666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
22. C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
23. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems used With Concrete By Slant Shear
24. C884 - Standard Test Method for Thermal Compatibility Between Concrete and an Epoxy-Resin Overlay
25. C989 – Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
26. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics
27. D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

28. D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging

1.3 SUBMITTALS

- A. Submit a detailed list of concrete materials, and corresponding sources, proposed for use in concrete. If conveying concrete by pump is requested, related data regarding concrete materials, pumping device and methods shall be submitted for approval three weeks before such method is proposed for use. Tests for approval of concrete mixtures to be pumped shall be paid for by Contractor. Provide certified mill test reports of cement, (including names and locations of mills and shops, and analyses of chemical and physical properties), properly correlated to concrete to be used.
- B. Submit Methods of Construction three weeks prior to starting work, describing methods, sequence of construction, manpower and type of equipment proposed for use for performing cast-in-place concrete work including required controlled demolition and repair preparation. Coordinate the requirements of section 1.5 Demonstration Panel into the Methods of Construction submittal. This submission shall not relieve Contractor of his responsibility for providing proper methods, equipment, workmanship, and safety precautions.
- C. Provide results of drying shrinkage tests from trial concrete mixes by the Owner's approved materials testing laboratory in accordance with section 2.5 of this specification.
- D. Submit data and descriptive literature for concrete constituents including admixtures, aggregate tests, bond breaker, bonding agent, chemical grout foam and repair grout.
- E. Submit detailed methods proposed for curing and protection of concrete not less than 10 days prior to the placement of any concrete.
- F. Submit drawings showing details of any proposed corrective work.
- G. Submit a truck load ticket for every concrete delivery. Ticket information shall include batch time and date, weights of all constituents, quantity of admixtures, water added at the batch plant and moisture content of coarse and fine aggregates.
- H. Maintain an accurate daily record of the locations and quantity of concrete placed. Submit a certified copy of this record with each pay estimate.

1.4 QUALITY ASSURANCE

- A. Provide inspection of cast-in-place concrete work, and testing, including slump tests, air content, and standard compression testing. Materials and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer. Such inspection and testing shall not relieve Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of this Section.
- B. Provide source of and allow access to materials required to be sampled and tested.
- C. Sampling and testing required by the Engineer to determine if materials proposed for use in the project comply with Specification requirements shall be made prior to actual use of materials in project. Coordinate the work to ensure that materials are supplied, sampled, tested and approved so as not to delay progress of the work.

- D. Whenever source, quality, or characteristics of approved material changes, or indicates lack of compliance with requirements of Contract Documents, resubmit additional materials for sampling and testing until requirements are satisfied. Additional sampling, testing and inspection of materials and workmanship not originally conforming to requirements of Contract Documents shall be provided at no additional cost.
- E. Provide notification prior to the start of any phase of concrete placement work so as to provide the opportunity to inspect the work. Such notification shall be made at least 24 hours in advance of concrete placements and at least 36 hours in advance of other inspections (forms, rebar, etc.).
- F. Facilitate observation by the Engineer as well as inspection and testing by the concrete testing agency, and furnish the following:
 - 1. Information as to time and place of shipments of materials to plant and project site
 - 2. Representative sample pieces requested for testing
 - 3. Safe access to the work at all times to allow proper inspection of the work
 - 4. Full and ample means and assistance for sampling and testing materials and proper facilities for inspection of work in plant and at project site
 - 5. Covered box large enough to contain twenty-four standard concrete cylinders. At temperatures below 60°F., box shall be electrically heated and thermostatically controlled to maintain inside temperature of 60° to 80°F. Cylinders shall be placed in box immediately after molding and shall be covered with moist burlap until delivery to laboratory, 24 to 72 hours after molding.
 - 6. Access by the Engineer to the batch plant supplying the concrete at any time.
- G. Compression tests shall consist of one set of 4 cylinders for each test made, cured, and tested by testing laboratories during progress of job. 6 cylinders will be required for each test made with concrete mix containing fly ash or ground granulated blast furnace slag. One set of cylinders shall be taken for every 100 cubic yards of concrete or fraction thereof placed in any 1 day.
 - 1. 1 cylinder of each set shall be tested for 7-day compressive strength; 2 cylinders shall be tested for 28-day compressive strength. The remaining cylinder shall be tested for 56-day compressive strength if either one of the 28-day tests are below the specified strength, otherwise the 56-day test will be eliminated.
 - 2. For modified mix with fly ash or ground granulated blast furnace slag, 1 cylinder of each set shall be tested for 7-day compressive strength, 2 cylinders shall be tested for 28-day compressive strength and 2 cylinders shall be tested for 56-days compressive strength. The remaining cylinder shall be tested for 84-day compressive strength if either one of the 56-day tests are below the specified strength, otherwise the 84-day test will be eliminated.
 - 3. The Owner will provide and pay for the services of an approved testing laboratory to test the cylinders. The Contractor shall coordinate and schedule all concrete testing performed by approved agency.
 - 4. Compression strength test of cylinders shall conform to ASTM Designation C39, latest revision. The testing laboratory will submit certified copies of the test

results directly to the Engineer and the Owner within 24 hours after tests are made.

5. Sampling, molding, curing and testing of cylinders shall conform to ASTM requirements. Specimens shall be cured under laboratory conditions. The Engineer may require additional cylinders to be cured under field conditions when unusual conditions may tend to reduce concrete strength.
 6. Report of tests shall include: name of project, date and location of concrete placement, design strength of concrete, mix data, slump, air content (if tested), compressive strength, age and condition of test cylinder, type of fracture, and type of curing.
- H. Slump test, to check consistency, shall be made from the sample used to mold cylinders. Additional slump tests may be taken of every batch delivered to job site.
- I. Tests for determination of air content shall be made as required to verify conformance with the specifications.
- J. Tests to determine concrete shrinkage properties with an added shrinkage reducing admixture shall be made in accordance with ASTM C157.
- K. The strength level of the concrete mix shall be considered satisfactory if both of the following criteria are satisfied:
1. Every arithmetic average of any three consecutive strength tests equals or exceeds the specified design strength.
 2. No individual strength test (average of two cylinders from the same test group) falls below the specified design strength by more than 500 psi when the specified design strength is 5000 psi or less or by more than 10 percent of the specified design strength when the design strength is more than 5000 psi.
- L. When tests of control specimens fall below these requirements, the Engineer will require 56 day or 84 day cylinder tests or core specimens taken from concrete in question and tested in accordance with ASTM C42. If these specimens do not meet strength requirements, the Engineer has the right to require additional curing, load tests, strengthening or removal and replacement of those parts of the structure which are unacceptable, and in addition, removal of such sound portions of structure as necessary to ensure safety, appearance, and durability of structure. Additional testing, load tests, strengthening or removal and replacement of parts or structure and any costs associated with delay of project shall be at no additional cost to the Owner.
- M. Any material or workmanship that is rejected, either at the batch plant or at the site, shall be replaced promptly at no additional cost to the Owner.
- N. If arrangements for corrections and/or replacements are not made within seven days after notice of rejection, the Owner has the right to have corrections and/or replacement made and charge cost thereof and any costs associated with delay of project against balance of monies withheld.
- O. Acceptance of work and admixtures at the batch plant shall not prevent final rejection at job site upon arrival or after it has been installed, if work is found to be defective.
- P. Portions of a structure which do not meet the requirements of the Contract Documents based on appearance or for any other aesthetic reason, shall be corrected or removed and replaced at no additional cost to the Owner.

- Q. Work on new concrete structures shall conform to the requirements of ACI 306.1, Standard Specifications for Cold Weather Concreting, except as modified herein.

1.5 DEMONSTRATION PANEL

- A. An area of the spillway to be repaired will serve as a demonstration panel to approve the controlled demolition of the spillway surface, new reinforcement placement, form work, mix design, fresh concrete placement and curing procedures and ensure repairs are satisfactory and in compliance with project drawings and specifications. The panel shall represent completed repair work for qualities of performance, appearance, materials, and construction.
- B. Refer to the project drawings for the area designated to be used for the demonstration panel. Construct the panel including all control/ construction joints & reinforcement as detailed on the drawings.
- C. Approval of the panel by the Owner's Representative is required before further work can continue on the remaining portions of the spillway. In order to accommodate construction, the panel shall be approved by the Engineer at each phase of the repair to allow the Contractor to begin the approved phase on the rest of the areas of repair; as scheduled below:
1. Removal of unsound and deteriorated concrete
 2. Repair of spalls and seepage through upstream facing.
 3. Installation of new reinforcement
 4. Form work installation and support
 5. Fresh concrete placement
 6. Curing procedures

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement shall be American-made Portland Cement, free from water soluble salts or alkalis which will cause efflorescence on exposed surfaces. Portland Cement shall be Type I/II, ASTM. Air entraining cements are prohibited.
- B. Use only one brand of cement for each type of cement throughout project. Contractor shall be responsible for whatever steps are necessary to ensure that no visual variations in color will result in exposed concrete and shall place on order and secure in advance a sufficient quantity of this (these) cement(s) to complete concrete work specified herein.
- C. Pozzolans and Blast Furnace Slag
1. Fly Ash: Class F conforming to the requirements of ASTM C618
 2. Ground Granulated Blast Furnace Slag: Conform to ASTM C989
- D. Normal Weight Fine Aggregate
1. Washed, inert, natural sand conforming to ASTM C33 and the following additional requirements:

- a. Fineness Modulus 2.75 (plus/minus 0.25)
 - b. Clay lumps and friable particles – 3.0 percent maximum
 - c. Coal and lignite – 0.5 percent maximum
 - d. Organic Impurities (ASTM C40) – Organic Plate No. 2
 - e. Strength of Mortar (ASTM C87) – not less than 95 percent at 7 days
 - f. Soundness (AASHTO T-104) - 10 percent maximum loss (magnesium sulfate solution, five cycles)
- E. Normal Weight Coarse Aggregate:
1. Well graded crushed stone or washed gravel conforming to ASTM C33 and the following additional requirements.
 - a. Material finer than No. 200 sieve – 1.0 percent maximum
 - b. Clay lumps and friable particles – 2.0 percent maximum
 - c. Chert (less than 2.40 specific gravity, saturated surface dry) – 3.0 percent maximum by weight.
 - d. Sum of clay lumps, friable particles, and chert (less than 2.40 specific gravity, saturated surface dry) – 3.0 percent maximum by weight. This limitation only applies to aggregates in which chert appears as an impurity.
 - e. Coal and lignite – 0.5 percent maximum
 - f. Soundness - 18 percent maximum loss (magnesium sulfate solution, five cycles)
 - g. Soundness - 10 percent maximum loss (sodium sulfate solution, five cycles)
 2. Coarse aggregates shall not exceed 35 percent by weight "percentage of wear" as determined by the Los Angeles Abrasion and Impact Tests in ASTM C131 and C535.
 3. Provide designated sizes noted in Table A for normal weight coarse aggregate to minimize shrinkage and cracking. The sizes shall also be chosen in accordance with ACI requirements for actual reinforcement clearances.
- F. Water shall be from approved source, potable, clean and free from oils, acids, alkali, organic matter and other deleterious material.

2.2 ADMIXTURES

- A. Mid-range water-reducing agent:
1. Mid-range water-reducing agent shall be by same manufacturer as air-entraining agent.
 2. Daracem - 55 GCP Applied Technologies
 3. Pozzolith 220N – BASF Admixtures, Inc.
 4. Eucon MR - Euclid Chemical Co.

5. Or equal conforming to ASTM C494 Type A
- B. High-range water reducing agent:
1. Daracem - 100 GCP Applied Technologies
 2. Reobuild 1000 - BASF Admixtures, Inc.
 3. Eucon-37 - Euclid Chemical Co.
 4. Or equal conforming to ASTM C494 Type F
- C. Air-entraining agent:
1. DAREX AEA - W.R. Grace & Co.
 2. MB-VR or MB-AE90 - BASF Admixtures, Inc.
 3. Air-Mix - Euclid Chemical Co.
 4. Or equal conforming to ASTM C260
- D. Shrinkage Reducing agent:
1. Masterlife SRA 035 – BASF Admixtures, Inc.
 2. Eclipse 4500 – GCP Applied Technologies
 3. Eucon SRA-XT – Euclid Chemical
 4. Or equal conforming to ASTM C494 Type S
- E. Admixtures which retard setting of cement in concrete shall not be used without written approval of the Engineer. Admixtures causing accelerated setting of cement in concrete shall not be used.

2.3 CONCRETE MIX

- A. Development of concrete mix design and testing shall be by an independent ACI certified concrete testing agency engaged by and at the expense of the Contractor and shall conform to the following requirements:
1. Select proportions of ingredients to meet the design strength and materials limits specified in Table B and to produce concrete having proper placability, durability, strength, appearance and other required properties. Proportioning shall also conform to the requirements in ACI 301 and ACI 318.
 2. The design mix shall be selected based on standard deviation data where a production facility has sufficient test records for a mix with essentially the same proportions.
 3. If sufficient test records are not available, (at least 30 consecutive strength tests or two groups of tests totaling at least 30 within the past 12 months), the design mix shall be developed using laboratory trial mixtures.
 4. Water content and cement content of concrete to be used in the work shall be based on a curve showing the relationship between water content, cement content, and 7 and 28 day compressive strengths of concrete made using proposed materials. Maximum water/cement (W/C) materials ratio or minimum cementitious materials content to be used in the proposed work shall be shown

by the curve to produce the average strength required in Table C. Curves shall be determined by four or more points, each representing an average of at least three test specimens at each age, and shall have a range of values sufficient to yield desired data, including all compressive strengths required by the Contract Documents, without extrapolation. Design mix of concrete to be used in the work, as determined from the curve, shall correspond to the following test strengths (Table C) obtained in laboratory trial mixtures, but in no case shall resulting mix conflict with limiting values as specified in Table B.

5. Sufficient materials for concrete mix design shall be furnished not less than five weeks before use. Duplicate small samples plainly and neatly labeled with source, where proposed to be used, date, and name of collector shall be provided and presented to the testing agency for permanent reference.
 6. All concrete is normal weight unless specifically designated otherwise with air-dry weight not to exceed 150 lbs. per cubic foot.
- B. Limiting values shown in Table B apply for specific strengths of concrete with 3/4 inch coarse aggregates unless noted otherwise.
 - C. In the spillway overlay, training and dam and walls exposed to weather, concrete shall contain the approved air-entraining admixture as per manufacturers written instructions to provide entrained air by volume in the cured concrete between 4.5 and 7.5 percent.
 - D. The approved water-reducing admixture shall be used in all concrete, in accordance with manufacturer's written instructions. Concrete mix with a 0.45 or lower water/cement ratio shall require a high range water reducer.
 - E. Deviation from the approved mix design will not be allowed without written approval of the Engineer. Additional testing by testing agency associated therewith shall be at no additional cost to the Owner.

2.4 SHRINKAGE TESTS

- A. Perform drying shrinkage tests for the trial batches using an approved material's testing laboratory, as specified herein.
- B. Fabricate, cure, dry, and measure specimens in accordance with ASTM C157 modified as follows:
 1. Remove specimens from molds at an age of 23 hours +/- 1 hour after trial batching, place immediately in water at 70 degrees F +/- 3 degrees F (21 degrees C +/- 2 degrees C) for at least 30 minutes, measure within 30 minutes thereafter to determine original length, and then submerge in saturated lime water at 73 degrees F +/- 3 degrees F (23 degrees C +/- 2 degrees C).
 2. At age seven days, take measurements to determine expansion, expressed as a percentage of the original specimen length. This length at age seven days shall be the base length for drying shrinkage calculations (zero days' drying age).
 3. Immediately place specimens in a humidity-controlled room maintained at 73 degrees F +/- 3 degrees F (23 degrees C +/- 2 degrees C) and 50 percent +/- 4 percent relative humidity for the remainder of the test.
 4. Report measurements to determine shrinkage expressed as percentage of the base length separately for 7, 14, 21 and 28 days of drying after 7 days of moist curing.

- C. Compute the drying shrinkage deformation of each specimen as the difference between the base length (at zero days' drying age) and the length after drying at each test age.
 - 1. Compute the average drying shrinkage deformation of the specimens to the nearest 0.0001 inch (0.00254 mm) at each test age.
 - 2. If the drying shrinkage of any specimen departs from the average that test age by more than 0.0004 inch (0.0102 mm), disregard the results obtained from that specimen.
 - 3. Report results of the shrinkage test to the nearest 0.001 percent of shrinkage.
- D. Take compression test specimens in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression test for the project.
- E. Acceptance of Test Results: The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age, shall be 0.028 percent or 0.032 percent, respectively.
 - 1. Use only mix designs for construction that have first met the trial batch shrinkage and compression requirements.
 - 2. If the trial batch specimens do not meet both the strength and shrinkage requirements, revise the mix designs and/or materials and retest.

2.5 MISCELLANEOUS CONCRETE MATERIALS

- A. Grout shall be a ready-to-use, non-metallic, non-shrink aggregate product requiring only the addition of water at the job site. Grout shall be as manufactured by Five Star Products, Inc.; Euclid Chemical Company; Master Builders; or equal equal. Grout shall be easily workable and shall have no drying shrinkage at any age. Compressive strength of grout (2 inch by 2 inch cubes) shall not be less than 5000 psi at 7 days, and 7500 psi at 28 days.
- B. Bonding Agent:
 - 1. Provide a two-component, 100% solids, moisture-tolerant structural epoxy adhesive conforming to ASTM C881, Type II. The bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation of Lyndhurst, NJ, Concrete Liquid (LPL) by Degussa Admixtures, Inc. of Cleveland, OH or equal.
 - 2. Latex bonding agent shall be a non-reemulsifiable acrylic-polymer latex conforming to ASTM C1059 Type II.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify all work prepared by other trades to receive work of this Section and correct any defective installations.
- B. Verify cover requirements over all reinforcement.
- C. Verify that reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.
- D. Verify site conditions to ensure that full access is available for placement of concrete.

3.2 HANDLING, STORAGE, AND PROTECTION OF MATERIALS

- A. Handle and store materials separately in such manner as to prevent intrusion of foreign matter, segregation, or deterioration. Do not use foreign materials or those containing frozen material. Remove improper and rejected materials immediately from point of use. Cover materials including steel reinforcement and accessories during construction period. Stockpile concrete constituents properly to assure uniformity throughout project.

3.3 JOINTS

- A. Construction and expansion joints indicated on Drawings are mandatory and shall not be omitted. Construction joints shall conform to the requirements of Section 03100 and the following:
 - 1. All horizontal construction joints are to be treated as follows: After placing of the concrete and after initial set of the concrete has taken place, the construction joint is to be cleaned off with a jet of water, air, or a jet of air and water mixed. The jet shall have sufficient force to clean off all loose concrete, scum, and laitance. The jet shall expose and clean off aggregate but shall not undercut or loosen the aggregate.
 - 2. Before placing new concrete against concrete already in place and hardened, the surface shall again be cleaned with a jet where practical.
 - 3. Where joints other than those shown are required, they shall be made at such locations as the Engineer may allow, and shall in no case impair the structural strength of the structure.
- B. Joints not indicated or specified shall be placed to least impair strength of structure and shall be subject to approval of the Engineer.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. Conform to requirements of ACI 318, paragraph 6.3, "Conduits and Pipes Embedded in Concrete", and as specified below.
- B. Install sleeves, furnished by other trades, at locations shown on the Drawings.

3.5 MIXING, CONSISTENCY, AND DELIVERY OF CONCRETE

- A. Concrete shall be ready-mixed, produced by a central batch plant. Hand or site mixing shall not be allowed. Constituents, including admixtures, except certain corrosion inhibitors and superplasticizers, shall be batched at the central batch plant. Admixtures shall be premixed in solution form and dispensed as recommended by the manufacturer.
- B. Central plant and rolling stock equipment and methods shall conform to Truck Mixer and Agitator Standard of Truck Mixer Manufacturer's National Ready-Mixed Concrete Association, ASTM C94, ASTM C685, and Contract Documents. Consistency of concrete at time of placement shall be as specified in Table D.
- C. Ready mixed concrete shall be transported to the site in watertight agitator or mixer trucks loaded not in excess of rated capacities. Discharge at site shall be within one and one-half hours after cement is first introduced into the aggregates. Concrete with a temperature greater than 90°F. shall be rejected and removed from the site.

- D. During hot weather conditions as defined in ACI 306R (i.e., any of the following conditions: high ambient temperature, high concrete temperature, low relative humidity, increased wind velocity, high solar radiation), when the temperature of the concrete is 85°F or above, the time between the introduction of cement to the aggregates and discharge shall not exceed one hour. In addition, when the rate of evaporation on the surface of the concrete is expected to approach 0.2 lb./ft²/hr. (see chart in ACI 305R) special precautions shall be taken against the formation of plastic shrinkage cracking on the surface of the concrete after placement.
- E. During cold weather conditions, that is, any period when for more than three successive days the average daily outdoor temperature drops below 40°F, the concrete temperature at the time of placement shall be as specified in Table E.
- F. Central mixed concrete shall be plant mixed a minimum of five minutes. Agitation shall begin immediately after premixed concrete is placed in truck and shall continue without interruption until discharged. Transit mixed concrete shall be mixed at mixing speed for at least ten minutes immediately after charging truck followed by agitation without interruption until discharged. All transit mixed truck load ticket information shall include batch time, load weights of constituents, gallonage of water added and amounts of additives.
- G. Retempering of concrete, which has partially hardened by mixing with or without additional cement, aggregates, or water shall not be permitted.

3.6 PLACING CONCRETE

- A. Pumping of concrete will be permitted. If selected for any portion of the work, submit the list of equipment to be provided and mix design suitable for pumping for approval.
- B. Remove excess water and foreign matter from forms and excavations. Do not place concrete on frozen soil. Provide adequate protection against frost action during freezing weather.
- C. Do not place concrete having slump outside of allowable range.
- D. Transport concrete from mixer to place of final deposit as rapidly as practical by methods which prevent separation of ingredients and displacement of reinforcements, and which avoid rehandling. Do not deposit partially hardened concrete. When concrete is conveyed by chutes, equipment shall be of such size and shape to ensure continuous flow in chute. Flat (coal) chutes shall not be used. Chutes shall be of metal or metal lined and uniformly sloped. Slope shall not be less than 25 degrees nor more than 45 degrees from horizontal. Discharge end of chute shall be provided with baffle plate or spout to prevent segregation. If discharge end of chute is more than five feet above surface of concrete in forms, a spout shall be used. Concrete shall be lowered and maintained as near to the surface of deposit as practicable. When operation is intermittent, the chute shall discharge into hopper. The chute shall be thoroughly cleaned before and after each use and debris and any water shall be discharged outside of the forms. Concrete shall not be allowed to flow horizontally over distances exceeding 10 feet or dropped vertically over 6 feet.
- E. Place concrete in such a manner as to prevent segregation and accumulations of hardened concrete on forms or reinforcement above the grade of concrete being placed. Suitable hoppers and spouts with restricted outlets and tremies shall be used as required.

- F. Thoroughly consolidate each layer of concrete by rodding and vibrating using internal type mechanical vibrator. Vibration shall be done by experienced operators under close supervision and shall be carried on only enough to produce homogeneity and optimum consolidation without permitting segregation of constituents or "pumping" of air. Vibrators used for normal weight concrete shall operate at speeds of not less than 7,000 vpm and be of suitable capacity. Do not use vibrators to move concrete. Vibration shall be supplemented by spading to remove bubbles and honeycombs adjacent to visible surfaces. At least one vibrator shall be on hand for every 10 cubic yards of concrete placed per hour, plus one spare. Vibrators shall be operable and on site prior to starting concrete placement.
- G. Vertical lifts shall not exceed 36 inches. Vibrate completely through successive lifts to avoid pour lines. Vibrate first lift thoroughly until top of lift glistens to avoid stone pockets, honeycomb, and segregation.
- H. Deposit concrete continuously, and in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously between planned construction joints, as specified, field joints and additional reinforcement shall be introduced at the Contractor's expense to preserve structural continuity.
- I. Cold joints, particularly in exposed concrete, including "honeycombs", are unacceptable. If they occur in concrete surfaces exposed to view, the Engineer will require that entire section in which blemish occurs be removed and replaced with new materials at the Contractor's expense.
- J. When placing exposed concrete in walls or columns, strike corners of forms rapidly and repeatedly from outside along full height while depositing concrete and vibrating. Care shall be taken to thoroughly vibrate the concrete below and around wall penetrations.
- K. Chutes, hoppers, spouts, adjacent work, etc., shall be thoroughly cleaned before and after each use, and water and debris shall be discharged outside form.
- L. Sloped floors shall be placed with the use of pipe screeds for grade control. Pipe screeds shall be in place prior to placing the concrete for the floors.

3.7 CURING AND PROTECTION

- A. When concrete is placed at or below an ambient air temperature of 40°F. or whenever this temperature or lower values are likely to occur within 48 hours after placement of concrete, cold weather concreting procedures, according to ACI 306.1 and as specified herein, shall be followed. The entire area affected shall be protected by adequate housing or covering, and heating. No salt, chemicals or other foreign materials shall be used in the mix to lower the freezing point of concrete. No oil or kerosene fired heaters shall be utilized. Vent flue gases from combustion heating units to the outside of the enclosure.
- B. No frozen materials shall be used in batching concrete and any ice shall be removed from coming into contact with the concrete.
- C. Protect concrete work against injury from heat, cold, and defacement of any nature during construction operations.

- D. Concrete shall be treated and protected immediately after concreting or cement finishing is completed, to provide continuous moist curing above 50°F. for at least 7 days, regardless of ambient air temperatures.
- E. All concrete shall be cured immediately after finishing in accordance with the following requirements:
 - 1. Curing shall be accomplished by a continuous soaking process such as the use of soaker hose, sprinklers or accomplished through the use of a laminated reinforced asphalt impregnated paper which is non-staining or by use of plastic roll materials either of which shall be thoroughly wetted at least once a day or more often as required in very hot weather. Such paper or plastic shall be placed as soon as possible after finishing of concrete so that scarring of the surface will not occur. Paper or plastic shall be held in place on the surface of the concrete in such a manner and means as will not allow it to be blown off or otherwise dislodged from the concrete surface. Curing procedures shall be maintained continuously for a period of at least 7 days unless otherwise directed and approved by the Engineer.
 - 2. All methods of curing shall be subject to approval of the Engineer, and each method employed shall be practical and adequate for the curing required.
 - 3. Curing compounds in lieu of wet curing will not be allowed.
- F. Keep a permanent temperature record showing date and outside temperature during concreting operations. Thermometer readings shall be taken at start of work in morning, at noon, and again late in afternoon. Locations of concrete placed during such periods shall likewise be recorded in such manner as to show any effect temperatures may have had on construction. Copies of temperature records shall be distributed daily to the Engineer.

3.8 REMOVAL OF FORMWORK, SHORING AND RESHORING

- A. Forms and shoring shall not be removed until concrete has attained sufficient strength to support its own weight, construction loads to be placed thereon and lateral loads, without damage to structure or excessive deflection.
- B. With the exception of construction joint bulkheads and keyways, forms and supports shall remain in place for not less than the minimum time periods noted below.
 - 1. Unless specifically authorized by the Engineer, forms for vertical surfaces shall not be removed before the concrete has attained a strength of not less than 30 percent of the minimum allowable prescribed compressive strength nor not less than the minimum time period specified in Table F.
 - 2. Unless specifically authorized by the Engineer, forms for horizontal surfaces shall not be removed before the concrete has attained a strength of not less than 60 percent of the minimum allowable prescribed compressive strength nor not less than the minimum time period specified in Table F.
 - 3. Definition of degree-days - Total number of days times mean daily air temperature at the surface of the concrete. For example, 5 days at temperature of 60°F. equals 300 degree-days. Days or fractions of days in which temperature is below 50°F. shall not be included in calculation of degree-days except where modified by Table E.

- C. Forms for construction joint bulkheads and keyways may be removed the following day, after the concrete pour. Extreme caution must be used to avoid damage to the concrete surface, keyway, and waterstop.
- D. Form removal shall be so performed that reshores are placed at same time as stripping operations where required, and that no area larger than one-fourth of a slab panel is unsupported at any time.
- E. Any test cylinders required to verify the specified minimum strengths for form removal shall be field cured under the same conditions as the concrete they represent. Such cylinders and testing shall be at the Contractor's expense.

3.9 FINISHING OF CAST-IN-PLACE CONCRETE

A. Upper Horizontal Surfaces

- 1. Horizontal surfaces not subjected to wear, such as tops of parapets, copings, walls, etc., shall be formed by placing an excess of material in the forms and removing or striking off such excess with a template, forcing the coarse aggregate below the surface of the mortar.
- 2. Horizontal surfaces shall be attained by striking off excess concrete and in no case shall concrete be added to the tops of walls, etc., once initial set has taken place.
- 3. The top of such surfaces shall be finished in a manner as required and dictated by the necessary appearance of the part being finished. For covered surfaces, a wood float finish will in most cases be sufficient. Steel troweling may be necessary where concrete is exposed to view and adjacent surfaces have a steel trowel finish. In other cases, a "broom" finish may be required.

B. Formed Surfaces

- 1. Immediately after the end of the wet cure period, remove form ties and patch all tie-holes, rat holes, and other surface voids with a non-metallic, non-shrink grout, which most nearly matches the color and texture of the concrete surface. All protrusions shall be ground smooth with an approved mechanical grinder.
- 2. Immediately upon removal of the forms, snap all form ties and fill tie holes with non-shrink grout to a point slightly indented from the finished surface. Hand chip all air pockets and laitance covered holes greater than 1/4 inch, repair these areas in accordance with Section 3.10. A mechanical grinder of a type approved by the Engineer shall then be used to remove any form marks, ribs, or bulges, or other protruding surface defects.

C. Surfaces Requiring Rub Finish

- 1. Rubbed finish of surfaces shall be provided on all poured exterior vertical concrete surfaces. Rubbing shall include but not be limited to:
 - a. The exterior face of the dam crest cap and spillway crest, training wall, and the exterior face of all vertical concrete surfaces from the top to 6 inches below grade.
- 2. Surfaces requiring a rubbed finish shall, when completed, shall present a smooth, even textured surface and proper appearance. The Engineer shall be the sole judge of the acceptability of a rubbed finish. Cement utilized in rubbing shall be

of the same type manufacturer and source as that used in batching the concrete. The following procedure shall be required and performed properly for all rubbed finish work, and this rubbing shall be repeated as many times as the Engineer deems it necessary in order to secure a satisfactory finish.

- a. Immediately upon removal of the forms, snap all form ties and fill tie holes with non-shrink grout to a point slightly indented from the finished surface. Hand chip all air pockets and laitance covered holes greater than 1/4 inch. A mechanical grinder of a type approved by the Engineer shall then be used to remove any form marks, ribs, or bulges, or other protruding surface defects.
- b. The surface shall then be wetted with clean water and a cement (4 parts), presifted fine sand (5 parts), and water grout shall be evenly applied utilizing a sponge float filling all exposed voids. The surface shall be rubbed with a burlap bag and allowed to thoroughly dry.
- c. The surface shall again be wetted and the grout reapplied with the sponge float and again rubbed with burlap, removing all excess material.
- d. To further fill the voids, rewet the surface and apply dry cement powder of the same manufacturer, type, and source used in batching the concrete. A burlap bag shall be used as the applicator. The excess cement powder shall be removed leaving only the voids filled. This procedure may have to be repeated to adequately fill all voids and present a uniform, smooth and even finished surface.
- e. After the final rubbing is completed, the surface shall be thoroughly drenched and kept wet for a period of 7 days unless otherwise directed by the Engineer. No other cement powder, grout or other surface coating will be allowed. Plastering of surfaces requiring a rubbed surface will NOT be tolerated.

3.10 REPAIRING OF HARDENED CONCRETE SURFACES

- A. Defective concrete and honeycombed areas shall not be patched unless examined and approval is given by the Engineer. After approval, areas involved shall be cut back to a minimum depth of 1 inch from the finished surface, or as otherwise directed, whichever is greater. Edges of areas to be repaired shall be cut square to a minimum depth of 3/4 inch. Feathered edges will not be allowed. Any voids or honeycomb around reinforcing steel shall be chipped away to provide at least 3/4 inch clearance all around to permit proper placement of repair concrete around the steel to the parent, sound concrete.
- B. Exposed surfaces shall be thoroughly cleaned of all mud, paint, grime, scum, laitance, organic matter, detritus, calcareous growth and other foreign matter by sand and water blasting or other acceptable means. Immediately after cleaning, the surface shall be checked by the Engineer for proper surface preparation, including fractured concrete or loose aggregate. Any such material shall be removed using pneumatic or hand tools. The final surfaces shall be thoroughly rinsed with clean water to remove remaining dirt and dust.
- C. Premoisten the prepared surface for at least 2 hours or reduce absorption of water by the parent concrete and to provide a reservoir for moist curing at the interface of the repair. The substrate should be saturated surface dry with no standing water. While the

concrete surface is still damp, apply a thin 1/16 inch coat of neat cement slurry (mixed to the consistency of a heavy paste) with a bristle brush to provide a bond coat throughout the entire cavity of the repair. Before the slurry has dried or changed color, promptly install the repair concrete or dry-pack, as may be required or selected.

- D. For relatively small areas, ram repair concrete into this portion of the formed void. This concrete shall comprise a crumbly-dry 1-1-1.5 mixture of cement, concrete sand and pea gravel (or ¾" gravel) mixed slightly damp to the touch (just short of "balling"). The "dry-pack" consistency of the concrete shall be zero slump, but moist enough so that when it is rodded and tamped until dense, an excess of paste will appear on the surface in the form of a spider web. In cases of unformed voids of thinner section, do not build-up repair in excess of a depth which will sag with the weight of the fresh mortar or concrete. Trowel smooth with heavy pressure.
- E. Large areas may be repaired with the normal concrete mix approved for use on the project.
- F. The concrete shall be of the driest possible consistency and mix composition so that it can be worked into the corners and angles of forms and around the reinforcement, without permitting the materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting. Source and mixture of concrete shall be submitted for approval.
- G. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. Concrete shall be thoroughly consolidated and trowelled dense, smooth and plane. Avoid premature and excessive trowelling that could cause sagging.
- H. Repair areas and adjacent parent concrete surfaces shall be treated immediately after finishing providing continuous moist curing without change in color for at least 7 days. Surfaces shall be covered with damp burlap and sealed with taped polyethylene. Membrane curing compounds shall not be used.
- I. Leave finished work and adjacent concrete surfaces in a neat, clean condition with no evidence of spillovers or staining.
- J. Repairs to all leaking cracks and joints shall be repaired in conformance with Specification Section 03930.

3.11 CLEANING

- A. Concrete surfaces shall be cleaned of objectionable stains as determined by the Engineer. Materials containing acid in any form or methods which will damage the "skin" of concrete surfaces shall not be employed, except where otherwise specified.

Cast-In-Place Concrete Data Sheet

TABLE A
Coarse Aggregate Size

Concrete Section	Coarse Aggregate Size (inches)	ASTM C33 Size Number
All concrete	3/4	67

TABLE B
Maximum Allowable Water/Cement Ratios

Compressive Strength (PSI)	Maximum Allowable Water/Cement Ratio ¹	Total Cementitious Material (lbs.) ^{2,3}	
		Minimum	Maximum
4500 ⁴	0.40 ⁵	611	635

¹Maximum; decrease if possible. This represents total water in mix at time of mixing, including free water on aggregates.

²Total cementitious material is for ¾" coarse aggregate mix - use lower quantity for larger coarse aggregate size mix. Fly ash may be substituted for up to 20 percent by weight of the total cementitious material in all classes of concrete. Ground granulated blast furnace slag may be substituted for up to 40 percent by weight of the total cementitious material in all classes of concrete. For all water retaining structures and below grade structures, fly ash shall be substituted for a minimum of 15 percent and a maximum of 25 percent of the total cementitious material, or ground granulated blast furnace slag shall be substituted for a minimum of 25 percent and a maximum of 40 percent of the total cementitious material.

³For concrete flatwork with a steel trowel finish, fly ash may be substituted for up to 10 percent by weight and ground granulated iron blast-furnace slag may be substituted for up to 25 percent by weight of the total cementitious material.

⁴For all water retaining structures exposed to freeze/thaw conditions, concrete exposed to freezing and thawing in a moist condition, and/or concrete exposed to deicing chemicals, use 4500 psi minimum design mix.

⁵Concrete mix with a 0.45 or lower water/cement ratio shall require a high range water reducer.

Cast-In-Place Concrete Data Sheet (Cont.)

TABLE C
Minimum Strength of Lab Mixes (PSI)

Design Strength	Trial Mix Strength 28 Days
4500	5700

TABLE D
Concrete Slump⁵

Portion of Structure	Recommended (inches)	Maximum Range (inches)
Walls, Spillway Facing	4	3-5

⁵After addition of high range water reducer

TABLE E
Concrete Temperature During Cold Weather Conditions

Least Dimension of Section (Inches)	Minimum Temperature Of Concrete As Placed And Maintained During The Protection Period, °F	Maximum Gradual Decrease In Surface Temperature During Any 24 Hours After End Of Protection, °F
Less than 12	55	50
12 to less than 36	50	40
36 to less than 72	45	30
Greater than 72	40	20

Cast-In-Place Concrete Data Sheet (Cont.)

TABLE F
Minimum Degree Day Requirement for Form Removal

Form Use	Degree-Days
Walls and Vertical Surfaces	200

END OF SECTION

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SECTION 03930

CONCRETE REPAIR

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Concrete Repair
- B. Related Sections
 - 1. Section 03300 – Cast-in-Place Concrete
 - 2. Section 07920 - Joint Sealants

1.2 REFERENCES

- A. The Connecticut State Building Code, latest edition.
- B. American Concrete Institute (ACI)
 - 1. ACI 318-02 - Building Code Requirements for Reinforced Concrete
 - 2. ACI-503 – Use of Epoxy Compounds with Concrete
- C. American National Standards Institute (ANSI) / National Science Foundation (NSF)
 - 1. NSF/ANSI Standard 61 – Drinking Water System Components – Health Effects
- D. American Society for Testing and Materials (ASTM)
 - 1. A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
 - 2. C33 - Standard Specification for Concrete Aggregates
 - 3. C78 - Standard Test Method for flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
 - 4. C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)
 - 5. C150 – Standard Specification for Portland Cement
 - 6. C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading)
 - 7. C297 - Standard Test Method for Rubber Products- Chemical Analysis
 - 8. C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
 - 9. C666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
 - 10. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems used With Concrete By Slant Shear

11. C884 – Standard Test Method for Thermal Compatibility Between Concrete and an Epoxy-Resin Overlay.
12. D93 - Standard Test Method for Flash Point by Pensky-Martens Closed Cup Tester
13. D570 – Standard Test Method for Water Absorption of Plastics
14. D638 - Standard Test Method for Tensile Properties of Plastic
15. D695 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics
16. D790 - Standard Test Method for Flexural Properties of Unreinforced Plastics and Electrical Insulating Materials
17. D1042 - Standard Test Method for Linear Dimensional Changes of Plastics
18. D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics
19. D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
20. D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
21. D2196 - Standard Test Method for Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield Type) Viscometer
22. D2369 - Standard Test Method for Volatile Content of Coatings
23. D3574 – Standard Test Method for Flexible Cellular Materials – Slab, Bonded, and Molded Urethane Foams
24. D4541 - Standard Test Method for Active Matter in Anionic Surfactant by Potentiometer Titration

1.3 SUBMITTALS

- A. Submit Methods of Construction three weeks prior to starting work, describing methods, sequence of construction, manpower and type of equipment proposed for use for providing watertight repair of concrete deficiencies. This submission shall not relieve Contractor of his responsibility for providing proper methods, equipment, workmanship, and safety precautions.
- B. Submit data and descriptive literature for liquid chemical grout, polymer-modified cementitious waterproof mortar, and all repair mortars.
- C. Submit detailed methods proposed for curing and protection of concrete repairs not less than 10 days prior to the placement of any repair grout.
- D. Submit drawings showing details of any proposed corrective work.
- E. Concrete repair product must be compatible with waterproof coating product.

1.4 QUALITY ASSURANCE

- A. Contractor qualifications: Contractor shall be qualified in the field of waterproof concrete repair. The contractor shall have minimum of 5 years experience performing work similar in method and extent.

- B. Contractor shall use equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.
- C. Inspection of concrete deficiency repairs, including cracks, spalls, hollow-sounding areas, and honeycombed areas will be performed by the Engineer. Materials and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer. Such inspection and testing shall not relieve Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to furnish materials and workmanship in accordance with requirements of this Section.
- D. Provide source of and allow access to materials required to be sampled and tested.
- E. Pre-coating meeting with the Contractor, Owner, and Engineer, shall be scheduled at least a week before coating application.
- F. Provide notification prior to the start of any phase of concrete crack, expansion joint or construction joint repair so as to provide the opportunity to inspect the work. Such notification shall be made at least 24 hours in advance of performance of repairs.
- G. Facilitate inspection and testing by the Engineer, and furnish the following:
 - 1. Representative sample pieces requested for testing
 - 2. Safe access to the work at all times to allow proper inspection of the work
- H. The Contractor shall warranty all repairs to be free of leaks and water infiltration for a minimum of one year from the date of substantial completion.
- I. One year from substantial completion of the specified repairs, the Owner shall determine the soundness of the repairs. Any repairs found to be deficient at that time shall be repaired by the Contractor at no additional cost to the owner.

1.5 MOCKUP

- A. Provide a 10' by 10' mockup of the cementitious repair mortar on the dam face prior to the full application.
- B. Engineer and Owner to approve material finish prior to application to the dam face.

PART 2 PRODUCTS

2.1 CEMENTITIOUS REPAIR MORTAR

- A. Portland-cement repair concrete conforming to the following properties:
 - 1. Compressive Strength (ASTM C-39)
 - a. 1 day: 2,000 psi min.
 - b. 7 days: 5,500 psi min.
 - c. 28 days: 6,500 psi min.
 - 2. Splitting Tensile Strength (ASTM C-496) at 28 days: 1000 psi min.
 - 3. Flexural Strength (ASTM C-78)
 - a. 1 day: 500 psi min.
 - b. 7 days: 750 psi min.

- c. 28 days: 1,000 psi min.
4. Freeze/Thaw Resistance (ASTM C-666): 300 cycles – 99%
5. Direct Tensile Bond Strength (ASTM C-503)
 - a. 1 day: 200 psi
 - b. 7 days: 300 psi
6. Shrinkage (ASTM C-157): less than 0.05% at 28 days
7. Scaling Resistance (ASTM C-672) 50 cycles
8. Manufacturers:
 - a. Kyrstol – Repair Grout
 - b. Xypex – Megamix 2
 - c. Approved Equal

2.2 SPRAY APPLIED CEMENTITIOUS REPAIR MORTAR

- A. Material shall be Portland Cement, fiber reinforced, shrinkage compensated, silica Fume enhanced conforming to the following properties:
 1. Compressive Strength (ASTM C-109)
 - a. 1 day: 4,500 psi min.
 - b. 7 days: 8,000 psi min.
 - c. 28 days: 10,000 psi min.
 2. Splitting Tensile Strength (ASTM C-496) at 28 days: 735 psi min.
 3. Flexural Strength (ASTM C-293)
 - a. 28 days: 1,100 psi min.
 4. Tensile Adhesion (ASTM C-1583): 350 psi at 28 days
 5. Manufacturers:
 - a. Krystol – T1
 - b. Xypex – Megamix 1
 - c. Approved Equal

2.3 WATERPROOF COATING

- A. Waterproof coating to be applied to the vertical concrete dam face conforming to the following properties.
 1. Tensile (Pull-Off) Strength (ASTM D-4541): 175 psi min.
 2. Hydrostatic head resistance: 50 feet min.
 3. Acceptable waterproof coating systems:
 - a. Krystol – T1

- b. Xypex – Concentrate
- c. Approved Equal

2.4 HYDROPHOBIC POLYURETHANE CHEMICAL GROUT FOR REPAIR OF LEAKING CRACKS OR JOINTS

- A. The hydrophobic polyurethane Chemical Grout shall be low viscosity, expanding, liquid chemical grout designed to seal leaking cracks, fractures, joints and holes in concrete. The grout shall adhere to the concrete surface and form a flexible gasket that stops water.
- B. Polyurethane Chemical Grout shall meet the following minimum requirements:

POLYURETHANE CHEMICAL GROUT TECHNICAL DATA

Uncured Properties

Solid volume (ASTM D2369)	100%
Viscosity, cps (ASTM D2196)	200 cps at 77° F
Density (ASTM D3754)	1.02 g/cm ³
Flashpoint COC Method	>270° F

Cured Properties

Tensile Strength (ASTM D180)	150 psi
Elongation	100%

- C. Product requires the use of a catalyst.
- D. Approval and test certification in accordance with ANSI/NSF Standard 61 is required for all uses in contact with potable water.
- E. Polyurethane Chemical Grout shall be DeNeef Flex SLV or approved equal.
- F. Catalyst shall be made by same manufacturer as Polyurethane Chemical Grout.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that preparation of concrete surfaces to be repaired in accordance with manufacturer's recommendations.
- B. Location and extend of concrete repairs bid as unit price items shall be determined in the field by the Contractor.
- C. Verify cover requirements over all reinforcement.
- D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete repairs are accurately placed, positioned securely, and will not cause hardship in placing repair material.
- E. Verify site conditions to ensure that full access is available for placement of concrete.

3.2 REPAIRS TO EXISTING SPALLED CONCRETE SURFACES

- A. These repair procedures are limited to the spalled concrete surfaces with and without exposed steel reinforcing.
- B. Edges of areas to be repaired shall be cut square to a minimum depth of 1/2 inch so that there will be no feathered edges. Existing spalled surfaces shall be mechanically prepared to remove deteriorated concrete. Concrete shall be chipped away to provide a minimum of 3/4 inch of clearance all around any exposed steel reinforcement to permit proper placement of repair mortar or concrete around the steel to the parent, sound concrete. Spalled surfaces shall be thoroughly cleaned of mud, paint, grime, scum, laitance, organic matter, detritus, calcareous growths and other foreign matter, by sand-and-water blasting or other acceptable means as approved by the Engineer. Immediately after cleaning, the surface shall be checked by the Engineer for proper condition, including fractured concrete or loose aggregate. Any such material shall be removed by pneumatic or hand tools. The final surfaces shall be thoroughly rinsed with clean water to remove all remaining dirt and dust. Prepare all surfaces to be repaired in accordance with all repair material manufacturer's recommendations.
- C. Portland cement mortar shall be mechanically mixed in accordance with the manufacturer's recommendations. When the repair depth exceeds 1 inch, coarse aggregate shall be added to the mortar mix in accordance with the manufacturer's recommendations.
- D. At least 2 hours prior to application of the repair mortar or concrete, the prepared surface shall be thoroughly moistened with clean water to reduce absorption and provide a reservoir for moist curing at the interface of the repair. The substrate should be saturated surface dry with no standing water. In locations requiring repair mortar, the mortar shall be scrubbed into the moistened substrate to completely fill all pores and voids. Allow mortar or concrete to set to desired stiffness. Sponge float finish remaining repair areas to provide a smooth uniform textured surface.
- E. Repair areas and adjacent parent concrete surfaces shall be treated immediately after finishing, providing continuous moist curing without change in color for at least 7 days. Surfaces shall be covered with damp burlap and sealed with taped polyethylene. Membrane curing compounds shall not be used.
- F. Leave finished work and adjacent concrete surfaces in a neat, clean condition with no evidence of spillovers or staining.
- G. Spall depth between 2" and 4" shall be repaired with cementitious repair mortar and stainless steel helical anchors 8" O.C.
- H. Spall depth greater than 4" shall be repaired with cementitious repair mortar and adhesive anchors #3 bars at 18" O.C.

3.3 REPAIRS OF HARDENED CONCRETE SURFACES

- A. Defective concrete including form tie holes not previously patched and honeycombed areas. Areas shall not be patched unless examined and approval is given by the Engineer. After approval, areas involved shall be cut back to a minimum depth of 1 inch from the finished surface, or as otherwise directed, whichever is greater. Edges of areas to be repaired shall be cut square to a minimum depth of 3/4 inch. Feathered edges will not be allowed. Any voids or honeycomb around reinforcing steel shall be chipped away to provide at least 3/4 inch clearance all around to permit proper placement of repair mortar or concrete around the steel to the parent, sound concrete.

Prepare all surfaces to be repaired in accordance with repair material manufacturer's recommendations.

- B. Exposed surfaces shall be thoroughly cleaned of all mud, paint, grime, scum, laitance, organic matter, detritus, calcareous growth and other foreign matter by sand and water blasting or other acceptable means. Immediately after cleaning, the surface shall be checked by the Engineer for proper surface preparation, including fractured concrete or loose aggregate. Any such material shall be removed using pneumatic or hand tools. The final surfaces shall be thoroughly rinsed with clean water to remove remaining dirt and dust.
- C. Premoisten the prepared surface for at least 2 hours or reduce absorption of water by the parent concrete and to provide a reservoir for moist curing at the interface of the repair. The substrate should be saturated surface dry with no standing water. While the concrete surface is still damp, apply a thin 1/16 inch coat of neat cement slurry (mixed to the consistency of a heavy paste) with a bristle brush to provide a bond coat throughout the entire cavity of the repair. Before the slurry has dried or changed color, promptly install the repair concrete or dry-pack, as may be required or selected.
- D. For relatively small areas, ram repair concrete into this portion of the formed void. This concrete shall comprise a crumbly-dry 1-1-1.5 mixture of cement, concrete sand and pea gravel (or 3/4" gravel) mixed slightly damp to the touch (just short of "balling"). The "dry-pack" consistency of the concrete shall be zero slump, but moist enough so that when it is rodded and tamped until dense, an excess of paste will appear on the surface in the form of a spider web. In cases of unformed voids of thinner section, do not build-up repair in excess of a depth which will sag with the weight of the fresh mortar or concrete. Trowel smooth with heavy pressure.
- E. Large areas may be repaired with concrete in conformance with Paragraph 2.2 of this section.
- F. The concrete shall be of the driest possible consistency and mix composition so that it can be worked into the corners and angles of forms and around the reinforcement, without permitting the materials to segregate or free water to collect on the surface, due consideration being given to the methods of placing and compacting. Source and mixture of concrete shall be submitted for approval.
- G. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited which has hardened sufficiently to cause the formation of seams and planes of weakness within the section. Concrete shall be thoroughly consolidated and trowelled dense, smooth and plane. Avoid premature and excessive troweling that could cause sagging.
- H. Repair areas and adjacent parent concrete surfaces shall be treated immediately after finishing providing continuous moist curing without change in color for at least 7 days. Surfaces shall be covered with damp burlap and sealed with taped polyethylene. Membrane curing compounds shall not be used.
- I. Leave finished work and adjacent concrete surfaces in a neat, clean condition with no evidence of spillovers or staining.

3.4 LIQUID CHEMICAL GROUT INSTALLATION

- A. Surfaces to liquid chemical grout injection shall be cleaned of laitance, efflorescence and mineral deposits or any material that will inhibit repair of the crack. The full extent of

the crack shall be visible prior to repair. The substrate shall be prepared in accordance with manufacturer's recommendations.

- B. Injection of the liquid chemical grout shall be done through metal-rubber type packers designed to withstand injection pressures of 5000 pounds per square inch, psi, in wet and dry structure.
- C. The packer shall be installed in a drilled hole. The hole shall be drilled with a rotary hammer drill.
- D. Place packers in the previously drilled hole. If the packer can't be pushed into the hole, tap it in. Tighten the packer with a wrench as tight as necessary.
- E. Holes shall be drilled at approximately 45 degrees to the surface and towards the crack. Holes shall be staggered on opposite sides of the crack.
- F. Distance between packers shall allow for complete sealing of the crack, but not greater than 20 inches.
- G. When all preparation work is completed, make sure the injection pump is in good working order. All equipment that comes in contact with the liquid chemical grout must be kept dry.
- H. Mix liquid chemical grout components in accordance with the manufacturer's specifications and recommendations.
- I. Catch all surplus material and solvent in a waste container.
- J. Begin the injection at the point of highest resistance to ensure good penetration and minimal loss of chemical.
- K. Utilize a pressure gauge to ensure the pressure is kept in a range that will allow sufficient flow of material.
- L. Pump liquid chemical grout into the packer until it has traveled to the next packer, and is oozing out slowly on the visible side of the crack. Once you are assured that the liquid chemical grout has reached the next injection packer, proceed to the next packer and continue injecting the crack. After injecting a minimum of 2 packers, return to the first packer and inject again. Continue in this fashion until the crack is completely filled and a watertight repair is completed.
- M. All Application procedures shall conform to the recommendations of the manufacturer, including material handling, mixing, environmental controls during application, safety and equipment.

3.5 SPRAY APPLIED CEMENTITIOUS REPAIR MORTAR

- A. Prepare surfaces in accordance with the manufacturer's requirements and the following:
 - 1. Remove all unsound or loose concrete
 - 2. Surface profile to be ICRI CSP 6 or better
 - 3. Surface to saturated surface dry prior to mortar application
- B. Mix mortar in accordance with manufacturer's requirements.
- C. Apply mortar through wet process spraying.

- D. Spray applied cementitious repair mortar shall be applied to the full upstream face to create a uniform surface prior to waterproof coating.
- E. Minimum mortar thickness is 3/8". Maximum neat mortar thickness is 2".
- F. Cure in accordance with manufacturer's recommendations.

3.6 WATERPROOF COATING INSTALLATION

- A. Complete all concrete spall and crack repairs prior to installing waterproof coating.
- B. Concrete surfaces shall be cleaned and prepared in accordance with manufacturer's recommendations.
- C. Minimum Concrete Surface Profile as defined by the International Concrete Repair Institute shall be CSP-3.
- D. Concrete surfaces shall be saturated surface dry immediately prior to waterproofing application.
- E. Apply waterproofing uniformly covering all exposed surfaces in accordance with manufacturer's recommendations.
- F. Installed product is to be covered and moist cured for a minimum of 3 days in accordance with manufacturer's recommendations.
- G. The waterproof topcoat shall be a maximum thickness of 3/8".

END OF SECTION

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DIVISION 5 - METALS

SECTION 05050

WELDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Welding for fabrication and installation of metals
- B. Related Sections
 - 1. Section 05500 – Miscellaneous Metals

1.2 REFERENCES

- A. American Society of Mechanical Engineers (ASME):
 - 1. BPVC SEC V, Nondestructive Examination.
 - 2. BPVC SEC IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
- B. American Society of Nondestructive Testing (ASNT): SNT-TC-IA, Personnel Qualification and Certification in Nondestructive Testing.
- C. American Welding Society (AWS):
 - 1. B2.1, Specification for Welding Procedure and Performance Qualification.
 - 2. D1.1, Structural Welding Code - Steel.
 - 3. QC 1, Standard for AWS Certification of Welding Inspectors.

1.3 DEFINITIONS

- A. CWI-Certified Welding Inspector.
- B. NDT-Nondestructive Testing.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. Shop and field welding procedure specifications (WPS).
 - 2. Procedure qualification records (PQR).
 - 3. Welding Documentation: Submit on appropriate forms in referenced welding codes.
 - 4. Nondestructive testing procedure specifications prepared in accordance with ASME BPVC SEC V.
- B. Quality Control Submittals:
 - 1. Welder/welding operator performance qualifications (WPQ).
 - 2. Certified welding inspector (CWI) credentials.

3. Testing agency personnel credentials.
4. Welding inspector's reports.
5. Shop inspection and quality control records when requested.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Welding Procedure Specifications: In accordance with AWS D1.1 (Annex E) or AWS B2.1 (App. A) or ASME BPVC SEC IX (Forms QW-482 and QW-483).
2. Welding Procedure Specifications: In accordance with AWS D1.1 (Annex E) or AWS B2.1 (App. A) or ASME BPVC SEC IX (Forms QW-482 and QW-483).
3. Welding Inspector: Certified in accordance with AWS QC 1, and having prior experience with the welding codes specified.
4. Testing Agency: Personnel performing tests shall be NDT Level II Certified in accordance with ASNT SNT-TC-1A.

1.6 SEQUENCING AND SCHEDULING

- A. Unless otherwise specified, Submittals required in this Section shall be submitted and approved prior to commencement of welding operations.

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

- A. Welding fabrication, materials, and workmanship shall be subjected to inspection and testing during the fabrication process.
- B. Welding of parts shall be in accordance with the Standard Code for Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the Engineer.
- C. Welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code.
- D. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.
- E. Notify the Owner's Project Representative prior to the start of any fabrication or other phases of the work to afford them reasonable opportunity to inspect work.
- F. A Certified Welding Inspector (CWI) shall be retained by the fabricator to visually inspect all fabrication welds in accordance with AWS D1.1, Section 6 and Table 6.1, Visual Acceptance Criteria.
- G. The CWI shall be present whenever shop welding is performed. The CWI shall perform inspection before, during, and after welding. CWI duties include:
1. Verifying conformance of specified job material and proper storage.
 2. Monitoring conformance with approved WPS.
 3. Monitoring conformance of WPQ.

4. Inspecting weld joint fit-up and in-process inspection.
 5. Providing 100 percent visual inspection of all welds.
 6. Supervising nondestructive testing personnel and evaluating test results.
 7. Maintaining records and preparing report confirming results of inspection and testing comply with the Work.
- H. Maintain inspection and quality control records of shop work.
- I. Acceptance of work at the shop shall not prevent its final rejection at the jobsite, even after erection, if it is found to be defective in any way.
- J. Nondestructive testing of fabrication welds will be conducted by an independent Testing Agency, retained by the Owner, in accordance with the criteria specified below and in conjunction with the testing required for field welding.

PART 3 EXECUTION

3.1 GENERAL

- A. Welding and Fabrication by Welding:
1. Conform to governing welding codes referenced in the attached Welding and Nondestructive Testing Requirements Data Sheet.
 2. Each welder working on the project, whether in the shop or in the field, shall be assigned an identification symbol or mark. Each welder shall mark or stamp his identification symbol at each weldment completed, whether in the shop or in the field.

3.2 FIELD QUALITY CONTROL

- A. Welding fabrication, materials, and workmanship shall be subjected to inspection and testing during the erection and installation process.
- B. Nondestructive testing of erection, installation and fabrication welds will be conducted by an independent Testing Agency, retained by the Owner, in accordance with the weld inspection criteria specified below.
- C. The Contractor shall facilitate inspection and testing by the Testing Agency. Furnish the Testing Agency, upon request, with the following:
1. Complete sets of approved shop drawings and corrective work procedures at shop(s) and in the field.
 2. Cutting lists, order lists, material bills and shipping lists.
 3. Information as to time and place of shipment of materials to the shop(s) and the field.
 4. Full and ample means and assistance for testing, including access to all field and shop welds required to be tested.
- D. Notify the Engineer prior to the start of any erection or installation or other phases of the work to afford reasonable opportunity to inspect the work.
- E. Maintain inspection and quality control records of field work.

3.3 NONDESTRUCTIVE WELD TESTING REQUIREMENTS

A. Weld Inspection Criteria:

1. Selection of Welds to be Tested: As agreed upon between Engineer and Contractor.
2. Unless otherwise specified, perform NDT of welds at a spot testing frequency as determined in the attached table in Data Sheet 05050 – A, in accordance with the referenced welding codes, as follows:
 - a. Butt Joint Welds: All butt welds to be provided shall be radiographically tested and repaired.
 - b. Groove Welds: All groove welds to be provided shall be ultrasonically tested and repaired.
 - c. Fillet Welds: A randomly sampled percentage of all fillet welds to be provided shall be examined and repaired, using either dye penetrant or magnetic particle inspection methods.
 - d. All Welds: 100 percent visually inspected.
3. Weld Acceptance:
 - a. Visual Inspection (VT):
 - 1) Structural Tubing: AWS D1.1, paragraph 6.9, Visual Inspection, Tubular Connections;
 - 2) All Other Structural Steel: AWS D1.1, paragraph 6.9, Visual Inspection, Statically Loaded Nontubular Connections.
 - b. Ultrasonic Testing (UT): Perform UT of groove welds in accordance with AWS D1.1, paragraph 6.13.3, Class R Indications.
 - c. Radiographic Testing (RT): Perform RT of butt joint welds in accordance with AWS D1.1, paragraph 6.12.1.
 - d. Magnetic Particle (MT):
 - 1) Perform on fillet and partial penetration groove welds in accordance with AWS D1.1, paragraph 6.10.
 - 2) Acceptance shall be in accordance with VT standards specified above.
 - e. Liquid Penetrant (PT):
 - 1) Perform on fillet and partial penetration groove welds per AWS D1.1, paragraph 6.10.
 - 2) Acceptance shall be in accordance with VT standards specified above.

3.4 WELD DEFECT REPAIR

- #### A. Deficient welds shall be cut out to sound material and rewelded.

- B. Verify by retesting that rejected weld defects have been repaired and are acceptable in accordance with the appropriate welding codes.

3.5 SUPPLEMENTS

- A. The supplements listed below, following “END OF SECTION,” are a part of this Specification.

- 1. DATA SHEET 05050 – A , Welding and Nondestructive Testing Requirements.

END OF SECTION

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DATA SHEET 05050-A

Welding and Nondestructive Testing Requirements

Specification Section	Governing Welding Codes or Standards	Submit Welding Procedure Spec.	Submit Welder/ Welding Operator Qual.	Onsite Welding Inspector Req'd	Submit Written Nondestructive Testing Procedure Specifications	Nondestructive Testing Requirements
05500 Metal Fabrications and Castings	AWS D1.1, Structural Welding Code–Steel or AWS D1.2, Structural Welding Code–Aluminum	Yes	Yes	Yes	Yes	100% VT ⁵ ; 100% UT ¹ or RT ² of all groove-and-butt joint welds; 10% MT ³ or PT ⁴ of all fillet welds; see Section 05500

¹UT–Ultrasonic Testing.

²RT–Radiographic Testing.

³MT–Magnetic Particle Testing.

⁴PT–Liquid Dye Penetrant Testing.

⁵VT–Visual Testing

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SECTION 05500

MISCELLANEOUS METALS

1.1 SUMMARY

A. Section Includes:

1. Galvanized steel base plates, fasteners and anchor bolts.
2. Galvanized steel railing and toeboard.
3. Slide Gate Operator Support Platform.
4. Electrolysis isolators.
5. Fasteners for Miscellaneous Metals items.

1.2 REFERENCES

A. The Connecticut State Building Code, Latest Edition

B. American Iron and Steel Institute (AISI), Stainless Steel Types

1. AISI Type 316 - Stainless Steel Bolts, Bars, Sheets and Shapes
2. AISI Type 316L - Stainless Steel Bars, Shapes, Plates and Pipe

C. American National Standards Institute (ANSI)

1. A14.3, Safety Requirements for Fixed Ladders

D. American Society for Testing and Materials (ASTM)

1. A27, Standard Specification for Steel Casting, Carbon, for General Application
2. A36, Standard Specification for Carbon Structural Steel
3. A47, Standard Specification for Ferritic Malleable Iron Castings
4. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
5. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
6. A143, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement
7. A148, Standard Specification for Steel Castings, High Strength, for Structural Purposes
8. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
9. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
10. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service

11. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
12. A276, Standard Specification for Stainless Steel Bars and Shapes
13. A283, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
14. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
15. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
16. A384, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
17. A385, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
18. A490, Standard Specification for Structural bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
19. A563, Standard Specification for Carbon and Alloy Steel Nuts
20. A568, Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
21. A606, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
22. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
23. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
24. B210, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes
25. B221, Standard Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
26. B241, Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube
27. B316, Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold Heading Wire and Rods
28. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
29. F436, Standard Specification for Hardened Steel Washers
30. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
31. F594, Standard Specification for Stainless Steel Nuts
32. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

33. F1554, Standard Specification for Anchor Bolts, Steel, 36-, 55-, and 105-ksi Yield Strength
- E. American Welding Society (AWS):
 1. B2.1, Specification for Welding Procedure and Performance Qualification.
 2. D1.1, Structural Welding Code - Steel.
 3. D1.2, Structural Welding Code - Aluminum.
 4. QC 1, Standard for AWS Certification of Welding Inspectors.
- F. International Code Council Evaluation Service (ICC-ES): Evaluation Reports for Concrete and Masonry Anchors.
- G. Occupational Safety and Health Administration (OSHA):
 1. 29 CFR 1910.27, Fixed Ladders.
- H. National Association of Architectural Metal Manufacturers (NAAMM):
 1. ANSI MBG 531, Metal Bar Grating Manual.
 2. ANSI MBG 532, Heavy-Duty Metal Bar Grating Manual.
 3. Metal Stairs Manual.
- I. Steel Structures Painting Council (SSPC)

1.3 SUBMITTALS

- A. Product Data:
 1. Concrete and Masonry Drilled Anchors:
 - a. Manufacturer's product descriptions.
 - b. Specific installation instructions, including drilled hole size, preparation, placement procedures, and instructions for safe handling of anchoring systems.
 2. Component Handrail Systems:
 - a. Manufacturer's product descriptions.
 - b. System installation and assembly instructions.
 3. Steel Grating.
 - a. Manufacturer's product descriptions.
 - b. System load ratings, including deflection and load charts.
 4. Color Galvanizing System with color chips for Owner approval.
 5. Bitumastic Troweling for Surfaces in Contact with Concrete.
 6. Galvanizing touch-up / repair materials.
- B. Shop Drawings:

1. Detailed shop drawings, including erection drawings, for all metal fabrications, including welding and fastener information:
 - a. Submit for approval before fabrication.
 - b. Identify sizes of structural members, method of assembly, anchorage, and connection to other members.
 2. Grating layout drawings, indicating all penetrations and openings.
- C. Quality Control Submittals:
1. Connection Design Calculations: stamped by a licensed professional structural engineer, registered in the State where the work will be performed, properly coordinated with Shop Drawings.
 2. Shop Drawings and design calculations for the sluice gate operator support platform framing and grating, sealed by a licensed professional engineer in the state of Connecticut. Platform framing members and grating shall be designed for live, ice, and dead loads per the ASCE-7 and the following.
 - a. Live loads for sluice gate platform are 100 pounds per square foot (psf) and the operator load, coordinated by the Contractor
 - b. Dead loads include member self-weights and operator self-weight.
 3. Concrete and Masonry Drilled Anchors:
 - a. Current test data or ICC-ES evaluation report.
 - b. Adhesive Anchor Installer Certification.
 4. Hot-Dip Galvanizing:
 - a. Certificate of compliance, signed by the galvanizer, referencing the specific project, with a description of the material processed and the ASTM standard used for coating.
 - b. Certificate shall verify the level of pre-galvanizing cleaning and the minimum coating thickness achieved.
 - c. Galvanizing shall comply with ASTM A123 for fabricated products and ASTM A153 for hardware.
 5. Coating shall be certified OTC/VOC compliant and conform to EPA and local requirements.
 6. Welding: In accordance with the requirements of the American Welding Society.
 7. Provide Certificates of Compliance on other materials as requested by the Engineer.

1.4 QUALITY ASSURANCE

- A. Shop Assembly: Pre-assemble items in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Qualifications for Welding Work: In accordance with the requirements of the American Welding Society.
- D. All handrails, grating, etc. shall comply with OSHA, ADA, and The Connecticut State Building Code.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and stack materials carefully to prevent deformation or damage.
- B. Store materials carefully on substantial timbers and blocking, so arranged that materials will be free from earth and properly drained, preventing any splattering with dirt or accumulation of water or snow in or about materials.
- C. Prevent accumulation of mud, dirt, or other foreign matter on materials. Any accumulation shall be completely removed prior to erection.
- D. Protect painted, hot-dip galvanized, and other finishes from damage due to metal banding and rough handling. Use padded slings and straps.
- E. Adhesive Anchor Systems:
 - 1. Store adhesive cartridges on pallets or shelving in covered storage area, in accordance with manufacturer’s written instructions.
 - 2. Cartridge Markings: Include manufacturer’s name, product name, material type, batch or serial number, and adhesive expiration date.
 - 3. Dispose of cartridges if shelf life has expired.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Steel Shapes:	
W-Shapes	A992
M-, S-, and HP-Shapes	A36
Channels	A36
Angles	A36
Plates	A36
Steel Sheet	A570 or A611, Class 1.
Steel Pipe	A53, Grade B
Hollow Structural Shapes	A500, Grade B
Stainless Steel:	
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316
Nuts	F594, AISI Type 316

Item	ASTM Reference
Steel Plate, Sheet, and Strip	A240, AISI Type 316
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts A153 for galvanized components
Anchor Bolts and Rods	F1554, Grade 55, with weldability supplement S1
Threaded Rods	A36
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436

2.2 MANUFACTURED UNITS

A. Concrete and Masonry Drilled Anchors

1. General: Materials shall be AISI Type 316 stainless, hot-dip galvanized, or zinc-plated steel, as shown in Data Sheet – 05500 – A, FASTENER MATERIALS SCHEDULE, at end of this section.
2. Adhesive Anchors:
 - a. Threaded Rod:
 - 1) ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.
 - 2) Length as required, to provide minimum depth of embedment.
 - 3) Clean and free of grease, oil, or other deleterious material.
 - 4) For hollow-unit masonry, provide galvanized or stainless steel wire cloth screen tube to fit threaded rod.
 - b. Adhesive:
 - 1) Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
 - 2) Two-component, designed to be used in adverse freeze/thaw environments, with gray color after mixing.
 - 3) Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
 - 4) Nonsag, with selected viscosity base on installation temperature and overhead application where applicable.
 - c. Manufacturers and Products:
 - 1) ITW Ramset/Red Head, Wood Dale, IL; Epcon Ceramic 6 Epoxy or A7 Adhesive Anchor System. (Use only Epcon A7 Adhesive System for hollow masonry.)

- 2) Hilti, Inc., Tulsa, OK; HIT Injection Adhesive System, HIT HY 200 (HIT HY 70 for hollow masonry).
 - 3) Powers Rawl, New Rochelle, NY; Power Fast Epoxy Injection Gel Cartridge System.
 - 4) Simpson Strong-Tie Co., Inc., Pleasanton, CA; Epoxy-Tie Adhesive ET.
 - 5) Covert Operations, Inc., Long Beach, CA; CIA-Gel 7000 Epoxy Anchors.
 - 6) Unitex, Kansas City, MO; Pro-Poxy 300 and Pro-Poxy 300 Fast Epoxy Adhesive Anchors.
3. Adhesive Threaded Inserts:
- a. Stainless steel, internally threaded insert.
 - b. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-R Insert with HIT HY 200 adhesive.
- B. Fasteners:
1. Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Data Sheet – 05500 – A, FASTENER MATERIALS SCHEDULE, at the end of this section.
 2. Bolts, Nuts and Washers: ASTM A325, galvanized to ASTM A153 for galvanized members.
 3. Anchor Bolts: ASTM F1554, Grade 36
 4. High Strength Bolts: ASTM A325 or ASTM A490, Type 1, plain uncoated. Bolt length and thread length shall be as required for the connection type shown, with hardened washers as required.
- C. Galvanized Steel Railing
1. Steel pipe railings and handrails shall be fabricated in accordance with the dimensions and details shown on the drawings and as specified herein.
 2. Close exposed ends of rails by welding 3/16 inch thick steel plate in place.
 3. Toe Boards: Provide toeboards at railings as indicated on the drawings. Fabricate to dimensions and details indicated, fastened to each railing post.
 4. Hot-dip galvanize all railing member after fabrication and welding, in accordance with ASTM A123 as specified hereinafter.
 5. Factory-applied coating over hot-dipped galvanized steel.

2.3 ACCESSORIES

- A. Welding Materials: In accordance with the requirements of Section AWS D1.1 and AWS D1.2

- B. Electrolysis Isolators: All dissimilar metals shall be isolated over their full length with 1/8 inch thick neoprene unless otherwise noted.

2.4 SHOP FABRICATION

A. General

1. All dimensions shall be verified at the site before fabrication is started.
2. Galvanized items shall be shop fabricated and completely welded prior to galvanizing.
3. Fit and shop assemble items in largest practical sections, for delivery to site.
4. Fabricate items with joints tightly fitted and secured.
5. Welding shall be in accordance with the requirements of AWS D1.1
6. 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.
7. Exposed Mechanical Fastenings: Flush countersunk screws or bolts, unobtrusively located, consistent with the design of the component, except where specifically noted otherwise.
8. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
9. Miscellaneous metals work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.
10. Metal Surfaces: For fabrication of miscellaneous metal work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
11. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fittings.
12. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the Engineer. Finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95% of the theoretical weight computed from the dimensions shown.
13. No splicing of any member or part of the work will be allowed where full-length members are commercially available.

14. Screws, bolts, studs and other connecting devices required in the work shall be concealed wherever possible. On all finish work where fasteners must be exposed to view, they shall be countersunk and finished flush with the exposed surfaces. All screws, bolts and other fastening devices used for exterior work shall be aluminum, bronze or stainless steel, whichever is appropriate for the work in which it is to be used.
15. Factory applied coating shall be applied after galvanizing and in Owner specified color per approved samples.

B. Fabrication Tolerances:

1. Squareness: 1/8 inch maximum difference in diagonal measurements.
2. Maximum Offset Between Faces: 1/16 inch.
3. Maximum Misalignment of Adjacent Members: 1/16 inch.
4. Maximum Bow: 1/8 inch in 48 inches.
5. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.5 FINISHES

A. Hot Dip Galvanizing

1. Material for galvanizing shall be geometrically suitable as specified in ASTM A384 and A385.
2. To be chemically suitable for galvanizing, steel should contain carbon below 0.25%, phosphorous below 0.5%; and manganese below 1.35%. Contact galvanizer if steel does not comply to determine suitability for processing.
3. To safeguard against warpage or distortion of steel members, in conformance with ASTM A384, miscellaneous metals fabricator shall submit shop drawings of non-standard fabrications, all tubular fabrications, all fabrications involving any dimension that exceeds the size of the galvanizer's kettle, and any fabrication involving materials of different thickness. These drawings shall be submitted to the galvanizer prior to fabrication to determine the suitability of the material for galvanizing.
4. All ferrous metals specified herein or indicated on the drawings as galvanized shall be hot-dipped galvanized after fabrication in compliance with ASTM A123 as modified to include 0.5% nickel, A143, A153, A384, or A385 as applicable. Galvanizing bath shall include zinc, nickel, and other state of the art alloys designed to ensure homogeneous metallurgical growth and greater corrosion resistance.
5. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the ASTM number, and the weight of the zinc coating in ounces per square foot. Coating shall be not less than 2.3 oz. per square foot of surface. After galvanizing, steel to be painted shall be dipped in a 0.2% chromic acid solution.
6. Within 12 hours of galvanizing, a factory prime coating shall be applied to all galvanized steel that is to be painted.

7. To minimize distortion, material less than thirty feet in length shall be preheated in a suitable chamber maintaining a constant heat of no less than 200°F immediately prior to immersion into the molten zinc.
8. To minimize surface imperfections (e.g., flux inclusions) material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride prior to galvanizing. The type of galvanizing kettle utilizing a flux blanket overlaying the molten zinc shall not be permitted.

B. Coating Types

1. All finish colors will be selected from manufacturer's color chips. Owner will select the colors and level of gloss. Match final colors to selected color chips.
2. All coating types shall be from the same manufacturer. Colorgalv or approved equal.
3. Coating system schedule:

Coat	Material	Thickness (DFT)
Primer	Polyamide epoxy	2-6 mils
Topcoat	Aliphatic acrylic urethane	3-5 mils
Clear-coat	Aliphatic acrylic urethane	1-2 mils

2.6 SOURCE QUALITY CONTROL

- A. Miscellaneous Metals fabrications, materials, and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer.
- B. Inspection and testing of shop welding shall be in accordance with the requirements of AWS D1.1. Repair and retest defective welds as specified in AWS D1.1.
- C. Maintain inspection and quality control records of shop and field work.
- D. The Contractor shall maintain records of each impact wrench used in the shop, showing dates, sizes of bolts tested and the corresponding torque values. Certified copies of the records shall be made available to the Engineer, upon request.
- E. Notify the Engineer prior to start of any fabrication, the start of sandblasting and painting, or other phases of work so as to afford them reasonable opportunity to inspect work.
- F. Furnish the Engineer upon request, with the following:
 1. Complete sets of approved Shop Drawings and corrective work procedures at fabricating shop(s) and in field.
 2. Cutting lists, order lists, material bills, and shipping lists.
 3. Information as to time and place of all rollings and shipments of material to shops and field.
 4. Representative sample pieces requested for testing.

5. Full and ample means and assistance for testing materials, and proper facilities for inspection of work, in mill, shop and field.
 6. Manufacturer coating color chips for Owner selection.
- G. Do not remove any marks or tags identifying rejected work.
- H. Any work found deficient shall be corrected or replaced in accordance with these specifications. Deficient welds shall be cut out to sound material and re-welded. Deficient assemblies shall be taken apart, corrected and reassembled, using new materials as required. ASTM A490 bolts shall not be reused. ASTM A325 bolts may be retightened once only.
- I. Miscellaneous Metals work that has been rejected by the Engineer in the mill or shop shall be corrected without delay and at no expense to the Owner.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Verify that anchor bolts, bearing plates, and other items furnished to be installed by others have been installed correctly.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. All steel and aluminum surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling applied in accordance with manufacturer's instructions prior to installation.

3.3 FIELD FABRICATION

- A. No fabricated section shall be cut in the field without the permission of the Engineer.
- B. All miscellaneous metals work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.
- C. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Accessories and connections to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fittings.
- D. No splicing of any member or part of the work will be allowed where full-length members are commercially available. Jointing shall meet the approval of the Engineer.
- E. Screws, bolts, studs and other connecting devices required in the work shall be concealed wherever possible. On finish work where fasteners must be exposed to view, they shall be countersunk and finished flush with the exposed surfaces. Screws, bolts and other fastening devices used for exterior work shall be aluminum, bronze or stainless steel, whichever is appropriate for the work in which it is to be used.

3.4 INSTALLATION

- A. Install all items furnished except items to be imbedded in concrete or masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in

accordance with the details shown. Fastening to wood plugs in masonry will not be permitted.

B. Bar Gratings:

1. Comply with Recommendations of NAAMM Metal Bar Grating Manual for installation of gratings, including installation clearances and standard anchoring details.
2. Secure removable units to supporting members with type and size clips and fasteners indicated, or if not indicated as recommended by grating manufacturer for type of installation conditions shown.
3. Secure non-removable units to supporting members by welding where both materials are the same, otherwise fasten by bolting as indicated above.

3.5 CONCRETE AND MASONRY DRILLED ANCHORS

- A. Begin installation only after concrete or masonry to receive anchors has attained design strength.
- B. Install in accordance with manufacturer's instructions.
- C. Provide minimum embedment, edge distance, and spacing as follows, unless indicated otherwise by anchor manufacturer's instructions or shown otherwise on Drawings:

Anchor Type	Min. Embedment (bolt diameters)	Min. Edge Distance (bolt diameters)	Min. Spacing (bolt diameters)
Adhesive	9	9	13.5

- D. Use only drill type, bit type, and diameter recommended by anchor manufacturer. Clean hole of debris and dust with brush and compressed air.
- E. When embedded steel or rebar is encountered in the drill path, slant drill to clear obstruction. If drill must be slanted more than 10 degrees to clear obstruction, notify Engineer for direction on how to proceed.
- F. Adhesive Anchors:
 1. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F.
 2. Remove any standing water from hole with oil-free compressed air. Inside surface of hole shall be dry where required by manufacturer's instructions.
 3. Do not disturb anchor during recommended curing time.
 4. Do not exceed maximum torque as specified in manufacturer's instructions.

3.6 FIELD QUALITY CONTROL

- A. The fact that Miscellaneous Metals work has been accepted at the shop shall not prevent its final rejection at the job site, even after it has been erected, if it is found to be defective in any way.
- B. Miscellaneous Metals erection, materials, and workmanship shall be subjected to inspection and testing in mill, shop and/or field by the Engineer.

- C. Inspection and testing of field welding shall be in accordance with the requirements of Section AWS D1.1.
- D. Maintain inspection and quality control records of shop and field work.
- E. Notify the Engineer prior to start of any miscellaneous metals erection, or other phases of work so as to afford them reasonable opportunity to inspect work.
- F. Furnish the Engineer upon request, with the following:
 - 1. Complete sets of approved Shop Drawings and corrective work procedures at fabricating shop(s) and in field.
 - 2. Full and ample means and assistance for testing materials, and proper facilities for inspection of work, in mill, shop and field.
- G. Do not remove any marks or tags identifying rejected work.
- H. Any work found deficient shall be corrected or replaced in accordance with these specifications, without delay and at no expense to the Owner.
- I. Welded Connections shall be tested in accordance with AWS D1.1 and AWS D1.2.

3.7 ADJUST AND CLEAN

- A. Touch-Up Painting - Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as approved for use for shop painting.
- B. Apply by brush or spray to provide a minimum dry film thickness not less than coating thickness required by ASTM A123 or A153 as applicable.
- C. For galvanized surfaces, clean field welds, bolted connections and abraded areas and touch-up all damage using suitable touch up material complying with ASTM A780.

3.8 FASTENERS

- A. Anti-seizing Lubricant: Use on all stainless steel threads.
- B. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.
- C. Provide fasteners in accordance with Data Sheet – 05500 – A, following this section, unless otherwise noted on the drawings.

DATA SHEET 05500-A
Fastener Materials Schedule

Service Use and Location	Product	Remarks
Anchor Bolts Cast Into Concrete for Equipment Bases		
All Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
Drilled Anchors for Metal Components to Concrete (Handrail Posts, and other Equipment)		
Exterior and Interior Wet and Dry Areas	Hot-dip galvanized steel or stainless steel sleeve, wedge, or expansion anchors, or stainless steel adhesive anchors	Use zinc-plated undercut anchors for overhead and ceiling installations.
Submerged or Corrosive Areas	Stainless steel adhesive anchors	
Connections for Steel Fabrications and Wood Components		
All Areas	Stainless steel bolts	
All Others		
All Areas	Stainless steel fasteners	

END OF SECTION

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DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION 07920

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:
 - a. Construction, contraction, and expansion joints in cast-in-place concrete
 - b. Rout and seal repair of cracking in existing concrete
 - c. Other joints as indicated
2. Exterior joints in horizontal traffic surfaces as indicated below:
 - a. Construction, contraction, and expansion joints in cast-in-place concrete dam crest, training walls, and spillway
 - b. Other joints as indicated

B. Related Sections

1. Section 03300 - Cast-in-Place Concrete
2. Section 03930 - Concrete Repair

1.2 REFERENCES

- A. ASTM C717 - Standard Terminology of Building Seals and Sealants
- B. ASTM C719 - Standard Test Method for Adhesion Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle)
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants
- E. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber

1.3 PERFORMANCE

- A. Provide joint sealants that have been produced and installed to establish and maintain watertight continuous seals.

1.4 SUBMITTALS

- A. Submit Product Data from manufacturers for each joint sealant product required, including instructions for joint preparation and joint sealant application.
- B. Submit certificates from manufacturers of joint sealants attesting that their products comply with Specification requirements and are suitable for use indicated.

- C. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project name, addresses, names of Engineers and Owners, plus other information specified.
- D. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- E. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications - Company specializing in performing the work of this Section who has successfully completed within the last 3 years at least 3 joint sealant applications similar in type and size to that of this Project.
- B. Single Source Responsibility for Joint Sealant Materials - Obtain joint sealer materials from a single manufacturer for each different product required.
- C. All sealants shall be used as received from the manufacturer and no thinning or other alterations will be allowed at the job site.
- D. Product Testing - Provide comprehensive test data for each type of joint sealant based on tests conducted by a qualified independent testing laboratory on current product formulations within a 24-month period preceding date of submittal of test results.
 - 1. Test elastomeric sealants for compliance with requirements specified by reference to ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C 719), low-temperature flexibility, modules of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
 - a. Include test results performed on joint sealers after they have cured 1 year.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions - Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40°F (4.4°C).
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes.

- B. Joint Width Conditions - Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions - Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

- A. Sequencing installation of joint sealers to occur not less than 21 or more than 30 days after completion of waterproofing, unless otherwise indicated.

PART 2 PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility - Provide joint sealants that are compatible with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors - Provide color of exposed joint sealants as selected by the Engineer from manufacturer's standard colors.

2.2 SEALANT - SUBMERSION AND TRAFFIC SURFACE APPLICATION

- A. The sealant to be used for this work shall be a polyurethane-base, non-sag elastomeric sealant with underwater primer.
 - 1. The sealant shall conform to Federal Specifications TT-S-00227E, Class A, Type II; ASTM C920, Type M, Grade NS, Class 25.
 - 2. The sealant shall exhibit inherent adhesion, which will not migrate in time.
 - 3. The sealant shall withstand total movement up to 25% extension and 25% compression.
 - 4. Unless otherwise directed, sealant color shall be manufacturer's standard color, which matches most closely the color of the material being jointed.
 - 5. The sealant shall be Sikaflex 2c NS EZ Mix as manufactured by Sika Corporation or equal.

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard - Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C920 requirements, including those referenced for Type, Grade, Class and Uses.
 - 1. 35% movement in both extension and compression for a total of 70% movement.
- B. One-Part Nonacid-Curing Silicone Sealant - Type S - Grade NS - Class 25 - and complying with the following requirements for uses and additional joint movement capability.
 - 1. Uses T, NT, M, G, A, and as applicable to joint substrates indicated, O.
 - 2. Additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719 to withstand the following, percentage

increase and decrease of joint width as measured at time of application and remain in compliance with other requirements of ASTM C920 for uses indicated.

- a. 100% movement in extension and 50% movement in compression for a total of 150% movement.
- C. Products - Subject to compliance with requirements, provide one of the following:
1. One-Part Elastomeric Sealant:
 - a. Sikaflex 1A.
 - b. or equal.

2.4 JOINT SEALANT BACKING

- A. General - Provide sealant backings of material and type which are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers - Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nonglassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 1. Either open cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.
- C. Elastomeric Tubing Joint-Fillers - Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26°F (-15°C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape - Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

- A. Primer - Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated.
- B. Cleaners for Nonporous Surfaces - Provide nonstaining, chemical cleaners of type which are acceptable to manufacturer of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oil residues or otherwise have detrimental effect on a sealant adhesion or in-service performance.
- C. Masking Tape - Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.
- D. Accessory Materials for Fire-Stopping Sealants - Provide forming, joint-fillers, packing and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints - Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers and the following requirements.
 - 1. Remove all foreign material from joint substrates, which could interfere with adhesion of joint sealant.
 - 2. Clean concrete joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means, which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Joint Priming - Prime joint substrates as recommended by joint sealant manufacturer. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape - Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General - Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard - Comply with recommendations of ASTM C1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Installation of Sealant Backings - Install sealant backings to comply with the following requirements:
 - 1. Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths, which allow optimum sealant movement capability.

- a. Do not leave gaps between ends of joint-fillers.
 - b. Do not stretch, twist, puncture or tear joint fillers.
 - c. Remove absorbent joint fillers, which have become wet prior to sealant application and replace with dry material.
2. Install bond breaker tape between sealants and joint fillers, compression seals or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.
 3. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.
- D. Installation of Sealants - Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants - Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform bends of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Do not use tooling agents, which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 5A in ASTM C1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

JOINT SEALER SCHEDULE

Joint Sealants	Description of joint construction and location where sealant is typically applied (see note below).
Non-sag Elastomeric Sealant with Underwater Primer	All submerged joints and traffic surfaces.
One-Part Elastomeric Sealant	Exterior and interior joints in horizontal and vertical surfaces of concrete and masonry; between concrete masonry; between metal and concrete, mortar.

JOINT SEALER SCHEDULE

Provide a joint seal at all joints subject to weather infiltration whether shown or scheduled. Joints not shown or scheduled shall receive a joint sealant as selected by the Engineer from the sealants listed above.

END OF SECTION

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DIVISION 11 - EQUIPMENT

SECTION 11285

SLIDE GATES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Slide gates
 - 2. Floor stand

1.2 REFERENCES

- A. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- B. ASTM A276 - Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes
- C. ASTM B21 – Standard Specification for Naval Brass, Rod, Bar, and Shapes
- D. ASTM B98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes
- E. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications
- F. AWWA C501 - Standard for Cast-Iron Sluice Gates
- G. Steel Structures Painting Council (SSPC)

1.3 SUBMITTALS

- A. Functional field and leakage test procedures and checklist at least two weeks in advance of testing.
- B. Certificate of Compliance for painting system and procedures.
- C. Manufacturer's field reports following field checking of slide gates and appurtenances after installation and before equipment is placed in operation.
- D. Leakage test reports upon completion of field leakage tests.
- E. Provide fabrication, assembly, and installation drawings and manuals with dimensions. Include plans, elevations, and details of sections and connections to adjoining work.
- F. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages.
- G. Product Data - manufacturer's technical data, detail drawings, and installation instructions.
- H. Six copies of Operation and Maintenance Manuals.

1.4 QUALITY ASSURANCE

- A. Slide gates and appurtenances provided under this Section shall be the standard product in regular production by manufacturers whose products have proven reliable in similar

service. If required, the manufacturer shall furnish evidence of similar installations in satisfactory operation.

- B. All slide gates and related components shall be the product of one manufacturer.
- C. Field measurements
 - 1. Contractor shall verify size, location, and placement of slide gates prior to fabrication.
- D. Shop assembly
 - 1. Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments.
- E. The gate manufacturer's shop welds, welding procedures, and welders shall be qualified and certified in accordance with the requirements of the latest edition of ASME Section IX.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Slide gates shall be completely shop assembled to insure proper fit and adjustment of all parts. Slide gates shall be complete when shipped and the manufacturer shall use all due and customary care in preparing them for shipment to avoid damage in handling or in transit. Particular care shall be taken to see that parts are completely closed and locked in position before shipment.
- B. Deliver materials to the site to ensure uninterrupted progress of the Work.
- C. Store all slide gates and appurtenances off the ground in an approved enclosed shelter. Protect all materials from condensation and corrosion.
- D. Handle all slide gates and appurtenances with extreme care. Slide gates which are cracked, chipped, distorted or otherwise damaged or dropped will not be acceptable. Protect all threads, seats, and ends from damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide slide gates and appurtenances as manufactured by one of the following:
 - 1. Rodney Hunt Company, Orange, Massachusetts
 - 2. Or equal

2.2 MATERIALS

- A. Iron castings for frame, disc and guides, stem guides, floorstands and other items: ASTM A126, Class B
- B. Bronze castings for wedges, thrust nut, lift nut and coupling: ASTM B584, Alloy C86500
- C. Bronze for seat facings in frame and disc: ASTM B21, Alloy C46400
- D. Bronze tongue and guide liners: ASTM B98, Alloy C65500
- E. Stainless steel for stems and fasteners: ASTM A276, Type 316

- F. Bolts and studs embedded in concrete shall be Type 316 stainless steel.
- G. Gasket material and installation shall conform to manufacturer's recommendations.
- H. Materials used in the construction of the gates and appurtenances shall be the best suited for the application.
- I. Anchor bolts, nuts, and other fasteners furnished for connection of the equipment to the concrete structures shall be of Type 316 stainless steel. They shall be of ample size and strength for the purpose intended.

2.3 SLIDE GATES

- A. Slide gates shall be cast iron, fully bronze mounted, and will have side wedges for seating head conditions and side, top, and bottom wedges for unseating head conditions when the width of the gate exceeds 24 inches. Fabricated gates will not be accepted.
- B. Unless otherwise noted, slide gates shall conform in all respects to the latest edition of AWWA C501. All frames, discs, and guides shall conform to minimum AWWA C501 standards for tensile, compressive, and shear strength.
- C. Slide gates shall be designed to safely withstand conditions listed in Slide Gate Schedule with liberal safety factors used in the design of all the equipment. Working stresses will not exceed the lower value of one third of the yield strength or one fifth of the ultimate strength of the material. At a minimum, safety factors shall conform to those of AWWA C501.
- D. Provide each slide gate with a brass or Type 316 stainless steel nameplate. Nameplates shall be permanently fastened to the floorstands at the factory.
- E. Frame
 - 1. The frame shall be of cast iron, one-piece construction with mounting flange and rectangular opening as shown on the Drawings and specified herein.
 - 2. Contact surfaces of the frame shall be machined.
 - 3. The frame shall have machined dovetailed grooves on the front face into which bronze seat facings shall be driven and then machined.
 - 4. The back of the frame shall be machined for mounting on the concrete.
 - 5. Frames for slide gates, greater than 24 inches wide, subject to unseating heads will have integrally cast pads machined with keyways to receive top and bottom wedge seats.
- F. Disc
 - 1. The disc shall be of cast iron, one-piece construction, rectangular with integrally cast vertical and horizontal ribs. A reinforcing rib along each side shall be provided to insure rigidity between the side wedges. The recess on the backside of the disc shall be minimized, so that when the gate is acting as a weir, unnecessary vibration shall be reduced.
 - 2. The disc shall have machined dovetailed grooves on the seating face into which bronze seat facings shall be driven and then machined.

3. Wedge pads for side wedges and for top and bottom wedges, when required shall be cast integrally on the disc and then machined to receive the adjustable bronze wedges.
4. The disc shall have a tongue on each side extending the full length of the disc into a groove in the gate guides. These tongues shall be machined on all sides to maintain a maximum 1/16 inch clearance between the disc tongue and the gate guide groove. The disc tongue shall be bronze lined.
5. A heavily reinforced nut pocket shall be cast integrally on the vertical centerline and above the horizontal center and be of such shape to receive the square-backed thrust nut.

G. Guides

1. The guides shall be cast iron, one-piece, designed to withstand the total thrust due to the water pressure and the wedging action.
2. Guides shall be machined on contact surfaces and a groove shall be machined the entire length of the guide to allow a maximum 1/16 inch clearance between the disc tongue and the guide groove. The guide groove shall be bronze lined.
3. Guides shall be of such length as to retain and support at least one-half the disc in the full open position. Gates to open upward.
4. Guides shall be integrally cast with or attached to the frame with stainless steel studs and nuts and shall be dowelled to prevent any relative motion between the guides and the frame. Bronze wedge seats shall be securely attached to machined pads on the guides.

H. Wedges

1. Wedges shall be solid cast bronze, machined on contact surfaces.
2. Wedges shall be attached to the disc with studs and nuts and shall have adjusting screws with lock nuts.

I. Seat Facings

1. Seat facings shall be malleable extruded bronze of a composition which will increase in wearing ability with cold working.
2. The extruded seat facings shall fill and permanently lock in the machined dovetailed grooves when driven into place. Attaching pins and screws will not be allowed.
3. The installed seat facings shall be machined.

J. Stems

1. The operating stem shall be of a size to safely withstand, without buckling or distortion, the stresses induced by all operating forces.
2. The stem shall be designed by the manufacturer to transmit in compression at least 2-1/2 times the rated output of the operating mechanism with a 40 lb. effort on the crank or handwheel.
3. Stems of more than one section shall be joined by stainless steel couplings threaded and keyed to the stems.

4. Threaded and keyed couplings of the same size shall be interchangeable.
5. Manually operated, rising stem gates shall be provided with an adjustable stop collar on the stem above the floorstand lift nut.
6. Rising stems shall be furnished with a transparent plastic pipe stem cover with gate position markings on the pipe. Cover shall be of sufficient diameter and length to permit full travel of the threaded stem without obstruction.
7. Each slide gate shall be provided with a thrust nut for connecting the stem to the disc.
8. Provide dial position indicator on the gate.

K. Stem Guides

1. Stem guides shall be cast iron, bronze bushed, and mounted on cast iron brackets.
2. Stem guides shall be adjustable in two directions and shall be spaced at sufficient intervals to adequately support the stem.
3. Stem guide spacing shall not exceed 7 feet and shall not exceed an L/r ratio of 200.

L. Flush Bottom Closure

1. The flush bottom closure type of gate shall have a compressible resilient seal attached to the bottom of the disc (sliding member) with a stainless steel bar and fasteners.
2. The seal shall be of a specially extruded shape, and designed to accurately fit to the bottom rib of the disc.
3. The seal shall be shaped to produce a wide sealing area on a machined cast iron stop bar that is bolted to the gate frame to form a flush invert.
4. The differential sealing pressure of the resilient seal on the stop bar shall be variable by adjustment of the side wedges on the gate.

2.4 FLOOR STANDS

- A. Provide floor stand with foot wall bracket and with hand crank for manual operation.
- B. Floor stand shall be a crank operated type, and shall be provided with either single or double gear reduction depending upon the lifting capacity required. Provided a threaded cast bronze lift nut to engage the operating stem.
- C. Roller bearings will be provided above and below a flange on the operating nut to support both opening and closing thrusts.
- D. Floor stands shall operate the gates under the specified operating head with not greater than a 40 pound pull on the crank. Gears where required, shall be steel with machine-cut teeth designated for smooth operation. The stainless steel pinion shafts on crank operated floor stands, whether single or double ratio, shall be supported on tapered roller bearings or needle bearings. All components shall be totally enclosed in a cast iron case and cover. Positive mechanical seals shall be provided on the operating nut, and the pinion shaft shall exclude moisture and dirt as well as prevent leakage of lubricant out of the hoist. Lubricating fittings shall be provided for the lubrication of

all gears and bearings. Removable crank shall be designed for rough treatment and minimum weight.

- E. Floor stands shall include a high strength pedestal designed to position the input, shaft, or handwheel approximately 36 inches above the operating floor.
- F. Permanently attach or cast an arrow with the word “open” on the crank indicating the direction of rotation to open the gate.
- G. All manual operators shall turn right to close unless otherwise specified.
- H. Foot wall bracket shall be installed per manufacturer’s requirements and Contract Drawings.

2.5 FINISHES

A. Cleaning and Preparation

- 1. After assembly, surfaces shall be cleaned by blast cleaning in accordance with the requirements of the SSPC Specification listed in the Coating Schedule.
- 2. All surfaces shall be dry and free of grease before painting in conformance with the paint manufacturer's instructions.

B. Coating

- 1. The gate manufacturer shall be responsible for shop prime and finish painting of all gates and appurtenances supplied under this Section.
- 2. All coatings shall conform with VOC Emission Regulations in effect at the manufacturing location and at the project site to allow touch-up or recoating to be performed with the same products.
- 3. The number of coats, mil thickness and surface preparation shall be in accordance with the paint manufacturer's recommendations for the gates application, but in no case shall be less than the requirements in the following schedule.
- 4. Colors shall be manufacturer's standard, selected by the Owner, provided they are selected for ease of field touch-up and color match and are fade resistant. Colors shall be selected to provide contrast between the product and the prime coat, and between the prime coat and the finish coat, to insure uniform covering and coating thickness.
- 5. Coatings shall be applied after gate assembly and in accordance with the paint manufacturer's recommendations for thinning, technique and safety precautions.
- 6. Where required by application, the coating shall be approved for contact with drinking water by NSF, EPA, or other appropriate governing agencies.

- C. Touch-up coatings with same products in field after installation of gates to repair any blemishes or damage to manufacturer's coating system.

PART 3 EXECUTION

3.1 PREPARATION

- A. Coordinate exact dimensions of slide gate openings required for proper installation of gates assemblies with slide gate manufacturer.

- B. Repairs required to concrete surfaces as a result of the execution of the Work shall be made in a manner satisfactory to the Engineer at no additional cost to the Owner. No repair work shall commence until the Contractor has received Engineer's approval of proposed methods and materials.

3.2 INSTALLATION

- A. Demolish the existing slide gate and cut the low-level outlet pipe flush with the upstream face, as necessary to allow the new slide gate to operate.
- B. Install all slide gate and appurtenances in accordance with manufacturer's printed installation manual. Use extreme care in the handling, storage and installation of all equipment to prevent damage or distortion and insure proper performance.
- C. Between the frame and the existing concrete walls, place a 1 inch thick grout pad to reduce any irregularities on the surface of the existing concrete wall.
- D. Set anchor bolts in accordance with manufacturer's approved drawings.
- E. Frames and guides shall be installed in a true vertical plane and shall be installed with ninety degree corners.
- F. Install identifying and operating labels and/or tags permanently attached to equipment.
- G. Final Checks Before Startup: Perform the following preventive maintenance operations and checks before startup:
 - 1. Remove covers from grease-lubrication-type bearings, flush bearings with kerosene, and thoroughly clean. Fill with new lubricant according to manufacturer's recommendations.
 - 2. Check that stems are free to rotate by hand. Do not operate if bound or dragging slightly, until cause of trouble is determined and corrected.
 - 3. Test and adjust gate operation and tolerances. Replace damaged and malfunctioning equipment.
- H. Apply anti-seize compound, such as Never-Seez or approved equal, to all fasteners.

3.3 FIELD QUALITY CONTROL

- A. Site Tests
 - 1. Adjust all parts and components as required to provide proper operation.
 - 2. Field Tests - Conduct field test of each slide gate in presence of Engineer to demonstrate that each part and all components together function correctly. Test all slide gates in an approved manner in the presence of Engineer for water leakage under a seating head. Under these seating head conditions, the leakage shall not exceed 0.1 gpm per foot of periphery for seating heads up to 50 feet, and for unseating heads up to 30 feet. Slide gates which exceed the maximum leakage specified shall be modified and retested until compliance with specified requirements can be demonstrated. Provide all testing equipment required.
 - 3. The manufacturer shall notify the Engineer a minimum of 2 weeks prior to the shop test. If the Engineer is unable to attend the shop test, the manufacture shall video tape the test, if requested by the Engineer, and send a copy of the video to

the Engineer. In addition, the manufacturer shall provide test results to the Engineer.

B. Manufacturer’s Service

1. Provide the services of a qualified, factory trained representative of the manufacturer to check and approve the installation before it is placed in operation.
2. The field service representative shall be a full-time employee of the manufacturer and shall have at least 5 years experience in the type of slide gate equipment furnished under these Specifications. Manufacturer's agents will not be allowed to perform field service requirements.
3. Manufacturer's representative shall provide a minimum of 4 hours on-site instruction to the Owner's personnel in the operation, care and maintenance of the gates and appurtenances.

3.4 SLIDE GATE SCHEDULE

Quantity	1
Size	24” x 24”
Wall Fitting/Installation	Mount to concrete face
Design Seating Head:	15.0 Feet
Design Unseating Head	17.0 Feet
Type of Operation	Manual - Hand Crank
Type of Hoisting Mechanism	Crank-operated floor stand
Dial Position Indicator	Yes
Clear Plastic Stem Cover	Yes
Remarks	Gates to open upward

END OF SECTION

APPENDIX A – SEDIMENT SAMPLING DATA



Friday, August 26, 2022

Attn: Nick Granata
Tighe & Bond
213 Court St, Suite 1100
Middletown, CT 06457

Project ID: BRUSH RESERVOIR DAM
SDG ID: GCL98794
Sample ID#s: CL98794 - CL98797

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

Enclosed are revised Analysis Report pages. Please replace and discard the original pages. If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style with a large initial "P".

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

August 26, 2022

SDG I.D.: GCL98794

Project ID: BRUSH RESERVOIR DAM

Client Id	Lab Id	Matrix
SED-2	CL98794	SOIL
SED-3	CL98795	SOIL
SED-1	CL98796	SOIL
TOE-1	CL98797	SOIL



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 26, 2022

FOR: Attn: Nick Granata
 Tighe & Bond
 213 Court St, Suite 1100
 Middletown, CT 06457

Sample Information

Matrix: SOIL
 Location Code: TIGHE
 Rush Request: Standard
 P.O.#: 10-1000-195

Custody Information

Collected by:
 Received by: CP
 Analyzed by: see "By" below

Date

08/05/22
 08/05/22

Time

9:55
 14:36

Laboratory Data

SDG ID: GCL98794
 Phoenix ID: CL98794

Project ID: BRUSH RESERVOIR DAM
 Client ID: SED-2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.62	0.62	mg/Kg	1	08/11/22	EK	SW6010D
Arsenic	7.3	1.2	mg/Kg	1	08/11/22	EK	SW6010D
Barium	241	0.62	mg/Kg	1	08/11/22	EK	SW6010D
Cadmium	< 0.62	0.62	mg/Kg	1	08/11/22	EK	SW6010D
Chromium	57.3	0.62	mg/Kg	1	08/11/22	EK	SW6010D
Mercury	0.14	0.05	mg/Kg	2	08/10/22	IE	SW7471B
Lead	75.1	0.62	mg/Kg	1	08/11/22	EK	SW6010D
Selenium	< 2.5	2.5	mg/Kg	1	08/11/22	EK	SW6010D
SPLP Lead	< 0.010	0.010	mg/L	1	08/23/22	CPP	SW6010D
TCLP Silver	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Arsenic	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Barium	0.66	0.01	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Cadmium	< 0.005	0.005	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Chromium	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Mercury	< 0.0002	0.0002	mg/L	1	08/08/22	IE	SW846 1311/7470
TCLP Lead	0.042	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Selenium	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010D
SPLP Metals Digestion	Completed				08/22/22	AB/AB	SW3010A
TCLP Metals Digestion	Completed				08/06/22	AB/AB	SW3005A
Percent Solid	47		%		08/05/22	K	SW846-%Solid
Conductivity - Soil Matrix	522	5	umhos/cm	1	08/08/22	PK	SW9050A
Corrosivity	Negative		Pos/Neg	1	08/05/22	'K/JW/AK	SW846-Corr
Flash Point	>200	200	Degree F	1	08/10/22	G	SW1010B
Ignitability	Passed	140	degree F	1	08/10/22	G	SW846-Ignit
pH at 25C - Soil	5.64	1.00	pH Units	1	08/05/22 22:00	'K/JW/AK	SW846 9045D
Reactivity Cyanide	< 11	11	mg/Kg	1	08/10/22	DK/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/10/22	DK/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/10/22	DK/GD	SW846-React

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Soil Extraction for Pesticide	Completed				08/05/22	B/Q	SW3545A
Field Extraction	Completed				08/05/22		SW5035A
Mercury Digestion	Completed				08/10/22	KL/KL	SW7471B
Extraction of ETPH	Completed				08/05/22	B/P/MO	SW3546
Soil Extraction for SVOA	Completed				08/05/22	P/A	SW3546
Paint Filter Test	Passed		PASS/FAIL		08/05/22	O	SW9095B
Extraction for PCB	Completed				08/09/22	R/JDW/Q	SW3540C
SPLP Extraction for Metals	Completed				08/19/22	AB	SW1312
SPLP Extraction for Organics	Completed				08/19/22	AB	SW1312
SPLP Pesticides Ext.	Completed				08/23/22	B/T	SW3510C
TCLP Digestion Mercury	Completed				08/06/22	AB/AB	SW7470A
TCLP Extraction for Metals	Completed				08/05/22	AB	SW1311
Total Metals Digest	Completed				08/05/22	L/AG	SW3050B

TPH by GC (Extractable Products)

Ext. Petroleum H.C. (C9-C36)	ND	130	mg/Kg	1	08/08/22	JRB	CTETPH 8015D
Identification	ND		mg/Kg	1	08/08/22	JRB	CTETPH 8015D

QA/QC Surrogates

% COD (surr)	83		%	1	08/08/22	JRB	50 - 150 %
% Terphenyl (surr)	89		%	1	08/08/22	JRB	50 - 150 %

PCB (Soxhlet SW3540C)

PCB-1016	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1221	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1232	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1242	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1248	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1254	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1260	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1262	ND	690	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1268	ND	690	ug/Kg	10	08/10/22	SC	SW8082A

QA/QC Surrogates

% DCBP	61		%	10	08/10/22	SC	30 - 150 %
% DCBP (Confirmation)	57		%	10	08/10/22	SC	30 - 150 %
% TCMX	55		%	10	08/10/22	SC	30 - 150 %
% TCMX (Confirmation)	57		%	10	08/10/22	SC	30 - 150 %

Pesticides

4,4' -DDD	19	14	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDE	12	2.8	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDT	ND	2.8	ug/Kg	2	08/08/22	AW	SW8081B
a-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Alachlor	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Aldrin	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
b-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Chlordane	ND	28	ug/Kg	2	08/08/22	AW	SW8081B
d-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Dieldrin	ND	7.0	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan I	ND	14	ug/Kg	2	08/08/22	AW	SW8081B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Endosulfan II	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan sulfate	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Endrin	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Endrin aldehyde	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Endrin ketone	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
g-BHC	ND	2.8	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor	ND	7.0	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor epoxide	ND	14	ug/Kg	2	08/08/22	AW	SW8081B
Methoxychlor	ND	70	ug/Kg	2	08/08/22	AW	SW8081B
Toxaphene	ND	280	ug/Kg	2	08/08/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
% DCBP	32		%	2	08/08/22	AW	30 - 150 %
% DCBP (Confirmation)	33		%	2	08/08/22	AW	30 - 150 %
% TCMX	42		%	2	08/08/22	AW	30 - 150 %
% TCMX (Confirmation)	42		%	2	08/08/22	AW	30 - 150 %
<u>SPLP Pesticides</u>							
4,4' -DDD	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
4,4' -DDE	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
4,4' -DDT	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
a-BHC	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Alachlor	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Aldrin	ND	0.003	ug/L	1	08/25/22	AW	SW8081B
b-BHC	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Chlordane	ND	0.050	ug/L	1	08/25/22	AW	SW8081B
d-BHC	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Dieldrin	ND	0.002	ug/L	1	08/25/22	AW	SW8081B
Endosulfan I	ND	0.020	ug/L	1	08/25/22	AW	SW8081B
Endosulfan II	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Endosulfan sulfate	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Endrin	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Endrin aldehyde	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Endrin Ketone	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
g-BHC	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Heptachlor	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Heptachlor epoxide	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Methoxychlor	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Toxaphene	ND	0.20	ug/L	1	08/25/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
%DCBP (Surrogate Rec)	95		%	1	08/25/22	AW	30 - 150 %
%DCBP (Surrogate Rec) (Confirmation)	63		%	1	08/25/22	AW	30 - 150 %
%TCMX (Surrogate Rec)	90		%	1	08/25/22	AW	30 - 150 %
%TCMX (Surrogate Rec) (Confirmation)	69		%	1	08/25/22	AW	30 - 150 %
<u>Volatiles</u>							
1,1,1,2-Tetrachloroethane	ND	20	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,1-Trichloroethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	10	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,2-Trichloroethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,1-Dichloroethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,1-Dichloroethene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,1-Dichloropropene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,3-Trichloropropane	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dibromoethane	ND	2.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dichlorobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,2-Dichloroethane	ND	20	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dichloropropane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,3-Dichlorobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
1,3-Dichloropropane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
1,4-Dichlorobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
2,2-Dichloropropane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
2-Chlorotoluene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
2-Hexanone	ND	110	ug/Kg	1	08/06/22	JLI	SW8260C
2-Isopropyltoluene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
4-Chlorotoluene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
4-Methyl-2-pentanone	ND	110	ug/Kg	1	08/06/22	JLI	SW8260C
Acetone	ND	1100	ug/Kg	1	08/06/22	JLI	SW8260C
Acrylonitrile	ND	10	ug/Kg	1	08/06/22	JLI	SW8260C
Benzene	ND	20	ug/Kg	1	08/06/22	JLI	SW8260C
Bromobenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
Bromochloromethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Bromodichloromethane	ND	20	ug/Kg	1	08/06/22	JLI	SW8260C
Bromoform	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Bromomethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Carbon Disulfide	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Carbon tetrachloride	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Chlorobenzene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Chloroethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Chloroform	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Chloromethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
cis-1,2-Dichloroethene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
cis-1,3-Dichloropropene	ND	10	ug/Kg	1	08/06/22	JLI	SW8260C
Dibromochloromethane	ND	10	ug/Kg	1	08/06/22	JLI	SW8260C
Dibromomethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Dichlorodifluoromethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Ethylbenzene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Hexachlorobutadiene	ND	200	ug/Kg	50	08/08/22	JLI	SW8260C
Isopropylbenzene	ND	500	ug/Kg	50	08/08/22	JLI	SW8260C
m&p-Xylene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Methyl Ethyl Ketone	ND	130	ug/Kg	1	08/06/22	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	42	ug/Kg	1	08/06/22	JLI	SW8260C
Methylene chloride	ND	42	ug/Kg	1	08/06/22	JLI	SW8260C
Naphthalene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
n-Butylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
n-Propylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
o-Xylene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
p-Isopropyltoluene	ND	500	ug/Kg	50	08/08/22	JLI	SW8260C
sec-Butylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
Styrene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
tert-Butylbenzene	ND	950	ug/Kg	50	08/08/22	JLI	SW8260C
Tetrachloroethene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Tetrahydrofuran (THF)	ND	42	ug/Kg	1	08/06/22	JLI	SW8260C
Toluene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Total Xylenes	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,2-Dichloroethene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,3-Dichloropropene	ND	10	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	1900	ug/Kg	50	08/08/22	JLI	SW8260C
Trichloroethene	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Trichlorofluoromethane	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
Trichlorotrifluoroethane	ND	42	ug/Kg	1	08/06/22	JLI	SW8260C
Vinyl chloride	ND	21	ug/Kg	1	08/06/22	JLI	SW8260C
<u>QA/QC Surrogates</u>							
% 1,2-dichlorobenzene-d4	94		%	1	08/06/22	JLI	70 - 130 %
% Bromofluorobenzene	85		%	1	08/06/22	JLI	70 - 130 %
% Dibromofluoromethane	97		%	1	08/06/22	JLI	70 - 130 %
% Toluene-d8	98		%	1	08/06/22	JLI	70 - 130 %
% 1,2-dichlorobenzene-d4 (50x)	101		%	50	08/08/22	JLI	70 - 130 %
% Bromofluorobenzene (50x)	95		%	50	08/08/22	JLI	70 - 130 %
% Dibromofluoromethane (50x)	95		%	50	08/08/22	JLI	70 - 130 %
% Toluene-d8 (50x)	97		%	50	08/08/22	JLI	70 - 130 %
<u>Semivolatiles</u>							
1,2,4,5-Tetrachlorobenzene	ND	100	ug/Kg	1	08/06/22	WB	SW8270D
1,2,4-Trichlorobenzene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Dichlorobenzene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Diphenylhydrazine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
1,3-Dichlorobenzene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
1,4-Dichlorobenzene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2,2'-Oxybis(1-Chloropropane)	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2,4,5-Trichlorophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2,4,6-Trichlorophenol	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dichlorophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dimethylphenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrophenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,6-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2-Chloronaphthalene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2-Chlorophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylnaphthalene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylphenol (o-cresol)	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitrophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
3,3'-Dichlorobenzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
3-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4,6-Dinitro-2-methylphenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Bromophenyl phenyl ether	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloro-3-methylphenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloroaniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
4-Chlorophenyl phenyl ether	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitrophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthylene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Acetophenone	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Aniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Anthracene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benz(a)anthracene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benzdine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(a)pyrene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(b)fluoranthene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(ghi)perylene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(k)fluoranthene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Benzoic acid	ND	1400	ug/Kg	1	08/06/22	WB	SW8270D
Benzyl butyl phthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethoxy)methane	ND	420	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethyl)ether	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-ethylhexyl)phthalate	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
Carbazole	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Chrysene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Dibenz(a,h)anthracene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Dibenzofuran	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Diethyl phthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Dimethylphthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-butylphthalate	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-octylphthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Fluoranthene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Fluorene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobenzene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobutadiene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorocyclopentadiene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Hexachloroethane	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Indeno(1,2,3-cd)pyrene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Isophorone	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Naphthalene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Nitrobenzene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodimethylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodi-n-propylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodiphenylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Pentachloronitrobenzene	ND	140	ug/Kg	1	08/06/22	WB	SW8270D
Pentachlorophenol	ND	700	ug/Kg	1	08/06/22	WB	SW8270D
Phenanthrene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Phenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Pyrene	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Pyridine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
<u>QA/QC Surrogates</u>							
% 2,4,6-Tribromophenol	100		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorobiphenyl	77		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorophenol	58		%	1	08/06/22	WB	30 - 130 %
% Nitrobenzene-d5	79		%	1	08/06/22	WB	30 - 130 %
% Phenol-d5	77		%	1	08/06/22	WB	30 - 130 %
% Terphenyl-d14	74		%	1	08/06/22	WB	30 - 130 %

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Paint Filter Test:
Pass = no free liquids were detected. Fail = free liquids were detected.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediatly. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Volatile Comment:
There was a suppression of the last internal standard in the low level analysis, all affected compounds are reported from the methanol preserved high level analysis which did not exhibit this interference.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.
If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.


Phyllis Shiller, Laboratory Director
August 26, 2022
Reviewed and Released by: Sarah Bell, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 26, 2022

FOR: Attn: Nick Granata
 Tighe & Bond
 213 Court St, Suite 1100
 Middletown, CT 06457

Sample Information

Matrix: SOIL
 Location Code: TIGHE
 Rush Request: Standard
 P.O.#: 10-1000-195

Custody Information

Collected by:
 Received by: CP
 Analyzed by: see "By" below

Date

08/05/22
 08/05/22

Time

9:00
 14:36

Laboratory Data

SDG ID: GCL98794
 Phoenix ID: CL98795

Project ID: BRUSH RESERVOIR DAM
 Client ID: SED-3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.47	0.47	mg/Kg	1	08/11/22	EK	SW6010D
Arsenic	2.98	0.94	mg/Kg	1	08/11/22	EK	SW6010D
Barium	138	0.47	mg/Kg	1	08/11/22	EK	SW6010D
Cadmium	< 0.47	0.47	mg/Kg	1	08/11/22	EK	SW6010D
Chromium	36.2	0.47	mg/Kg	1	08/11/22	EK	SW6010D
Mercury	0.05	0.04	mg/Kg	2	08/10/22	IE	SW7471B
Lead	20.0	0.47	mg/Kg	1	08/11/22	EK	SW6010D
Selenium	< 1.9	1.9	mg/Kg	1	08/11/22	EK	SW6010D
TCLP Silver	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Arsenic	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Barium	0.54	0.01	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Cadmium	< 0.005	0.005	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Chromium	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Mercury	< 0.0002	0.0002	mg/L	1	08/08/22	IE	SW846 1311/7470
TCLP Lead	0.014	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Selenium	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010D
TCLP Metals Digestion	Completed				08/06/22	AB/AB	SW3005A
Percent Solid	67		%		08/05/22	K	SW846-%Solid
Conductivity - Soil Matrix	168	5	umhos/cm	1	08/08/22	PK	SW9050A
Corrosivity	Negative		Pos/Neg	1	08/05/22	'K/JW/AK	SW846-Corr
Flash Point	>200	200	Degree F	1	08/10/22	G	SW1010B
Ignitability	Passed	140	degree F	1	08/10/22	G	SW846-Ignit
pH at 25C - Soil	5.56	1.00	pH Units	1	08/05/22 22:00	'K/JW/AK	SW846 9045D
Reactivity Cyanide	< 7	7	mg/Kg	1	08/10/22	DK/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/10/22	DK/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/10/22	DK/GD	SW846-React
Soil Extraction for Pesticide	Completed				08/09/22	O/MO	SW3545A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Field Extraction	Completed				08/05/22		SW5035A
Mercury Digestion	Completed				08/10/22	KL/KL	SW7471B
Extraction of ETPH	Completed				08/05/22	B/P/MO	SW3546
Soil Extraction for SVOA	Completed				08/05/22	P/A	SW3546
Paint Filter Test	Passed		PASS/FAIL		08/05/22	O	SW9095B
Extraction for PCB	Completed				08/09/22	R/JDW/Q	SW3540C
TCLP Digestion Mercury	Completed				08/06/22	AB/AB	SW7470A
TCLP Extraction for Metals	Completed				08/05/22	AB	SW1311
Total Metals Digest	Completed				08/05/22	L/AG	SW3050B

TPH by GC (Extractable Products)

Ext. Petroleum H.C. (C9-C36)	ND	93	mg/Kg	1	08/08/22	JRB	CTETPH 8015D
Identification	ND		mg/Kg	1	08/08/22	JRB	CTETPH 8015D

QA/QC Surrogates

% COD (surr)	85		%	1	08/08/22	JRB	50 - 150 %
% Terphenyl (surr)	93		%	1	08/08/22	JRB	50 - 150 %

PCB (Soxhlet SW3540C)

PCB-1016	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1221	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1232	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1242	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1248	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1254	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1260	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1262	ND	490	ug/Kg	10	08/09/22	SC	SW8082A
PCB-1268	ND	490	ug/Kg	10	08/09/22	SC	SW8082A

QA/QC Surrogates

% DCBP	71		%	10	08/09/22	SC	30 - 150 %
% DCBP (Confirmation)	77		%	10	08/09/22	SC	30 - 150 %
% TCMX	31		%	10	08/09/22	SC	30 - 150 %
% TCMX (Confirmation)	30		%	10	08/09/22	SC	30 - 150 %

Pesticides

4,4' -DDD	6.0	2.0	ug/Kg	2	08/11/22	AW	SW8081B
4,4' -DDE	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
4,4' -DDT	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
a-BHC	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
Alachlor	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Aldrin	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
b-BHC	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
Chlordane	ND	5.0	ug/Kg	2	08/11/22	AW	SW8081B
d-BHC	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
Dieldrin	ND	5.0	ug/Kg	2	08/11/22	AW	SW8081B
Endosulfan I	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Endosulfan II	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Endosulfan sulfate	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Endrin	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Endrin aldehyde	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Endrin ketone	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
g-BHC	ND	2.0	ug/Kg	2	08/11/22	AW	SW8081B
Heptachlor	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Heptachlor epoxide	ND	9.9	ug/Kg	2	08/11/22	AW	SW8081B
Methoxychlor	ND	50	ug/Kg	2	08/11/22	AW	SW8081B
Toxaphene	ND	200	ug/Kg	2	08/11/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
% DCBP	30		%	2	08/11/22	AW	30 - 150 %
% DCBP (Confirmation)	50		%	2	08/11/22	AW	30 - 150 %
% TCMX	43		%	2	08/11/22	AW	30 - 150 %
% TCMX (Confirmation)	50		%	2	08/11/22	AW	30 - 150 %
<u>Volatiles</u>							
1,1,1,2-Tetrachloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,1,1-Trichloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,1,2,2-Tetrachloroethane	ND	4.9	ug/Kg	1	08/06/22	PS	SW8260C
1,1,2-Trichloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,1-Dichloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,1-Dichloroethene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,1-Dichloropropene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2,3-Trichlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2,3-Trichloropropane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2,4-Trichlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2,4-Trimethylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	08/06/22	PS	SW8260C
1,2-Dibromoethane	ND	0.82	ug/Kg	1	08/06/22	PS	SW8260C
1,2-Dichlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2-Dichloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,2-Dichloropropane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,3,5-Trimethylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,3-Dichlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,3-Dichloropropane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
1,4-Dichlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
2,2-Dichloropropane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
2-Chlorotoluene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
2-Hexanone	ND	41	ug/Kg	1	08/06/22	PS	SW8260C
2-Isopropyltoluene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
4-Chlorotoluene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
4-Methyl-2-pentanone	ND	41	ug/Kg	1	08/06/22	PS	SW8260C
Acetone	ND	410	ug/Kg	1	08/06/22	PS	SW8260C
Acrylonitrile	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Benzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Bromobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Bromochloromethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Bromodichloromethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Bromoform	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Bromomethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Carbon Disulfide	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Carbon tetrachloride	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Chlorobenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Chloroethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chloroform	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Chloromethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
cis-1,2-Dichloroethene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
cis-1,3-Dichloropropene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Dibromochloromethane	ND	4.9	ug/Kg	1	08/06/22	PS	SW8260C
Dibromomethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Dichlorodifluoromethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Ethylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Hexachlorobutadiene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Isopropylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
m&p-Xylene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Methyl Ethyl Ketone	ND	57	ug/Kg	1	08/06/22	PS	SW8260C
Methyl t-butyl ether (MTBE)	ND	16	ug/Kg	1	08/06/22	PS	SW8260C
Methylene chloride	ND	16	ug/Kg	1	08/06/22	PS	SW8260C
Naphthalene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
n-Butylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
n-Propylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
o-Xylene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
p-Isopropyltoluene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
sec-Butylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Styrene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
tert-Butylbenzene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Tetrachloroethene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Tetrahydrofuran (THF)	ND	16	ug/Kg	1	08/06/22	PS	SW8260C
Toluene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Total Xylenes	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
trans-1,2-Dichloroethene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
trans-1,3-Dichloropropene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
trans-1,4-dichloro-2-butene	ND	16	ug/Kg	1	08/06/22	PS	SW8260C
Trichloroethene	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Trichlorofluoromethane	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
Trichlorotrifluoroethane	ND	16	ug/Kg	1	08/06/22	PS	SW8260C
Vinyl chloride	ND	8.2	ug/Kg	1	08/06/22	PS	SW8260C
<u>QA/QC Surrogates</u>							
% 1,2-dichlorobenzene-d4	95		%	1	08/06/22	PS	70 - 130 %
% Bromofluorobenzene	75		%	1	08/06/22	PS	70 - 130 %
% Dibromofluoromethane	103		%	1	08/06/22	PS	70 - 130 %
% Toluene-d8	92		%	1	08/06/22	PS	70 - 130 %
<u>Semivolatiles</u>							
1,2,4,5-Tetrachlorobenzene	ND	100	ug/Kg	1	08/06/22	WB	SW8270D
1,2,4-Trichlorobenzene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Dichlorobenzene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Diphenylhydrazine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
1,3-Dichlorobenzene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
1,4-Dichlorobenzene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2,2'-Oxybis(1-Chloropropane)	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2,4,5-Trichlorophenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2,4,6-Trichlorophenol	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dichlorophenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2,4-Dimethylphenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrophenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,6-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2-Chloronaphthalene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2-Chlorophenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylnaphthalene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylphenol (o-cresol)	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitrophenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
3,3'-Dichlorobenzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
3-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4,6-Dinitro-2-methylphenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Bromophenyl phenyl ether	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloro-3-methylphenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloroaniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
4-Chlorophenyl phenyl ether	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitrophenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthylene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Acetophenone	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Aniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Anthracene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benz(a)anthracene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(a)pyrene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(b)fluoranthene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(ghi)perylene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(k)fluoranthene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Benzoic acid	ND	980	ug/Kg	1	08/06/22	WB	SW8270D
Benzyl butyl phthalate	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethoxy)methane	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethyl)ether	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-ethylhexyl)phthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Carbazole	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Chrysene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Dibenz(a,h)anthracene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Dibenzofuran	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Diethyl phthalate	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Dimethylphthalate	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-butylphthalate	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-octylphthalate	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Fluoranthene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Fluorene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobenzene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobutadiene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorocyclopentadiene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Hexachloroethane	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Indeno(1,2,3-cd)pyrene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Isophorone	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Naphthalene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Nitrobenzene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodimethylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodi-n-propylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodiphenylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Pentachloronitrobenzene	ND	140	ug/Kg	1	08/06/22	WB	SW8270D
Pentachlorophenol	ND	490	ug/Kg	1	08/06/22	WB	SW8270D
Phenanthrene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Phenol	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Pyrene	ND	340	ug/Kg	1	08/06/22	WB	SW8270D
Pyridine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
<u>QA/QC Surrogates</u>							
% 2,4,6-Tribromophenol	110		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorobiphenyl	77		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorophenol	60		%	1	08/06/22	WB	30 - 130 %
% Nitrobenzene-d5	83		%	1	08/06/22	WB	30 - 130 %
% Phenol-d5	79		%	1	08/06/22	WB	30 - 130 %
% Terphenyl-d14	71		%	1	08/06/22	WB	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Paint Filter Test:

Pass = no free liquids were detected. Fail = free liquids were detected.

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediatly. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

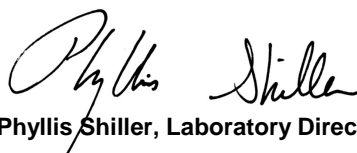
Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Volatile Comment:

There was a suppression of the last internal standard in the low level analysis, all affected compounds are reported from the methanol preserved high level analysis which did not exhibit this interference.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director

August 26, 2022

Reviewed and Released by: Sarah Bell, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 26, 2022

FOR: Attn: Nick Granata
 Tighe & Bond
 213 Court St, Suite 1100
 Middletown, CT 06457

Sample Information

Matrix: SOIL
 Location Code: TIGHE
 Rush Request: Standard
 P.O.#: 10-1000-195

Custody Information

Collected by:
 Received by: CP
 Analyzed by: see "By" below

Date

08/05/22
 08/05/22

Time

9:26
 14:36

Laboratory Data

SDG ID: GCL98794
 Phoenix ID: CL98796

Project ID: BRUSH RESERVOIR DAM
 Client ID: SED-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.61	0.61	mg/Kg	1	08/11/22	EK	SW6010D
Arsenic	5.5	1.2	mg/Kg	1	08/11/22	EK	SW6010D
Barium	224	0.61	mg/Kg	1	08/11/22	EK	SW6010D
Cadmium	< 0.61	0.61	mg/Kg	1	08/11/22	EK	SW6010D
Chromium	59.0	0.61	mg/Kg	1	08/11/22	EK	SW6010D
Mercury	0.15	0.05	mg/Kg	2	08/10/22	IE	SW7471B
Lead	49.3	0.61	mg/Kg	1	08/11/22	EK	SW6010D
Selenium	< 2.4	2.4	mg/Kg	1	08/11/22	EK	SW6010D
SPLP Lead	< 0.010	0.010	mg/L	1	08/23/22	CPP	SW6010D
TCLP Silver	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Arsenic	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Barium	0.50	0.01	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Cadmium	< 0.005	0.005	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Chromium	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Mercury	< 0.0002	0.0002	mg/L	1	08/08/22	IE	SW846 1311/7470
TCLP Lead	0.037	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Selenium	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010D
SPLP Metals Digestion	Completed				08/22/22	AB/AB	SW3010A
TCLP Metals Digestion	Completed				08/06/22	AB/AB	SW3005A
Percent Solid	50		%		08/05/22	K	SW846-%Solid
Conductivity - Soil Matrix	448	5	umhos/cm	1	08/08/22	PK	SW9050A
Corrosivity	Negative		Pos/Neg	1	08/05/22	'K/JW/AK	SW846-Corr
Flash Point	>200	200	Degree F	1	08/10/22	G	SW1010B
Ignitability	Passed	140	degree F	1	08/10/22	G	SW846-Ignit
pH at 25C - Soil	6.17	1.00	pH Units	1	08/05/22 22:00	'K/JW/AK	SW846 9045D
Reactivity Cyanide	< 9	9	mg/Kg	1	08/10/22	DK/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/10/22	DK/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/10/22	DK/GD	SW846-React

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Soil Extraction for Pesticide	Completed				08/05/22	B/MO	SW3545A
Field Extraction	Completed				08/05/22		SW5035A
Mercury Digestion	Completed				08/10/22	KL/KL	SW7471B
Extraction of ETPH	Completed				08/05/22	B/P/MO	SW3546
Soil Extraction for SVOA	Completed				08/05/22	P/A	SW3546
Paint Filter Test	Passed		PASS/FAIL		08/05/22	O	SW9095B
Extraction for PCB	Completed				08/09/22	R/JDW/Q	SW3540C
SPLP Extraction for Metals	Completed				08/19/22	AB	SW1312
SPLP Extraction for Organics	Completed				08/19/22	AB	SW1312
SPLP Pesticides Ext.	Completed				08/23/22	B/T	SW3510C
TCLP Digestion Mercury	Completed				08/06/22	AB/AB	SW7470A
TCLP Extraction for Metals	Completed				08/05/22	AB	SW1311
Total Metals Digest	Completed				08/05/22	L/AG	SW3050B

TPH by GC (Extractable Products)

Ext. Petroleum H.C. (C9-C36)	ND	120	mg/Kg	1	08/09/22	JRB	CTETPH 8015D
Identification	ND		mg/Kg	1	08/09/22	JRB	CTETPH 8015D

QA/QC Surrogates

% COD (surr)	69		%	1	08/09/22	JRB	50 - 150 %
% Terphenyl (surr)	77		%	1	08/09/22	JRB	50 - 150 %

PCB (Soxhlet SW3540C)

PCB-1016	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1221	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1232	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1242	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1248	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1254	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1260	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1262	ND	650	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1268	ND	650	ug/Kg	10	08/10/22	SC	SW8082A

QA/QC Surrogates

% DCBP	73		%	10	08/10/22	SC	30 - 150 %
% DCBP (Confirmation)	79		%	10	08/10/22	SC	30 - 150 %
% TCMX	78		%	10	08/10/22	SC	30 - 150 %
% TCMX (Confirmation)	79		%	10	08/10/22	SC	30 - 150 %

Pesticides

4,4' -DDD	20	13	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDE	11	2.6	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDT	ND	2.6	ug/Kg	2	08/08/22	AW	SW8081B
a-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Alachlor	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Aldrin	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
b-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Chlordane	ND	65	ug/Kg	2	08/08/22	AW	SW8081B
d-BHC	ND	2.0	ug/Kg	2	08/08/22	AW	SW8081B
Dieldrin	ND	6.5	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan I	ND	13	ug/Kg	2	08/08/22	AW	SW8081B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Endosulfan II	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan sulfate	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Endrin	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Endrin aldehyde	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Endrin ketone	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
g-BHC	ND	2.6	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor	ND	6.5	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor epoxide	ND	13	ug/Kg	2	08/08/22	AW	SW8081B
Methoxychlor	ND	65	ug/Kg	2	08/08/22	AW	SW8081B
Toxaphene	ND	260	ug/Kg	2	08/08/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
% DCBP	58		%	2	08/08/22	AW	30 - 150 %
% DCBP (Confirmation)	46		%	2	08/08/22	AW	30 - 150 %
% TCMX	71		%	2	08/08/22	AW	30 - 150 %
% TCMX (Confirmation)	53		%	2	08/08/22	AW	30 - 150 %
<u>SPLP Pesticides</u>							
4,4' -DDD	ND	0.020	ug/L	1	08/25/22	AW	SW8081B
4,4' -DDE	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
4,4' -DDT	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
a-BHC	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Alachlor	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Aldrin	ND	0.003	ug/L	1	08/25/22	AW	SW8081B
b-BHC	ND	0.030	ug/L	1	08/25/22	AW	SW8081B
Chlordane	ND	0.050	ug/L	1	08/25/22	AW	SW8081B
d-BHC	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Dieldrin	ND	0.002	ug/L	1	08/25/22	AW	SW8081B
Endosulfan I	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Endosulfan II	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Endosulfan sulfate	ND	0.020	ug/L	1	08/25/22	AW	SW8081B
Endrin	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Endrin aldehyde	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Endrin Ketone	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
g-BHC	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Heptachlor	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Heptachlor epoxide	ND	0.005	ug/L	1	08/25/22	AW	SW8081B
Methoxychlor	ND	0.010	ug/L	1	08/25/22	AW	SW8081B
Toxaphene	ND	0.20	ug/L	1	08/25/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
%DCBP (Surrogate Rec)	41		%	1	08/25/22	AW	30 - 150 %
%DCBP (Surrogate Rec) (Confirmation)	38		%	1	08/25/22	AW	30 - 150 %
%TCMX (Surrogate Rec)	73		%	1	08/25/22	AW	30 - 150 %
%TCMX (Surrogate Rec) (Confirmation)	64		%	1	08/25/22	AW	30 - 150 %
<u>Volatiles</u>							
1,1,1,2-Tetrachloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,1-Trichloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	5.5	ug/Kg	1	08/06/22	JLI	SW8260C
1,1,2-Trichloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,1-Dichloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,1-Dichloroethene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,1-Dichloropropene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,3-Trichloropropane	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dibromoethane	ND	0.91	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dichlorobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,2-Dichloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,2-Dichloropropane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,3-Dichlorobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
1,3-Dichloropropane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
1,4-Dichlorobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
2,2-Dichloropropane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
2-Chlorotoluene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
2-Hexanone	ND	46	ug/Kg	1	08/06/22	JLI	SW8260C
2-Isopropyltoluene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
4-Chlorotoluene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
4-Methyl-2-pentanone	ND	46	ug/Kg	1	08/06/22	JLI	SW8260C
Acetone	ND	460	ug/Kg	1	08/06/22	JLI	SW8260C
Acrylonitrile	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Benzene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Bromobenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
Bromochloromethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Bromodichloromethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Bromoform	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Bromomethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Carbon Disulfide	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Carbon tetrachloride	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Chlorobenzene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Chloroethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Chloroform	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Chloromethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
cis-1,2-Dichloroethene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
cis-1,3-Dichloropropene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Dibromochloromethane	ND	5.5	ug/Kg	1	08/06/22	JLI	SW8260C
Dibromomethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Dichlorodifluoromethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Ethylbenzene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Hexachlorobutadiene	ND	200	ug/Kg	50	08/08/22	JLI	SW8260C
Isopropylbenzene	ND	500	ug/Kg	50	08/08/22	JLI	SW8260C
m&p-Xylene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Methyl Ethyl Ketone	ND	55	ug/Kg	1	08/06/22	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	18	ug/Kg	1	08/06/22	JLI	SW8260C
Methylene chloride	ND	18	ug/Kg	1	08/06/22	JLI	SW8260C
Naphthalene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
n-Butylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
n-Propylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
o-Xylene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
p-Isopropyltoluene	ND	500	ug/Kg	50	08/08/22	JLI	SW8260C
sec-Butylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
Styrene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
tert-Butylbenzene	ND	740	ug/Kg	50	08/08/22	JLI	SW8260C
Tetrachloroethene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Tetrahydrofuran (THF)	ND	18	ug/Kg	1	08/06/22	JLI	SW8260C
Toluene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Total Xylenes	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,2-Dichloroethene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,3-Dichloropropene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	1500	ug/Kg	50	08/08/22	JLI	SW8260C
Trichloroethene	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Trichlorofluoromethane	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
Trichlorotrifluoroethane	ND	18	ug/Kg	1	08/06/22	JLI	SW8260C
Vinyl chloride	ND	9.1	ug/Kg	1	08/06/22	JLI	SW8260C
<u>QA/QC Surrogates</u>							
% 1,2-dichlorobenzene-d4	94		%	1	08/06/22	JLI	70 - 130 %
% Bromofluorobenzene	73		%	1	08/06/22	JLI	70 - 130 %
% Dibromofluoromethane	104		%	1	08/06/22	JLI	70 - 130 %
% Toluene-d8	93		%	1	08/06/22	JLI	70 - 130 %
% 1,2-dichlorobenzene-d4 (50x)	102		%	50	08/08/22	JLI	70 - 130 %
% Bromofluorobenzene (50x)	96		%	50	08/08/22	JLI	70 - 130 %
% Dibromofluoromethane (50x)	94		%	50	08/08/22	JLI	70 - 130 %
% Toluene-d8 (50x)	96		%	50	08/08/22	JLI	70 - 130 %
<u>Semivolatiles</u>							
1,2,4,5-Tetrachlorobenzene	ND	100	ug/Kg	1	08/06/22	WB	SW8270D
1,2,4-Trichlorobenzene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Dichlorobenzene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Diphenylhydrazine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
1,3-Dichlorobenzene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
1,4-Dichlorobenzene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2,2'-Oxybis(1-Chloropropane)	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2,4,5-Trichlorophenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2,4,6-Trichlorophenol	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dichlorophenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dimethylphenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrophenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,6-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2-Chloronaphthalene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2-Chlorophenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylnaphthalene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylphenol (o-cresol)	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitrophenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
3,3'-Dichlorobenzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
3-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4,6-Dinitro-2-methylphenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Bromophenyl phenyl ether	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloro-3-methylphenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloroaniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
4-Chlorophenyl phenyl ether	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitrophenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthylene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Acetophenone	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Aniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Anthracene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benz(a)anthracene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benzdine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(a)pyrene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(b)fluoranthene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(ghi)perylene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(k)fluoranthene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Benzoic acid	ND	1300	ug/Kg	1	08/06/22	WB	SW8270D
Benzyl butyl phthalate	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethoxy)methane	ND	420	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethyl)ether	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-ethylhexyl)phthalate	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
Carbazole	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Chrysene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Dibenz(a,h)anthracene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Dibenzofuran	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Diethyl phthalate	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Dimethylphthalate	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-butylphthalate	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-octylphthalate	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Fluoranthene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Fluorene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobenzene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobutadiene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorocyclopentadiene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Hexachloroethane	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Indeno(1,2,3-cd)pyrene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Isophorone	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Naphthalene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Nitrobenzene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodimethylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodi-n-propylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodiphenylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Pentachloronitrobenzene	ND	140	ug/Kg	1	08/06/22	WB	SW8270D
Pentachlorophenol	ND	650	ug/Kg	1	08/06/22	WB	SW8270D
Phenanthrene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Phenol	ND	460	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Pyrene	ND	460	ug/Kg	1	08/06/22	WB	SW8270D
Pyridine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
<u>QA/QC Surrogates</u>							
% 2,4,6-Tribromophenol	105		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorobiphenyl	77		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorophenol	59		%	1	08/06/22	WB	30 - 130 %
% Nitrobenzene-d5	83		%	1	08/06/22	WB	30 - 130 %
% Phenol-d5	78		%	1	08/06/22	WB	30 - 130 %
% Terphenyl-d14	83		%	1	08/06/22	WB	30 - 130 %

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediately. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

Paint Filter Test:

Pass = no free liquids were detected. Fail = free liquids were detected.

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

Volatile Comment:

There was a suppression of the last internal standard in the low level analysis, all affected compounds are reported from the methanol preserved high level analysis which did not exhibit this interference.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director

August 26, 2022

Reviewed and Released by: Sarah Bell, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

August 26, 2022

FOR: Attn: Nick Granata
 Tighe & Bond
 213 Court St, Suite 1100
 Middletown, CT 06457

Sample Information

Matrix: SOIL
 Location Code: TIGHE
 Rush Request: Standard
 P.O.#: 10-1000-195

Custody Information

Collected by:
 Received by: CP
 Analyzed by: see "By" below

Date Time
 08/05/22 10:35
 08/05/22 14:36

Laboratory Data

SDG ID: GCL98794
 Phoenix ID: CL98797

Project ID: BRUSH RESERVOIR DAM
 Client ID: TOE-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Silver	< 0.37	0.37	mg/Kg	1	08/11/22	EK	SW6010D
Arsenic	1.15	0.73	mg/Kg	1	08/11/22	EK	SW6010D
Barium	70.2	0.37	mg/Kg	1	08/11/22	EK	SW6010D
Cadmium	< 0.37	0.37	mg/Kg	1	08/11/22	EK	SW6010D
Chromium	13.3	0.37	mg/Kg	1	08/11/22	EK	SW6010D
Mercury	< 0.03	0.03	mg/Kg	2	08/10/22	IE	SW7471B
Lead	4.69	0.37	mg/Kg	1	08/11/22	EK	SW6010D
Selenium	< 1.5	1.5	mg/Kg	1	08/11/22	EK	SW6010D
TCLP Silver	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Arsenic	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Barium	0.76	0.01	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Cadmium	< 0.005	0.005	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Chromium	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Mercury	< 0.0002	0.0002	mg/L	1	08/08/22	IE	SW846 1311/7470
TCLP Lead	< 0.010	0.010	mg/L	1	08/08/22	TH	SW846 1311/6010
TCLP Selenium	< 0.05	0.05	mg/L	1	08/08/22	TH	SW846 1311/6010D
TCLP Metals Digestion	Completed				08/06/22	AB/AB	SW3005A
Percent Solid	92		%		08/05/22	K	SW846-%Solid
Conductivity - Soil Matrix	90	5	umhos/cm	1	08/08/22	PK	SW9050A
Corrosivity	Negative		Pos/Neg	1	08/05/22	'K/JW/AK	SW846-Corr
Flash Point	>200	200	Degree F	1	08/10/22	G	SW1010B
Ignitability	Passed	140	degree F	1	08/10/22	G	SW846-Ignit
pH at 25C - Soil	8.43	1.00	pH Units	1	08/05/22 22:00	'K/JW/AK	SW846 9045D
Reactivity Cyanide	< 5	5	mg/Kg	1	08/10/22	DK/GD	SW846 7.3.3.1/90
Reactivity Sulfide	< 20	20	mg/Kg	1	08/10/22	DK/GD	SW846 CH7
Reactivity	Negative		Pos/Neg	1	08/10/22	DK/GD	SW846-React
Soil Extraction for Pesticide	Completed				08/05/22	B/Q	SW3545A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Field Extraction	Completed				08/05/22		SW5035A
Mercury Digestion	Completed				08/10/22	KL/KL	SW7471B
Extraction of ETPH	Completed				08/05/22	B/P/MO	SW3546
Soil Extraction for SVOA	Completed				08/05/22	P/A	SW3546
Paint Filter Test	Passed		PASS/FAIL		08/05/22	O	SW9095B
Extraction for PCB	Completed				08/09/22	R/JDW/Q	SW3540C
TCLP Digestion Mercury	Completed				08/06/22	AB/AB	SW7470A
TCLP Extraction for Metals	Completed				08/05/22	AB	SW1311
Total Metals Digest	Completed				08/05/22	L/AG	SW3050B

TPH by GC (Extractable Products)

Ext. Petroleum H.C. (C9-C36)	ND	53	mg/Kg	1	08/08/22	JRB	CTETPH 8015D
Identification	ND		mg/Kg	1	08/08/22	JRB	CTETPH 8015D

QA/QC Surrogates

% COD (surr)	84		%	1	08/08/22	JRB	50 - 150 %
% Terphenyl (surr)	92		%	1	08/08/22	JRB	50 - 150 %

PCB (Soxhlet SW3540C)

PCB-1016	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1221	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1232	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1242	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1248	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1254	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1260	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1262	ND	360	ug/Kg	10	08/10/22	SC	SW8082A
PCB-1268	ND	360	ug/Kg	10	08/10/22	SC	SW8082A

QA/QC Surrogates

% DCBP	74		%	10	08/10/22	SC	30 - 150 %
% DCBP (Confirmation)	80		%	10	08/10/22	SC	30 - 150 %
% TCMX	77		%	10	08/10/22	SC	30 - 150 %
% TCMX (Confirmation)	76		%	10	08/10/22	SC	30 - 150 %

Pesticides

4,4' -DDD	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDE	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
4,4' -DDT	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
a-BHC	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
Alachlor	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Aldrin	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
b-BHC	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
Chlordane	ND	36	ug/Kg	2	08/08/22	AW	SW8081B
d-BHC	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
Dieldrin	ND	3.6	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan I	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan II	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Endosulfan sulfate	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Endrin	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Endrin aldehyde	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Endrin ketone	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
g-BHC	ND	1.4	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Heptachlor epoxide	ND	7.1	ug/Kg	2	08/08/22	AW	SW8081B
Methoxychlor	ND	36	ug/Kg	2	08/08/22	AW	SW8081B
Toxaphene	ND	140	ug/Kg	2	08/08/22	AW	SW8081B
<u>QA/QC Surrogates</u>							
% DCBP	62		%	2	08/08/22	AW	30 - 150 %
% DCBP (Confirmation)	59		%	2	08/08/22	AW	30 - 150 %
% TCMX	55		%	2	08/08/22	AW	30 - 150 %
% TCMX (Confirmation)	53		%	2	08/08/22	AW	30 - 150 %
<u>Volatiles</u>							
1,1,1,2-Tetrachloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,1,1-Trichloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	3.4	ug/Kg	1	08/08/22	JLI	SW8260C
1,1,2-Trichloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,1-Dichloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,1-Dichloroethene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,1-Dichloropropene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2,3-Trichloropropane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	5.0	ug/Kg	1	08/08/22	JLI	SW8260C
1,2-Dibromoethane	ND	0.57	ug/Kg	1	08/08/22	JLI	SW8260C
1,2-Dichlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2-Dichloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,2-Dichloropropane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,3-Dichlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,3-Dichloropropane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
1,4-Dichlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
2,2-Dichloropropane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
2-Chlorotoluene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
2-Hexanone	ND	28	ug/Kg	1	08/08/22	JLI	SW8260C
2-Isopropyltoluene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
4-Chlorotoluene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
4-Methyl-2-pentanone	ND	28	ug/Kg	1	08/08/22	JLI	SW8260C
Acetone	ND	280	ug/Kg	1	08/08/22	JLI	SW8260C
Acrylonitrile	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Benzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Bromobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Bromochloromethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Bromodichloromethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Bromoform	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Bromomethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Carbon Disulfide	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Carbon tetrachloride	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Chlorobenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Chloroethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chloroform	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Chloromethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
cis-1,2-Dichloroethene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
cis-1,3-Dichloropropene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Dibromochloromethane	ND	3.4	ug/Kg	1	08/08/22	JLI	SW8260C
Dibromomethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Dichlorodifluoromethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Ethylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Hexachlorobutadiene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Isopropylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
m&p-Xylene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Methyl Ethyl Ketone	ND	34	ug/Kg	1	08/08/22	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	11	ug/Kg	1	08/08/22	JLI	SW8260C
Methylene chloride	ND	11	ug/Kg	1	08/08/22	JLI	SW8260C
Naphthalene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
n-Butylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
n-Propylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
o-Xylene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
p-Isopropyltoluene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
sec-Butylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Styrene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
tert-Butylbenzene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Tetrachloroethene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Tetrahydrofuran (THF)	ND	11	ug/Kg	1	08/08/22	JLI	SW8260C
Toluene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Total Xylenes	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
trans-1,2-Dichloroethene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
trans-1,3-Dichloropropene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	11	ug/Kg	1	08/08/22	JLI	SW8260C
Trichloroethene	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Trichlorofluoromethane	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
Trichlorotrifluoroethane	ND	11	ug/Kg	1	08/08/22	JLI	SW8260C
Vinyl chloride	ND	5.7	ug/Kg	1	08/08/22	JLI	SW8260C
<u>QA/QC Surrogates</u>							
% 1,2-dichlorobenzene-d4	103		%	1	08/08/22	JLI	70 - 130 %
% Bromofluorobenzene	98		%	1	08/08/22	JLI	70 - 130 %
% Dibromofluoromethane	100		%	1	08/08/22	JLI	70 - 130 %
% Toluene-d8	97		%	1	08/08/22	JLI	70 - 130 %
<u>Semivolatiles</u>							
1,2,4,5-Tetrachlorobenzene	ND	100	ug/Kg	1	08/06/22	WB	SW8270D
1,2,4-Trichlorobenzene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Dichlorobenzene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
1,2-Diphenylhydrazine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
1,3-Dichlorobenzene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
1,4-Dichlorobenzene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2,2'-Oxybis(1-Chloropropane)	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2,4,5-Trichlorophenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2,4,6-Trichlorophenol	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dichlorophenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2,4-Dimethylphenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrophenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2,4-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2,6-Dinitrotoluene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
2-Chloronaphthalene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2-Chlorophenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylnaphthalene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2-Methylphenol (o-cresol)	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
2-Nitrophenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
3&4-Methylphenol (m&p-cresol)	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
3,3'-Dichlorobenzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
3-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4,6-Dinitro-2-methylphenol	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Bromophenyl phenyl ether	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloro-3-methylphenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
4-Chloroaniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
4-Chlorophenyl phenyl ether	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitroaniline	ND	300	ug/Kg	1	08/06/22	WB	SW8270D
4-Nitrophenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Acenaphthylene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Acetophenone	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Aniline	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Anthracene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benz(a)anthracene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benzidine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(a)pyrene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(b)fluoranthene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(ghi)perylene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benzo(k)fluoranthene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Benzoic acid	ND	710	ug/Kg	1	08/06/22	WB	SW8270D
Benzyl butyl phthalate	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethoxy)methane	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-chloroethyl)ether	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
Bis(2-ethylhexyl)phthalate	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
Carbazole	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Chrysene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Dibenz(a,h)anthracene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Dibenzofuran	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Diethyl phthalate	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Dimethylphthalate	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-butylphthalate	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
Di-n-octylphthalate	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Fluoranthene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Fluorene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobenzene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorobutadiene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Hexachlorocyclopentadiene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D

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Hexachloroethane	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Indeno(1,2,3-cd)pyrene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Isophorone	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Naphthalene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Nitrobenzene	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodimethylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodi-n-propylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
N-Nitrosodiphenylamine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
Pentachloronitrobenzene	ND	140	ug/Kg	1	08/06/22	WB	SW8270D
Pentachlorophenol	ND	350	ug/Kg	1	08/06/22	WB	SW8270D
Phenanthrene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Phenol	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Pyrene	ND	250	ug/Kg	1	08/06/22	WB	SW8270D
Pyridine	ND	200	ug/Kg	1	08/06/22	WB	SW8270D
<u>QA/QC Surrogates</u>							
% 2,4,6-Tribromophenol	122		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorobiphenyl	88		%	1	08/06/22	WB	30 - 130 %
% 2-Fluorophenol	62		%	1	08/06/22	WB	30 - 130 %
% Nitrobenzene-d5	85		%	1	08/06/22	WB	30 - 130 %
% Phenol-d5	80		%	1	08/06/22	WB	30 - 130 %
% Terphenyl-d14	79		%	1	08/06/22	WB	30 - 130 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

Corrosivity is based solely on the pH analysis performed above.

Ignitability is based solely on the results of the closed cup flashpoint analysis performed above. Passed is >140 degree F.

The regulatory hold time for pH is immediatly. This pH was performed in the laboratory and may be considered outside of hold-time.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Cyanide. This method is no longer listed in the current version of SW-846.

The reactivity, reported above, is based only on the EPA Interim Guidance for Reactive Sulfide. This method is no longer listed in the current version of SW-846.

Paint Filter Test:

Pass = no free liquids were detected. Fail = free liquids were detected.

Per 1.4.6 of EPA method 8270D, 1,2-Diphenylhydrazine is unstable and readily converts to Azobenzene. Azobenzene is used for the calibration of 1,2-Diphenylhydrazine.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.



Phyllis Shiller, Laboratory Director

August 26, 2022

Reviewed and Released by: Sarah Bell, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

August 26, 2022

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
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QA/QC Batch 636793 (mg/kg), QC Sample No: CL98935 2X (CL98794, CL98795, CL98796, CL98797)

Mercury - Soil	BRL	0.03	<0.03	<0.03	NC	111	110	0.9	99.6	107	7.2	70 - 130	30
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Comment:

Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.

QA/QC Batch 636390 (mg/L), QC Sample No: CL99020 (CL98794, CL98795, CL98796, CL98797)

Mercury - Water	BRL	0.0002	<0.0002	<0.0002	NC	110			100			80 - 120	20
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Comment:

Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.

QA/QC Batch 636393 (mg/L), QC Sample No: CL98794 (CL98794, CL98795, CL98796, CL98797)

ICP Metals - TCLP Extraction

Arsenic	BRL	0.05	<0.05	<0.05	NC	114	115	0.9	109			80 - 120	20
Barium	BRL	0.01	0.66	0.64	3.10	109	109	0.0	107			80 - 120	20
Cadmium	BRL	0.005	<0.005	<0.005	NC	107	107	0.0	103			80 - 120	20
Chromium	BRL	0.010	<0.010	<0.010	NC	104	105	1.0	101			80 - 120	20
Lead	BRL	0.010	0.042	0.041	NC	110	110	0.0	106			80 - 120	20
Selenium	BRL	0.05	<0.05	<0.05	NC	119	120	0.8	112			80 - 120	20
Silver	BRL	0.010	<0.010	<0.010	NC	116	116	0.0	112			80 - 120	20

Comment:

Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

QA/QC Batch 636329 (mg/kg), QC Sample No: CL98797 (CL98794, CL98795, CL98796, CL98797)

ICP Metals - Soil

Arsenic	BRL	0.67	1.15	1.01	NC	100	95.1	5.0	97.8			75 - 125	35
Barium	BRL	0.33	70.2	75.6	7.40	104	93.3	10.8	77.9			75 - 125	35
Cadmium	BRL	0.33	<0.37	<0.36	NC	102	89.9	12.6	101			75 - 125	35
Chromium	BRL	0.33	13.3	15.1	12.7	105	94.3	10.7	95.7			75 - 125	35
Lead	BRL	0.45	4.69	4.10	13.4	99.4	96.3	3.2	98.4			75 - 125	35
Selenium	BRL	1.3	<1.5	<1.4	NC	98.1	89.7	8.9	97.2			75 - 125	35
Silver	BRL	0.33	<0.37	<0.36	NC	97.3	91.5	6.1	101			75 - 125	35

Comment:

Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

QA/QC Batch 638534 (mg/L), QC Sample No: CM10305 (CL98794, CL98796)

ICP Metals - SPLP Extraction

Lead	BRL	0.010	0.023	0.024	NC	108	108	0.0	108			80 - 120	20
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Comment:

Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.



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QA/QC Report

August 26, 2022

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 636804 (mg/Kg), QC Sample No: CL97220 5X (CL98794, CL98795, CL98796, CL98797)													
Reactivity Cyanide	BRL	5	<5	<5.4	NC	91.0						85 - 115	30
Reactivity Sulfide	BRL	20	<20	<20	NC	95.8						80 - 120	30
QA/QC Batch 636377 (PH), QC Sample No: CL98600 (CL98794, CL98795, CL98796, CL98797)													
pH			5.65	5.66	0.20	101						85 - 115	20
QA/QC Batch 636841 (Degree F), QC Sample No: CL98797 (CL98794, CL98795, CL98796, CL98797)													
Flash Point			>200	>200	NC	100						75 - 125	30
Comment: Additional criteria matrix spike acceptance range is 75-125%.													
QA/QC Batch 636598 (umhos/cm), QC Sample No: CL99634 (CL98794, CL98795, CL98796, CL98797)													
Conductivity - Soil Matrix	BRL	5	68	69	1.50	92.0						75 - 125	30
Comment: Additional criteria matrix spike acceptance range is 75-125%.													



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QA/QC Data

SDG I.D.: GCL98794

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								

QA/QC Batch 636327 (mg/Kg), QC Sample No: CL98712 (CL98794, CL98795, CL98796, CL98797)

TPH by GC (Extractable Products) - Soil

Ext. Petroleum H.C. (C9-C36)	ND	50	116	88	27.5	86	82	4.8	60 - 120	30
% COD (surr)	99	%	128	120	6.5	91	99	8.4	50 - 150	30
% Terphenyl (surr)	102	%	137	127	7.6	88	93	5.5	50 - 150	30

Comment:

Additional surrogate criteria: LCS acceptance range is 60-120% MS acceptance range 50-150%. The ETPH/DRO LCS has been normalized based on the alkane calibration.

QA/QC Batch 636707 (ug/Kg), QC Sample No: CL98509 10X (CL98794, CL98795, CL98796, CL98797)

Polychlorinated Biphenyls - Soil

PCB-1016	ND	170	74	82	10.3	54	59	8.8	40 - 140	30
PCB-1221	ND	170							40 - 140	30
PCB-1232	ND	170							40 - 140	30
PCB-1242	ND	170							40 - 140	30
PCB-1248	ND	170							40 - 140	30
PCB-1254	ND	170							40 - 140	30
PCB-1260	ND	170	80	86	7.2	59	63	6.6	40 - 140	30
PCB-1262	ND	170							40 - 140	30
PCB-1268	ND	170							40 - 140	30
% DCBP (Surrogate Rec)	74	%	88	89	1.1	62	69	10.7	30 - 150	30
% DCBP (Surrogate Rec) (Confirm	76	%	84	81	3.6	54	60	10.5	30 - 150	30
% TCMX (Surrogate Rec)	80	%	80	88	9.5	59	61	3.3	30 - 150	30
% TCMX (Surrogate Rec) (Confirm	79	%	84	89	5.8	58	61	5.0	30 - 150	30

QA/QC Batch 636293 (ug/Kg), QC Sample No: CL98797 2X (CL98794, CL98796, CL98797)

Pesticides - Soil

4,4' -DDD	ND	1.7	69	63	9.1	65	63	3.1	40 - 140	30
4,4' -DDE	ND	1.7	63	58	8.3	61	58	5.0	40 - 140	30
4,4' -DDT	ND	1.7	65	59	9.7	60	58	3.4	40 - 140	30
a-BHC	ND	1.0	50	51	2.0	50	49	2.0	40 - 140	30
Alachlor	ND	3.3	NA	NA	NC	NA	NA	NC	40 - 140	30
Aldrin	ND	1.0	56	57	1.8	58	55	5.3	40 - 140	30
b-BHC	ND	1.0	60	62	3.3	66	59	11.2	40 - 140	30
Chlordane	ND	3.3	60	58	3.4	59	57	3.4	40 - 140	30
d-BHC	ND	3.3	54	46	16.0	45	42	6.9	40 - 140	30
Dieldrin	ND	1.0	60	56	6.9	59	56	5.2	40 - 140	30
Endosulfan I	ND	3.3	58	57	1.7	58	57	1.7	40 - 140	30
Endosulfan II	ND	3.3	67	60	11.0	62	60	3.3	40 - 140	30
Endosulfan sulfate	ND	3.3	69	51	30.0	61	60	1.7	40 - 140	30
Endrin	ND	3.3	68	64	6.1	67	64	4.6	40 - 140	30
Endrin aldehyde	ND	3.3	66	59	11.2	61	60	1.7	40 - 140	30
Endrin ketone	ND	3.3	72	65	10.2	64	63	1.6	40 - 140	30
g-BHC	ND	1.0	54	54	0.0	54	52	3.8	40 - 140	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blank		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	BLK RL								
Heptachlor	ND	3.3	53	55	3.7	56	53	5.5	40 - 140	30
Heptachlor epoxide	ND	3.3	60	60	0.0	60	58	3.4	40 - 140	30
Methoxychlor	ND	3.3	75	65	14.3	64	62	3.2	40 - 140	30
Toxaphene	ND	130	NA	NA	NC	NA	NA	NC	40 - 140	30
% DCBP	58	%	69	63	9.1	60	59	1.7	30 - 150	30
% DCBP (Confirmation)	52	%	61	56	8.5	52	49	5.9	30 - 150	30
% TCMX	47	%	52	55	5.6	55	51	7.5	30 - 150	30
% TCMX (Confirmation)	48	%	53	53	0.0	54	50	7.7	30 - 150	30

QA/QC Batch 636712 (ug/Kg), QC Sample No: CM00510 2X (CL98795)

Pesticides - Soil

4,4' -DDD	ND	1.7	73	76	4.0	76	67	12.6	40 - 140	30
4,4' -DDE	ND	1.7	67	68	1.5	76	68	11.1	40 - 140	30
4,4' -DDT	ND	1.7	71	71	0.0	78	70	10.8	40 - 140	30
a-BHC	ND	1.0	58	59	1.7	60	55	8.7	40 - 140	30
Alachlor	ND	3.3	NA	NA	NC	NA	NA	NC	40 - 140	30
Aldrin	ND	1.0	66	67	1.5	70	62	12.1	40 - 140	30
b-BHC	ND	1.0	68	66	3.0	75	69	8.3	40 - 140	30
Chlordane	ND	33	66	67	1.5	75	67	11.3	40 - 140	30
d-BHC	ND	3.3	35	38	8.2	43	38	12.3	40 - 140	30
Dieldrin	ND	1.0	65	66	1.5	70	62	12.1	40 - 140	30
Endosulfan I	ND	3.3	67	66	1.5	69	57	19.0	40 - 140	30
Endosulfan II	ND	3.3	76	78	2.6	80	73	9.2	40 - 140	30
Endosulfan sulfate	ND	3.3	65	67	3.0	69	62	10.7	40 - 140	30
Endrin	ND	3.3	66	68	3.0	73	65	11.6	40 - 140	30
Endrin aldehyde	ND	3.3	70	74	5.6	74	65	12.9	40 - 140	30
Endrin ketone	ND	3.3	80	82	2.5	82	74	10.3	40 - 140	30
g-BHC	ND	1.0	64	65	1.6	69	62	10.7	40 - 140	30
Heptachlor	ND	3.3	64	64	0.0	69	61	12.3	40 - 140	30
Heptachlor epoxide	ND	3.3	66	67	1.5	72	64	11.8	40 - 140	30
Methoxychlor	ND	3.3	78	81	3.8	82	74	10.3	40 - 140	30
Toxaphene	ND	130	NA	NA	NC	NA	NA	NC	40 - 140	30
% DCBP	79	%	75	74	1.3	73	68	7.1	30 - 150	30
% DCBP (Confirmation)	77	%	71	73	2.8	76	72	5.4	30 - 150	30
% TCMX	65	%	63	63	0.0	65	58	11.4	30 - 150	30
% TCMX (Confirmation)	58	%	56	58	3.5	60	54	10.5	30 - 150	30

QA/QC Batch 638834 (ug/L), QC Sample No: CM10530 (CL98794, CL98796)

Pesticides

4,4' -DDD	ND	0.003	103	105	1.9	94	95	1.1	40 - 140	20
4,4' -DDE	ND	0.003	90	94	4.3	91	86	5.6	40 - 140	20
4,4' -DDT	ND	0.003	78	75	3.9	73	73	0.0	40 - 140	20
a-BHC	ND	0.002	97	96	1.0	89	83	7.0	40 - 140	20
Alachlor	ND	0.005	NA	NA	NC	NA	NA	NC	40 - 140	20
Aldrin	ND	0.002	58	63	8.3	66	59	11.2	40 - 140	20
b-BHC	ND	0.002	95	93	2.1	101	95	6.1	40 - 140	20
Chlordane	ND	0.050	88	88	0.0	86	82	4.8	40 - 140	20
d-BHC	ND	0.005	64	70	9.0	70	57	20.5	40 - 140	20
Dieldrin	ND	0.002	97	96	1.0	89	87	2.3	40 - 140	20
Endosulfan I	ND	0.005	96	100	4.1	88	86	2.3	40 - 140	20
Endosulfan II	ND	0.005	103	102	1.0	95	101	6.1	40 - 140	20
Endosulfan sulfate	ND	0.005	101	99	2.0	95	97	2.1	40 - 140	20
Endrin	ND	0.005	103	102	1.0	93	91	2.2	40 - 140	20
Endrin aldehyde	ND	0.005	82	83	1.2	84	78	7.4	40 - 140	20

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blank		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	BLK RL								
Endrin ketone	ND	0.005	89	86	3.4	87	81	7.1	40 - 140	20
g-BHC	ND	0.002	98	95	3.1	90	86	4.5	40 - 140	20
Heptachlor	ND	0.005	79	80	1.3	80	69	14.8	40 - 140	20
Heptachlor epoxide	ND	0.005	102	100	2.0	92	91	1.1	40 - 140	20
Methoxychlor	ND	0.005	100	97	3.0	111	85	26.5	40 - 140	20
Toxaphene	ND	0.20	NA	NA	NC	NA	NA	NC	40 - 140	20
% DCBP	85	%	94	88	6.6	80	81	1.2	30 - 150	20
% DCBP (Confirmation)	81	%	90	88	2.2	82	95	14.7	30 - 150	20
% TCMX	73	%	77	72	6.7	82	77	6.3	30 - 150	20
% TCMX (Confirmation)	71	%	74	73	1.4	81	79	2.5	30 - 150	20

QA/QC Batch 636323 (ug/kg), QC Sample No: CL93373 (CL98794, CL98795, CL98796, CL98797)

Semivolatiles - Soil

1,2,4,5-Tetrachlorobenzene	ND	230	80	77	3.8	82	72	13.0	40 - 140	30
1,2,4-Trichlorobenzene	ND	230	74	73	1.4	77	69	11.0	40 - 140	30
1,2-Dichlorobenzene	ND	180	64	66	3.1	76	70	8.2	40 - 140	30
1,2-Diphenylhydrazine	ND	230	95	95	0.0	89	78	13.2	40 - 140	30
1,3-Dichlorobenzene	ND	230	62	62	0.0	72	63	13.3	40 - 140	30
1,4-Dichlorobenzene	ND	230	63	64	1.6	72	66	8.7	40 - 140	30
2,2'-Oxybis(1-Chloropropane)	ND	230	64	65	1.6	73	68	7.1	40 - 140	30
2,4,5-Trichlorophenol	ND	230	97	95	2.1	92	86	6.7	40 - 140	30
2,4,6-Trichlorophenol	ND	130	87	86	1.2	85	79	7.3	30 - 130	30
2,4-Dichlorophenol	ND	130	92	87	5.6	89	81	9.4	30 - 130	30
2,4-Dimethylphenol	ND	230	95	92	3.2	90	79	13.0	30 - 130	30
2,4-Dinitrophenol	ND	230	80	79	1.3	34	11	102.2	30 - 130	30
2,4-Dinitrotoluene	ND	130	100	98	2.0	93	78	17.5	30 - 130	30
2,6-Dinitrotoluene	ND	130	94	93	1.1	87	75	14.8	40 - 140	30
2-Chloronaphthalene	ND	230	88	88	0.0	86	75	13.7	40 - 140	30
2-Chlorophenol	ND	230	80	78	2.5	89	77	14.5	30 - 130	30
2-Methylnaphthalene	ND	230	87	85	2.3	89	78	13.2	40 - 140	30
2-Methylphenol (o-cresol)	ND	230	90	86	4.5	101	94	7.2	40 - 140	30
2-Nitroaniline	ND	330	199	>200	NC	167	175	4.7	40 - 140	30
2-Nitrophenol	ND	230	100	100	0.0	100	93	7.3	40 - 140	30
3&4-Methylphenol (m&p-cresol)	ND	230	89	82	8.2	97	87	10.9	30 - 130	30
3,3'-Dichlorobenzidine	ND	130	72	87	18.9	30	42	33.3	40 - 140	30
3-Nitroaniline	ND	330	78	90	14.3	67	84	22.5	40 - 140	30
4,6-Dinitro-2-methylphenol	ND	230	88	87	1.1	51	12	123.8	30 - 130	30
4-Bromophenyl phenyl ether	ND	230	92	92	0.0	87	79	9.6	40 - 140	30
4-Chloro-3-methylphenol	ND	230	97	94	3.1	98	89	9.6	30 - 130	30
4-Chloroaniline	ND	230	56	65	14.9	54	69	24.4	40 - 140	30
4-Chlorophenyl phenyl ether	ND	230	92	91	1.1	89	79	11.9	40 - 140	30
4-Nitroaniline	ND	230	101	99	2.0	96	87	9.8	40 - 140	30
4-Nitrophenol	ND	230	103	98	5.0	105	102	2.9	30 - 130	30
Acenaphthene	ND	230	92	92	0.0	93	78	17.5	30 - 130	30
Acenaphthylene	ND	130	78	77	1.3	78	68	13.7	40 - 140	30
Acetophenone	ND	230	77	77	0.0	84	78	7.4	40 - 140	30
Aniline	ND	330	92	53	53.8	93	46	67.6	40 - 140	30
Anthracene	ND	230	89	90	1.1	88	70	22.8	40 - 140	30
Benz(a)anthracene	ND	230	87	87	0.0	99	69	35.7	40 - 140	30
Benzidine	ND	330	<10	<10	NC	<10	<10	NC	40 - 140	30
Benzo(a)pyrene	ND	130	76	75	1.3	85	57	39.4	40 - 140	30
Benzo(b)fluoranthene	ND	160	89	86	3.4	103	67	42.4	40 - 140	30
Benzo(ghi)perylene	ND	230	87	86	1.2	79	60	27.3	40 - 140	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								
Benzo(k)fluoranthene	ND	230	82	77	6.3	80	64	22.2	40 - 140	30
Benzoic Acid	ND	670	124	96	25.5	68	65	4.5	30 - 130	30
Benzyl butyl phthalate	ND	230	94	95	1.1	91	81	11.6	40 - 140	30
Bis(2-chloroethoxy)methane	ND	230	87	86	1.2	85	77	9.9	40 - 140	30
Bis(2-chloroethyl)ether	ND	130	71	68	4.3	80	87	8.4	40 - 140	30
Bis(2-ethylhexyl)phthalate	ND	230	93	95	2.1	90	87	3.4	40 - 140	30
Carbazole	ND	230	90	90	0.0	84	72	15.4	40 - 140	30
Chrysene	ND	230	89	89	0.0	99	70	34.3	40 - 140	30 r
Dibenz(a,h)anthracene	ND	130	91	87	4.5	85	71	17.9	40 - 140	30
Dibenzofuran	ND	230	88	87	1.1	87	74	16.1	40 - 140	30
Diethyl phthalate	ND	230	97	97	0.0	91	83	9.2	40 - 140	30
Dimethylphthalate	ND	230	95	95	0.0	89	81	9.4	40 - 140	30
Di-n-butylphthalate	ND	670	100	99	1.0	91	77	16.7	40 - 140	30
Di-n-octylphthalate	ND	230	91	93	2.2	85	76	11.2	40 - 140	30
Fluoranthene	ND	230	92	89	3.3	130	62	70.8	40 - 140	30 r
Fluorene	ND	230	95	94	1.1	100	81	21.0	40 - 140	30
Hexachlorobenzene	ND	130	98	98	0.0	92	78	16.5	40 - 140	30
Hexachlorobutadiene	ND	230	74	74	0.0	78	71	9.4	40 - 140	30
Hexachlorocyclopentadiene	ND	230	49	45	8.5	18	<10	NC	40 - 140	30 m
Hexachloroethane	ND	130	65	68	4.5	75	60	22.2	40 - 140	30
Indeno(1,2,3-cd)pyrene	ND	230	95	92	3.2	89	66	29.7	40 - 140	30
Isophorone	ND	130	75	76	1.3	75	68	9.8	40 - 140	30
Naphthalene	ND	230	79	79	0.0	85	76	11.2	40 - 140	30
Nitrobenzene	ND	130	81	82	1.2	93	87	6.7	40 - 140	30
N-Nitrosodimethylamine	ND	230	43	44	2.3	45	42	6.9	40 - 140	30
N-Nitrosodi-n-propylamine	ND	130	83	82	1.2	91	87	4.5	40 - 140	30
N-Nitrosodiphenylamine	ND	130	76	75	1.3	71	64	10.4	40 - 140	30
Pentachloronitrobenzene	ND	230	99	95	4.1	90	76	16.9	40 - 140	30
Pentachlorophenol	ND	230	79	67	16.4	88	81	8.3	30 - 130	30
Phenanthrene	ND	130	92	91	1.1	133	76	54.5	40 - 140	30 r
Phenol	ND	230	85	84	1.2	94	82	13.6	30 - 130	30
Pyrene	ND	230	94	91	3.2	125	65	63.2	30 - 130	30 r
Pyridine	ND	230	55	41	29.2	33	31	6.3	40 - 140	30 m
% 2,4,6-Tribromophenol	97	%	106	104	1.9	107	99	7.8	30 - 130	30
% 2-Fluorobiphenyl	78	%	88	87	1.1	83	75	10.1	30 - 130	30
% 2-Fluorophenol	60	%	68	68	0.0	77	65	16.9	30 - 130	30
% Nitrobenzene-d5	70	%	78	79	1.3	91	85	6.8	30 - 130	30
% Phenol-d5	71	%	82	81	1.2	92	80	14.0	30 - 130	30
% Terphenyl-d14	83	%	93	90	3.3	81	64	23.4	30 - 130	30

Comment:

Additional 8270 criteria: 20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

QA/QC Batch 636490 (ug/kg), QC Sample No: CL98564 (CL98794, CL98795, CL98796)

Volatiles - Soil (Low Level)

1,1,1,2-Tetrachloroethane	ND	5.0	98	100	2.0				70 - 130	30
1,1,1-Trichloroethane	ND	5.0	100	99	1.0				70 - 130	30
1,1,2,2-Tetrachloroethane	ND	3.0	89	89	0.0				70 - 130	30
1,1,2-Trichloroethane	ND	5.0	97	94	3.1				70 - 130	30
1,1-Dichloroethane	ND	5.0	92	81	12.7				70 - 130	30
1,1-Dichloroethene	ND	5.0	104	102	1.9				70 - 130	30
1,1-Dichloropropene	ND	5.0	101	102	1.0				70 - 130	30
1,2,3-Trichlorobenzene	ND	5.0	91	88	3.4				70 - 130	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								
1,2,3-Trichloropropane	ND	5.0	89	87	2.3				70 - 130	30
1,2,4-Trichlorobenzene	ND	5.0	87	84	3.5				70 - 130	30
1,2,4-Trimethylbenzene	ND	1.0	91	91	0.0				70 - 130	30
1,2-Dibromo-3-chloropropane	ND	5.0	100	94	6.2				70 - 130	30
1,2-Dibromoethane	ND	5.0	99	95	4.1				70 - 130	30
1,2-Dichlorobenzene	ND	5.0	90	90	0.0				70 - 130	30
1,2-Dichloroethane	ND	5.0	96	94	2.1				70 - 130	30
1,2-Dichloropropane	ND	5.0	95	93	2.1				70 - 130	30
1,3,5-Trimethylbenzene	ND	1.0	92	95	3.2				70 - 130	30
1,3-Dichlorobenzene	ND	5.0	90	90	0.0				70 - 130	30
1,3-Dichloropropane	ND	5.0	99	95	4.1				70 - 130	30
1,4-Dichlorobenzene	ND	5.0	89	88	1.1				70 - 130	30
2,2-Dichloropropane	ND	5.0	106	109	2.8				70 - 130	30
2-Chlorotoluene	ND	5.0	92	94	2.2				70 - 130	30
2-Hexanone	ND	25	94	87	7.7				70 - 130	30
2-Isopropyltoluene	ND	5.0	94	94	0.0				70 - 130	30
4-Chlorotoluene	ND	5.0	92	92	0.0				70 - 130	30
4-Methyl-2-pentanone	ND	25	101	92	9.3				70 - 130	30
Acetone	ND	10	84	74	12.7				70 - 130	30
Acrylonitrile	ND	5.0	88	67	27.1				70 - 130	30
Benzene	ND	1.0	97	96	1.0				70 - 130	30
Bromobenzene	ND	5.0	92	92	0.0				70 - 130	30
Bromochloromethane	ND	5.0	97	93	4.2				70 - 130	30
Bromodichloromethane	ND	5.0	92	95	3.2				70 - 130	30
Bromoform	ND	5.0	95	97	2.1				70 - 130	30
Bromomethane	ND	5.0	94	94	0.0				70 - 130	30
Carbon Disulfide	ND	5.0	93	93	0.0				70 - 130	30
Carbon tetrachloride	ND	5.0	90	99	9.5				70 - 130	30
Chlorobenzene	ND	5.0	93	93	0.0				70 - 130	30
Chloroethane	ND	5.0	90	92	2.2				70 - 130	30
Chloroform	ND	5.0	94	93	1.1				70 - 130	30
Chloromethane	ND	5.0	108	97	10.7				70 - 130	30
cis-1,2-Dichloroethene	ND	5.0	95	92	3.2				70 - 130	30
cis-1,3-Dichloropropene	ND	5.0	97	99	2.0				70 - 130	30
Dibromochloromethane	ND	3.0	97	96	1.0				70 - 130	30
Dibromomethane	ND	5.0	99	96	3.1				70 - 130	30
Dichlorodifluoromethane	ND	5.0	131	120	8.8				70 - 130	30
Ethylbenzene	ND	1.0	97	96	1.0				70 - 130	30
Hexachlorobutadiene	ND	5.0	93	92	1.1				70 - 130	30
Isopropylbenzene	ND	1.0	92	95	3.2				70 - 130	30
m&p-Xylene	ND	2.0	95	95	0.0				70 - 130	30
Methyl ethyl ketone	ND	5.0	86	77	11.0				70 - 130	30
Methyl t-butyl ether (MTBE)	ND	1.0	99	94	5.2				70 - 130	30
Methylene chloride	ND	5.0	95	96	1.0				70 - 130	30
Naphthalene	ND	5.0	94	91	3.2				70 - 130	30
n-Butylbenzene	ND	1.0	99	96	3.1				70 - 130	30
n-Propylbenzene	ND	1.0	94	95	1.1				70 - 130	30
o-Xylene	ND	2.0	95	94	1.1				70 - 130	30
p-Isopropyltoluene	ND	1.0	96	96	0.0				70 - 130	30
sec-Butylbenzene	ND	1.0	95	96	1.0				70 - 130	30
Styrene	ND	5.0	97	96	1.0				70 - 130	30
tert-Butylbenzene	ND	1.0	94	97	3.1				70 - 130	30
Tetrachloroethene	ND	5.0	97	101	4.0				70 - 130	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								
Tetrahydrofuran (THF)	ND	5.0	92	82	11.5				70 - 130	30
Toluene	ND	1.0	97	98	1.0				70 - 130	30
trans-1,2-Dichloroethene	ND	5.0	101	100	1.0				70 - 130	30
trans-1,3-Dichloropropene	ND	5.0	103	103	0.0				70 - 130	30
trans-1,4-dichloro-2-butene	ND	5.0	100	98	2.0				70 - 130	30
Trichloroethene	ND	5.0	97	98	1.0				70 - 130	30
Trichlorofluoromethane	ND	5.0	107	104	2.8				70 - 130	30
Trichlorotrifluoroethane	ND	5.0	98	99	1.0				70 - 130	30
Vinyl chloride	ND	5.0	112	100	11.3				70 - 130	30
% 1,2-dichlorobenzene-d4	99	%	101	99	2.0				70 - 130	30
% Bromofluorobenzene	98	%	104	103	1.0				70 - 130	30
% Dibromofluoromethane	96	%	100	97	3.0				70 - 130	30
% Toluene-d8	100	%	100	101	1.0				70 - 130	30

Comment:

The Low Level MS/MSD are not reported for this batch.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 636698 (ug/kg), QC Sample No: CL99393 (CL98797)

Volatiles - Soil (Low Level)

1,1,1,2-Tetrachloroethane	ND	5.0	97	112	14.4				70 - 130	30
1,1,1-Trichloroethane	ND	5.0	96	107	10.8				70 - 130	30
1,1,2,2-Tetrachloroethane	ND	3.0	88	100	12.8				70 - 130	30
1,1,2-Trichloroethane	ND	5.0	93	102	9.2				70 - 130	30
1,1-Dichloroethane	ND	5.0	88	96	8.7				70 - 130	30
1,1-Dichloroethene	ND	5.0	90	100	10.5				70 - 130	30
1,1-Dichloropropene	ND	5.0	95	105	10.0				70 - 130	30
1,2,3-Trichlorobenzene	ND	5.0	96	108	11.8				70 - 130	30
1,2,3-Trichloropropane	ND	5.0	90	99	9.5				70 - 130	30
1,2,4-Trichlorobenzene	ND	5.0	97	110	12.6				70 - 130	30
1,2,4-Trimethylbenzene	ND	1.0	94	106	12.0				70 - 130	30
1,2-Dibromo-3-chloropropane	ND	5.0	99	110	10.5				70 - 130	30
1,2-Dibromoethane	ND	5.0	96	109	12.7				70 - 130	30
1,2-Dichlorobenzene	ND	5.0	88	99	11.8				70 - 130	30
1,2-Dichloroethane	ND	5.0	97	106	8.9				70 - 130	30
1,2-Dichloropropane	ND	5.0	86	96	11.0				70 - 130	30
1,3,5-Trimethylbenzene	ND	1.0	95	107	11.9				70 - 130	30
1,3-Dichlorobenzene	ND	5.0	91	102	11.4				70 - 130	30
1,3-Dichloropropane	ND	5.0	93	106	13.1				70 - 130	30
1,4-Dichlorobenzene	ND	5.0	89	99	10.6				70 - 130	30
2,2-Dichloropropane	ND	5.0	102	113	10.2				70 - 130	30
2-Chlorotoluene	ND	5.0	93	103	10.2				70 - 130	30
2-Hexanone	ND	25	99	113	13.2				70 - 130	30
2-Isopropyltoluene	ND	5.0	91	104	13.3				70 - 130	30
4-Chlorotoluene	ND	5.0	93	104	11.2				70 - 130	30
4-Methyl-2-pentanone	ND	25	99	113	13.2				70 - 130	30
Acetone	ND	10	81	85	4.8				70 - 130	30
Acrylonitrile	ND	5.0	90	98	8.5				70 - 130	30
Benzene	ND	1.0	89	99	10.6				70 - 130	30
Bromobenzene	ND	5.0	93	104	11.2				70 - 130	30
Bromochloromethane	ND	5.0	91	102	11.4				70 - 130	30
Bromodichloromethane	ND	5.0	96	107	10.8				70 - 130	30
Bromoform	ND	5.0	103	119	14.4				70 - 130	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blk		LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
	Blank	RL								
Bromomethane	ND	5.0	100	113	12.2				70 - 130	30
Carbon Disulfide	ND	5.0	84	94	11.2				70 - 130	30
Carbon tetrachloride	ND	5.0	115	129	11.5				70 - 130	30
Chlorobenzene	ND	5.0	88	101	13.8				70 - 130	30
Chloroethane	ND	5.0	88	100	12.8				70 - 130	30
Chloroform	ND	5.0	90	100	10.5				70 - 130	30
Chloromethane	ND	5.0	72	81	11.8				70 - 130	30
cis-1,2-Dichloroethene	ND	5.0	90	100	10.5				70 - 130	30
cis-1,3-Dichloropropene	ND	5.0	97	107	9.8				70 - 130	30
Dibromochloromethane	ND	3.0	99	113	13.2				70 - 130	30
Dibromomethane	ND	5.0	95	105	10.0				70 - 130	30
Dichlorodifluoromethane	ND	5.0	78	87	10.9				70 - 130	30
Ethylbenzene	ND	1.0	92	105	13.2				70 - 130	30
Hexachlorobutadiene	ND	5.0	90	102	12.5				70 - 130	30
Isopropylbenzene	ND	1.0	95	109	13.7				70 - 130	30
m&p-Xylene	ND	2.0	92	105	13.2				70 - 130	30
Methyl ethyl ketone	ND	5.0	88	97	9.7				70 - 130	30
Methyl t-butyl ether (MTBE)	ND	1.0	91	101	10.4				70 - 130	30
Methylene chloride	ND	5.0	72	80	10.5				70 - 130	30
Naphthalene	ND	5.0	105	121	14.2				70 - 130	30
n-Butylbenzene	ND	1.0	93	105	12.1				70 - 130	30
n-Propylbenzene	ND	1.0	92	104	12.2				70 - 130	30
o-Xylene	ND	2.0	95	107	11.9				70 - 130	30
p-Isopropyltoluene	ND	1.0	95	108	12.8				70 - 130	30
sec-Butylbenzene	ND	1.0	93	106	13.1				70 - 130	30
Styrene	ND	5.0	96	111	14.5				70 - 130	30
tert-Butylbenzene	ND	1.0	96	108	11.8				70 - 130	30
Tetrachloroethene	ND	5.0	94	104	10.1				70 - 130	30
Tetrahydrofuran (THF)	ND	5.0	87	99	12.9				70 - 130	30
Toluene	ND	1.0	90	100	10.5				70 - 130	30
trans-1,2-Dichloroethene	ND	5.0	91	100	9.4				70 - 130	30
trans-1,3-Dichloropropene	ND	5.0	102	114	11.1				70 - 130	30
trans-1,4-dichloro-2-butene	ND	5.0	105	118	11.7				70 - 130	30
Trichloroethene	ND	5.0	91	101	10.4				70 - 130	30
Trichlorofluoromethane	ND	5.0	98	109	10.6				70 - 130	30
Trichlorotrifluoroethane	ND	5.0	85	94	10.1				70 - 130	30
Vinyl chloride	ND	5.0	86	97	12.0				70 - 130	30
% 1,2-dichlorobenzene-d4	102	%	100	101	1.0				70 - 130	30
% Bromofluorobenzene	98	%	102	104	1.9				70 - 130	30
% Dibromofluoromethane	100	%	100	100	0.0				70 - 130	30
% Toluene-d8	97	%	99	99	0.0				70 - 130	30

Comment:

The Low Level MS/MSD are not reported for this batch.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

QA/QC Batch 636698H (ug/kg), QC Sample No: CL99393 50X (CL98794 (50X) , CL98796 (50X))

Volatiles - Soil (High Level)

1,2,3-Trichlorobenzene	ND	250	127		107	116	8.1	70 - 130	30
1,2,3-Trichloropropane	ND	250	108		100	105	4.9	70 - 130	30
1,2,4-Trichlorobenzene	ND	250	133		114	118	3.4	70 - 130	30
1,2,4-Trimethylbenzene	ND	250	120		106	109	2.8	70 - 130	30
1,2-Dichlorobenzene	ND	250	113		99	103	4.0	70 - 130	30

QA/QC Data

SDG I.D.: GCL98794

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
1,3,5-Trimethylbenzene	ND	250	122			108	110	1.8	70 - 130	30
1,3-Dichlorobenzene	ND	250	117			103	106	2.9	70 - 130	30
1,4-Dichlorobenzene	ND	250	114			101	104	2.9	70 - 130	30
2-Chlorotoluene	ND	250	120			107	109	1.9	70 - 130	30
2-Isopropyltoluene	ND	250	116			104	106	1.9	70 - 130	30
4-Chlorotoluene	ND	250	119			107	108	0.9	70 - 130	30
Bromobenzene	ND	250	117			105	108	2.8	70 - 130	30
Hexachlorobutadiene	ND	250	125			111	115	3.5	70 - 130	30
Isopropylbenzene	ND	250	124			112	114	1.8	70 - 130	30
Naphthalene	ND	250	135			119	131	9.6	70 - 130	30
n-Butylbenzene	ND	250	123			108	108	0.0	70 - 130	30
n-Propylbenzene	ND	250	121			108	110	1.8	70 - 130	30
p-Isopropyltoluene	ND	250	125			111	113	1.8	70 - 130	30
sec-Butylbenzene	ND	250	120			107	109	1.9	70 - 130	30
tert-Butylbenzene	ND	250	123			109	112	2.7	70 - 130	30
trans-1,4-dichloro-2-butene	ND	250	123			104	113	8.3	70 - 130	30
% 1,2-dichlorobenzene-d4	100	%	100			98	99	1.0	70 - 130	30
% Bromofluorobenzene	96	%	103			101	101	0.0	70 - 130	30
% Dibromofluoromethane	95	%	96			96	96	0.0	70 - 130	30
% Toluene-d8	96	%	98			99	98	1.0	70 - 130	30

l,m


Comment:

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

- l = This parameter is outside laboratory LCS/LCSD specified recovery limits.
- m = This parameter is outside laboratory MS/MSD specified recovery limits.
- r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference


 Phyllis Shiller, Laboratory Director
 August 26, 2022

Friday, August 26, 2022

Criteria: CT: GAM, GBM, I/C, RC

State: CT

Sample Criteria Exceedances Report

GCL98794 - TIGHE

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units
CL98794	\$PEST_SMR	4,4' -DDE	CT / RSR GA,GAA (mg/kg) / APS Organics	12	2.8	3	3	ug/Kg
CL98794	\$PEST_SMR	4,4' -DDD	CT / RSR GA,GAA (mg/kg) / APS Organics	19	14	3	3	ug/Kg
CL98794	TCLP-PB	TCLP Lead	CT / RSR GA (mg/l) TCLP / Inorganic/PCB	0.042	0.010	0.015	0.015	mg/L
CL98795	\$PEST_SMR	4,4' -DDD	CT / RSR GA,GAA (mg/kg) / APS Organics	6.0	2.0	3	3	ug/Kg
CL98796	\$PEST_SMR	4,4' -DDE	CT / RSR GA,GAA (mg/kg) / APS Organics	11	2.6	3	3	ug/Kg
CL98796	\$PEST_SMR	4,4' -DDD	CT / RSR GA,GAA (mg/kg) / APS Organics	20	13	3	3	ug/Kg
CL98796	TCLP-PB	TCLP Lead	CT / RSR GA (mg/l) TCLP / Inorganic/PCB	0.037	0.010	0.015	0.015	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedances. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedance information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



REASONABLE CONFIDENCE PROTOCOL LABORATORY ANALYSIS QA/QC CERTIFICATION FORM

Laboratory Name: Phoenix Environmental Labs, Inc.

Client: Tighe & Bond

Project Location: BRUSH RESERVOIR DAM

Project Number:

Laboratory Sample ID(s): CL98794-CL98797

Sampling Date(s): 8/5/2022

List RCP Methods Used (e.g., 8260, 8270, et cetera) 1311/1312, 6010, 7470/7471, 8081, 8082, 8260, 8270, ETPH

1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the CT DEP method-specific Reasonable Confidence Protocol documents?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1A	Were the method specified preservation and holding time requirements met?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
1B	<u>VPH and EPH methods only:</u> Was the VPH or EPH method conducted without significant modifications (see section 11.3 of respective RCP methods)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> NA
2	Were all samples received by the laboratory in a condition consistent with that described on the associated Chain-of-Custody document(s)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
3	Were samples received at an appropriate temperature (< 6 Degrees C)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
4	Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? See Sections: PEST Narration, SVOA Narration, VOA Narration.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
5	a) Were reporting limits specified or referenced on the chain-of-custody? b) Were these reporting limits met?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the Reasonable Confidence Protocol documents?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
7	Are project-specific matrix spikes and laboratory duplicates included in the data set?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

Notes: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1A or 1B is "No", the data package does not meet the requirements for "Reasonable Confidence". This form may not be altered and all questions must be answered.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete.

Authorized Signature: Greg Lawrence **Position:** Assistant Lab Director

Printed Name: Greg Lawrence **Date:** Friday, August 26, 2022

Name of Laboratory Phoenix Environmental Labs, Inc.

This certification form is to be used for RCP methods only.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



RCP Certification Report

August 26, 2022

SDG I.D.: GCL98794

SDG Comments

Metals Analysis:

The client requested a shorter list of elements than the 6010 RCP list. Only the RCRA 8 Metals are reported as requested on the chain of custody. The following analytes from the 6010 RCP Metals list were not reported: Antimony, Beryllium, Copper, Nickel, Thallium, Vanadium, Zinc.

Cyanide Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument:

LACHAT 08/10/22-1 Dan Kinney, Greg Danielewski, Chemist 08/10/22

CL98794 , CL98795 , CL98796 , CL98797

The samples were distilled in accordance with the method.

The initial calibration met criteria.

The calibration check standards (ICV,CCV) were within 15% of true value and were analyzed at a frequency of one per ten samples.

The continuing calibration blanks (ICB,CCB) had concentrations less than the reporting level.

The method blank, laboratory control sample (LCS), and matrix spike were distilled with the samples.

QC (Batch Specific):

Batch 636804 (CL97220)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 80 - 120 with the following exceptions: None.

Additional: LCS acceptance range is 80-120% for soils MS acceptance range 75-125% for soils

ETPH Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument:

AU-FID11 08/08/22-1 Jeff Bucko, Chemist 08/08/22

CL98794 (1X), CL98795 (1X), CL98796 (1X)

The initial calibration (ETPH510I) RSD for the compound list was less than 30% except for the following compounds: None.

As per section 7.2.3, a discrimination check standard was run (808A003_1) and contained the following outliers: None.

The continuing calibration %D for the compound list was less than 30% except for the following compounds:None.

AU-FID21 08/08/22-1 Jeff Bucko, Chemist 08/08/22

CL98797 (1X)

The initial calibration (ET_0705I) RSD for the compound list was less than 30% except for the following compounds: None.

As per section 7.2.3, a discrimination check standard was run (808A003_1) and contained the following outliers: None.

The continuing calibration %D for the compound list was less than 30% except for the following compounds:None.

QC (Batch Specific):

Batch 636327 (CL98712)



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SDG I.D.: GCL98794

ETPH Narration

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 60 - 120 with the following exceptions: None.

All LCSD recoveries were within 60 - 120 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

Additional surrogate criteria: LCS acceptance range is 60-120% MS acceptance range 50-150%. The ETPH/DRO LCS has been normalized based on the alkane calibration.

Mercury Narration

Were all QA/QC performance criteria specified in the analytical method achieved? Yes.

Instrument:

MERLIN 08/08/22 15:04 Ian Enders, Chemist 08/08/22

CL98794, CL98795, CL98796, CL98797

The method preparation blank, ICB, and CCBs contain all of the acids and reagents as the samples.

The initial calibration met all criteria including a standard run at or below the reporting level.

All calibration verification standards (ICV, CCV) met criteria.

All calibration blank verification standards (ICB, CCB) met criteria.

The matrix spike sample is used to identify spectral interference for each batch of samples, if within 85-115%, no interference is observed and no further action is taken.

The following Initial Calibration Verification (ICV) compounds did not meet criteria: None.

The following Continuing Calibration Verification (CCV) compounds did not meet criteria: None.

MERLIN 08/10/22 08:55 Ian Enders, Chemist 08/10/22

CL98794, CL98795, CL98796, CL98797

The method preparation blank, ICB, and CCBs contain all of the acids and reagents as the samples.

The initial calibration met all criteria including a standard run at or below the reporting level.

All calibration verification standards (ICV, CCV) met criteria.

All calibration blank verification standards (ICB, CCB) met criteria.

The matrix spike sample is used to identify spectral interference for each batch of samples, if within 85-115%, no interference is observed and no further action is taken.

The following Initial Calibration Verification (ICV) compounds did not meet criteria: None.

The following Continuing Calibration Verification (CCV) compounds did not meet criteria: None.

QC (Batch Specific):

Batch 636390 (CL99020)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 80 - 120 with the following exceptions: None.

Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.

Batch 636793 (CL98935)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 70 - 130 with the following exceptions: None.

All LCSD recoveries were within 70 - 130 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 70-130%. MS acceptance range is 75-125%.



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Mercury Narration

ICP Metals Narration

Were all QA/QC performance criteria specified in the analytical method achieved? Yes.

Instrument:

ARCOS 08/08/22 08:46 Emily Kolominskaya, Tina Hall, Chemist 08/08/22
CL98794, CL98795, CL98796, CL98797

Additional criteria for CCV and ICSAB:

Sodium and Potassium are poor performing elements, the laboratory's in-house limits are 85-115% (CCV) and 70-130% (ICSAB). The linear range is defined daily by the calibration range.

The following Initial Calibration Verification (ICV) compounds did not meet criteria: None.

The following Continuing Calibration Verification (CCV) compounds did not meet criteria: None.

The following ICP Interference Check (ICSAB) compounds did not meet criteria: None.

ARCOS 08/10/22 08:18 Emily Kolominskaya, Tina Hall, Chemist 08/10/22

CL98794, CL98795, CL98796, CL98797

Additional criteria for CCV and ICSAB:

Sodium and Potassium are poor performing elements, the laboratory's in-house limits are 85-115% (CCV) and 70-130% (ICSAB). The linear range is defined daily by the calibration range.

The following Initial Calibration Verification (ICV) compounds did not meet criteria: None.

The following Continuing Calibration Verification (CCV) compounds did not meet criteria: None.

The following ICP Interference Check (ICSAB) compounds did not meet criteria: None.

BLUE 08/23/22 07:36 Cindy Pearce, Chemist 08/23/22

CL98794, CL98796

The initial calibration met criteria.

The continuing calibration standards met criteria for all the elements reported. The linear range is defined daily by the calibration range.

The continuing calibration blanks were less than the reporting level for the elements reported.

The ICSA and ICSAB were analyzed at the beginning and end of the run and were within criteria. The linear range is defined daily by the calibration range.

The following Initial Calibration Verification (ICV) compounds did not meet criteria: None.

The following Continuing Calibration Verification (CCV) compounds did not meet criteria: None.

The following ICP Interference Check (ICSAB) compounds did not meet criteria: None.

QC (Batch Specific):

Batch 638534 (CM10305)

CL98794, CL98796

All LCS recoveries were within 80 - 120 with the following exceptions: None.

All LCSD recoveries were within 80 - 120 with the following exceptions: None.

All LCS/LCSD RPDs were less than 20% with the following exceptions: None.

Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

QC (Site Specific):

Batch 636329 (CL98797)

CL98794, CL98795, CL98796, CL98797



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Certification Report

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ICP Metals Narration

All LCS recoveries were within 75 - 125 with the following exceptions: None.
All LCSD recoveries were within 75 - 125 with the following exceptions: None.
All LCS/LCSD RPDs were less than 35% with the following exceptions: None.
All MS recoveries were within 75 - 125 with the following exceptions: None.
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

Batch 636393 (CL98794)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 80 - 120 with the following exceptions: None.
All LCSD recoveries were within 80 - 120 with the following exceptions: None.
All LCS/LCSD RPDs were less than 20% with the following exceptions: None.
All MS recoveries were within 75 - 125 with the following exceptions: None.
Additional Criteria: LCS acceptance range is 80-120% MS acceptance range 75-125%.

PCB Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument:

AU-ECD24 08/10/22-1 Saadia Chudary, Chemist 08/10/22

CL98794 (10X), CL98796 (10X), CL98797 (10X)

The initial calibration (PC804AI) RSD for the compound list was less than 20% except for the following compounds: None.
The initial calibration (PC804BI) RSD for the compound list was less than 20% except for the following compounds: None.
The continuing calibration %D for the compound list was less than 15% except for the following compounds:

Samples: CL98796, CL98797

Preceding CC 810B014 - None.

Succeeding CC 810B028 - PCB 1260 -17%L (%)

Samples: CL98794

Preceding CC 810B028 - PCB 1260 -17%L (%)

Succeeding CC 810B041 - None.

AU-ECD29 08/09/22-1 Saadia Chudary, Chemist 08/09/22

CL98795 (10X)

The initial calibration (PC617AI) RSD for the compound list was less than 20% except for the following compounds: None.
The initial calibration (PC617BI) RSD for the compound list was less than 20% except for the following compounds: None.
The continuing calibration %D for the compound list was less than 15% except for the following compounds:

Samples: CL98795

Preceding CC 809B021 - PCB 1016 -18%L (%), PCB 1260 -18%L (%)

Succeeding CC 809B035 - None.

QC (Batch Specific):

Batch 636707 (CL98509)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 40 - 140 with the following exceptions: None.
All LCSD recoveries were within 40 - 140 with the following exceptions: None.
All LCS/LCSD RPDs were less than 30% with the following exceptions: None.



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RCP Certification Report

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SDG I.D.: GCL98794

PEST Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? No.

QC Batch 636712 (Samples: CL98795): -----

The LCS/LCSD for one analyte is below the method criteria. A low bias for this analyte is possible. (d-BHC)

Instrument:

AU-ECD35 08/24/22-1

Adam Werner, Chemist 08/24/22

CL98794 (1X), CL98796 (1X)

The initial calibration (PS0809AI) RSD for the compound list was less than 20% except for the following compounds: None.

The initial calibration (PS0809BI) RSD for the compound list was less than 20% except for the following compounds: None.

The Endrin and DDT breakdown does not exceed 15% except for the following compounds:None.

The Endrin and DDT breakdown does not exceed the maximum of 20% except for the following compounds:None.

The continuing calibration %D for the compound list was less than 20% except for the following compounds:

Samples: CL98794, CL98796

Preceding CC 824A043 - Endrin -29%L (20%)

Succeeding CC 824A070 - 4,4'-DDD 21%H (20%), Endrin -25%L (20%)

A low "1A" standard was run after the samples to demonstrate capability to detect any compounds outside of the CC acceptance criteria. All reported samples were ND for the affected compounds.

AU-ECD4 08/08/22-1

Adam Werner, Chemist 08/08/22

CL98796 (2X)

The initial calibration (PS0728AI) RSD for the compound list was less than 20% except for the following compounds: None.

The initial calibration (PS0728BI) RSD for the compound list was less than 20% except for the following compounds: None.

The Endrin and DDT breakdown does not exceed 15% except for the following compounds:None.

The Endrin and DDT breakdown does not exceed the maximum of 20% except for the following compounds:None.

The continuing calibration %D for the compound list was less than 20% except for the following compounds:

Samples: CL98796

Preceding CC 808B015 - d-BHC 21%H (20%)

Succeeding CC 808B028 - d-BHC 46%H (20%)

AU-ECD6 08/08/22-1

Adam Werner, Chemist 08/08/22

CL98794 (2X), CL98797 (2X)

The initial calibration (PS0803AI) RSD for the compound list was less than 20% except for the following compounds: None.

The initial calibration (PS0803BI) RSD for the compound list was less than 20% except for the following compounds: None.

The Endrin and DDT breakdown does not exceed 15% except for the following compounds:None.

The Endrin and DDT breakdown does not exceed the maximum of 20% except for the following compounds:None.

The continuing calibration %D for the compound list was less than 20% except for the following compounds:None.

AU-ECD7 08/11/22-1

Adam Werner, Chemist 08/11/22

CL98795 (2X)

The initial calibration (PS630AI) RSD for the compound list was less than 20% except for the following compounds: None.

The initial calibration (PS630BI) RSD for the compound list was less than 20% except for the following compounds: None.

The Endrin and DDT breakdown does not exceed 15% except for the following compounds:None.

The Endrin and DDT breakdown does not exceed the maximum of 20% except for the following compounds:None.

The continuing calibration %D for the compound list was less than 20% except for the following compounds:None.

QC (Batch Specific):

Batch 636712 (CM00510)



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SDG I.D.: GCL98794

PEST Narration

CL98795

All LCS recoveries were within 40 - 140 with the following exceptions: d-BHC(35%)
All LCSD recoveries were within 40 - 140 with the following exceptions: d-BHC(38%)
All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

Batch 638834 (CM10530)

CL98794, CL98796

All LCS recoveries were within 40 - 140 with the following exceptions: None.
All LCSD recoveries were within 40 - 140 with the following exceptions: None.
All LCS/LCSD RPDs were less than 20% with the following exceptions: None.

QC (Site Specific):

Batch 636293 (CL98797)

CL98794, CL98796, CL98797

All LCS recoveries were within 40 - 140 with the following exceptions: None.
All LCSD recoveries were within 40 - 140 with the following exceptions: None.
All LCS/LCSD RPDs were less than 30% with the following exceptions: None.
All MS recoveries were within 30 - 150 with the following exceptions: None.
All MSD recoveries were within 30 - 150 with the following exceptions: None.
All MS/MSD RPDs were less than 30% with the following exceptions: None.

SVOA Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? No.

QC Batch 636323 (Samples: CL98794, CL98795, CL98796, CL98797): -----

The LCS/LCSD RPD exceeds the method criteria for one analyte, but this analyte was not reported in the sample(s) so no variability is suspected. (Aniline)

The QC recoveries for one analyte is below the method criteria. A low bias is likely. (Benzidine)

The QC recovery for one analyte is above the upper range but was not reported in the sample(s), therefore no significant bias is suspected. (2-Nitroaniline)

Instrument:

CHEM07 08/05/22-1

Matt Richard, Chemist 08/05/22

CL98794 (1X), CL98795 (1X), CL98796 (1X), CL98797 (1X)

For 8270 full list, the DDT breakdown and pentachlorophenol & benzidine peak tailing were evaluated in the DFTPP tune and were found to be in control.

For 8270 BN list, benzidine peak tailing was evaluated in the DFTPP tune and was found to be in control.

Initial Calibration Evaluation (CHEM07/7_SPLIT_0715):

100% of target compounds met criteria.

The following compounds had %RSDs >20%: None.

The following compounds did not meet recommended response factors: % 2,4,6-Tribromophenol 0.047 (0.05), Hexachlorobenzene 0.074 (0.1)

The following compounds did not meet a minimum response factors: % 2,4,6-Tribromophenol 0.047 (0.05)



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SDG I.D.: GCL98794

SVOA Narration

Continuing Calibration Verification (CHEM07/0805_03-7_SPLIT_0715):

Internal standard areas were within 50 to 200% of the initial calibration with the following exceptions: None.
99% of target compounds met criteria.

The following compounds did not meet % deviation criteria: Pyridine 31%L (30%)

The following compounds did not meet maximum % deviations: None.

The following compounds did not meet recommended response factors: Hexachlorobenzene 0.081 (0.1)

The following compounds did not meet minimum response factors: None.

QC (Batch Specific):

Batch 636323 (CL93373)

CL98794, CL98795, CL98796, CL98797

All LCS recoveries were within 40 - 140 with the following exceptions: 2-Nitroaniline(199%), Benzidine(<10%)

All LCSD recoveries were within 40 - 140 with the following exceptions: 2-Nitroaniline(>200%), Benzidine(<10%)

All LCS/LCSD RPDs were less than 30% with the following exceptions: Aniline(53.8%)

Additional 8270 criteria: 20% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 15-110%, for soils 30-130%)

VOA Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? No.

QC Batch 636490 (Samples: CL98794, CL98795, CL98796): -----

The LCS recovery is above the upper range for one analyte that was not reported in the sample(s), therefore no significant bias is suspected. (Dichlorodifluoromethane)

The LCSD recovery is below the lower range. All of the other QC is acceptable, therefore no significant bias is suspected. (Acrylonitrile)

QC Batch 636698H: -----

The LCS or the LCSD recovery is above the upper range for one or more analytes that were not reported in the sample(s), therefore no significant bias is suspected. (1,2,4-Trichlorobenzene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, 2-Chlorotoluene, 2-isopropyltoluene, 4-Chlorotoluene, Hexachlorobutadiene, Isopropylbenzene, n-Butylbenzene, n-Propylbenzene, p-Isopropyltoluene, sec-Butylbenzene, tert-Butylbenzene)

The QC recovery for one analyte is above the upper range but was not reported in the sample(s), therefore no significant bias is suspected. (Naphthalene)

Instrument:

CHEM03 08/08/22-1

Jane Li, Chemist 08/08/22

CL98794 (50X), CL98796 (50X), CL98797 (1X)

Initial Calibration Evaluation (CHEM03/VT-L080322):

98% of target compounds met criteria.

The following compounds had %RSDs >20%: Acetone 34% (20%), Methylene chloride 28% (20%)

The following compounds did not meet Table 4 recommended minimum response factors: Acetone 0.060 (0.1), Tetrachloroethene 0.188 (0.2)



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VOA Narration

The following compounds did not meet the minimum response factor of 0.05: None.

Continuing Calibration Verification (CHEM03/0808_02-VT-L080322):

Internal standard areas were within 50 to 200% of the initial calibration with the following exceptions: None.
100% of target compounds met criteria.

The following compounds did not meet % deviation criteria: None.

The following compounds did not meet maximum % deviations: None.

The following compounds did not meet Table 4 recommended minimum response factors: None.

CHEM26 08/05/22-2 Jane Li, Chemist 08/05/22

CL98794 (1X), CL98795 (1X), CL98796 (1X)

Initial Calibration Evaluation (CHEM26/VT-080222):

95% of target compounds met criteria.

The following compounds had %RSDs >20%: Acetone 22% (20%), Bromoform 23% (20%), trans-1,3-Dichloropropene 22% (20%), trans-1,4-dichloro-2-butene 38% (20%)

The following compounds did not meet Table 4 recommended minimum response factors: None.

The following compounds did not meet the minimum response factor of 0.05: None.

Continuing Calibration Verification (CHEM26/0805_37-VT-080222):

Internal standard areas were within 50 to 200% of the initial calibration with the following exceptions: None.
100% of target compounds met criteria.

The following compounds did not meet % deviation criteria: None.

The following compounds did not meet maximum % deviations: None.

The following compounds did not meet Table 4 recommended minimum response factors: None.

QC (Batch Specific):

Batch 636490 (CL98564) CHEM26 8/5/2022-2

CL98794(1X), CL98795(1X), CL98796(1X)

All LCS recoveries were within 70 - 130 with the following exceptions: Dichlorodifluoromethane(131%)

All LCSD recoveries were within 70 - 130 with the following exceptions: Acrylonitrile(67%)

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

The Low Level MS/MSD are not reported for this batch.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

Batch 636698 (CL99393) CHEM03 8/8/2022-1

CL98797(1X)

All LCS recoveries were within 70 - 130 with the following exceptions: None.

All LCSD recoveries were within 70 - 130 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

The Low Level MS/MSD are not reported for this batch.

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-160% for Chloroethane-HL and Trichlorofluoromethane-HL.

Batch 636698H (CL99393) CHEM03 8/8/2022-1

CL98794(50X), CL98796(50X)

All LCS recoveries were within 70 - 130 with the following exceptions: 1,2,4-Trichlorobenzene(133%), Naphthalene(135%)

Additional 8260 criteria: 10% of LCS/LCSD compounds can be outside of acceptance criteria as long as recovery is 40-160%, 25-



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SDG I.D.: GCL98794

VOA Narration

160% for Chloroethane-HL and Trichlorofluoromethane-HL.

Temperature Narration

The samples were received at 2.5C with cooling initiated.
(Note acceptance criteria for relevant matrices is above freezing up to 6°C)

Sarah Bell

Subject: FW: Brush Reservoir Dam Additional Analysis

*Note: I am currently working remotely. You may call me directly at my cell number below or email Sarah Bell
Project Manager
Phoenix Environmental Laboratories
587 East Middle Turnpike
Sarah@phoenixlabs.com
(C)860-558-0726
Website: www.phoenixlabs.com

From: Casey Watts <CWatts@TigheBond.com>
Sent: Friday, August 19, 2022 11:19 AM
To: Sarah Bell <sarah@phoenixlabs.com>; Greg Lawrence <greg@phoenixlabs.com>
Cc: Nicholas A. Granata <NAGranata@tighebond.com>
Subject: Brush Reservoir Dam Additional Analysis

Hello Sarah,

Could you add the following additional analyses to the below samples?

Delivery group GCL98794 (BRUSH RESERVOIR DAM):

CL98794 - SED-2: SPLP Pesticides, SPLP Lead
CL98796 - SED-4: SPLP Pesticides, SPLP Lead

Thank you

Casey Watts (*he/him/his*)
Environmental Scientist II



o. 860.704.4804 | m. 203.535.5533

213 Court Street, Suite 1100, Middletown, CT 06457

w: tighebond.com | halvorsondesign.com



APPENDIX B – HAZARDOUS BUILDING MATERIALS ASSESSMENT

Suspect Asbestos-Containing Materials Bulk Sampling Summary Aquarion Water Company (AWC) Brush Reservoir Dam

To: Dennis Fields
FROM: Bob Hobbins
DATE: January 27, 2023

On January 17, 2023, Tighe & Bond, Inc. (Tighe & Bond) conducted suspect asbestos-containing materials (ACM) bulk sampling at the Aquarion Water Company's (AWC) Brush Reservoir Dam, located at Barn Hill Road in North Stamford, Connecticut (the "Site"). This sampling was conducted in support of planned repairs and removal to the existing dam structure (the "Project"). This work was performed in accordance with our Agreement dated December 19, 2022.

Prior to any type of building/structure demolition or renovation, a thorough investigation is required to identify and quantify asbestos-containing materials (ACM) which may be impacted by the Project. The investigation is required by the following regulations:

- United States Environmental Protection Agency (EPA) National Emissions Standard for Hazardous Air Pollutants (NESHAP) regulations (Title 40 CFR, Part 61, Subpart M)
- State of Connecticut Department of Public Health (CTDPH) Standards for Asbestos Abatement (19a-332a-1 – 19a-332a-23)
- Occupational Safety and Health Administration (OSHA) 29 CFR Part 1926.1101 Asbestos in Construction regulations.

The bulk sampling was conducted by Tighe & Bond's State of Connecticut-licensed Asbestos – Inspector John (Bob) Hobbins (CTDPH License #000700). A copy of Mr. Hobbins' license is attached to this report. Descriptions of the sampling and assessment efforts for the work are provided below.

Bulk Sampling

The asbestos bulk sampling was performed within the existing dam structure in support of planned repair and removal activities to determine the presence or absence of ACM. The number of bulk samples of suspect ACM from each homogenous group of materials were collected in general accordance with standards described in the EPA Asbestos Hazard and Emergency Response Act (AHERA) Regulations as required by EPA NESHAP regulations.

The EPA and OSHA define a material that contains greater than one percent (>1%) asbestos, utilizing PLM/DS, as being an ACM, while CTDPH defines ($\geq 1\%$) asbestos as being an ACM. Materials that are identified as "none detected" are specified as not containing asbestos. Materials containing less than one percent (<1%) asbestos are regulated to a degree by OSHA related to work practices, worker exposure, and waste containerization.

The sampled materials were collected in accordance with the EPA requirements and submitted to EMSL Analytical Inc. (EMSL) in Cinnaminson, New Jersey, for asbestos analysis via Polarized Light Microscopy (PLM) using EPA approved protocol in accordance with the National Institute of Standards and Technology (NIST).

Results

Suspect materials identified and sampled on January 17, 2023, by Tighe & Bond, were determined to be non-asbestos containing as defined by the EPA and CTDPH.

Refer to Table 1 for a complete inventory of suspect ACM identified and sampled during this sampling event. Attached for reference is laboratory analytical results and chain-of-custody forms for the suspect ACM sampled.

A photographic log of conditions found at the Site during the sampling is included in this report. Tighe & Bond's sampling activities and report are subject to the Hazardous Building Materials Assessment (HBMA) Limitations which is attached to this memorandum.

Dear JOHN R. HOBBS,

Attached you will find your validated certificate for the coming year. Should you have any questions about your certificate renewal, please do not hesitate to write or call:

Department of Public Health
P.O. Box 340308
M.S.#12MQA
Hartford, CT 06134-0308

(860) 509-7603
opl.c.dph@ct.gov
www.ct.gov/dph/license

Sincerely,

MANISHA JUTHANI, MD, COMMISSIONER
DEPARTMENT OF PUBLIC HEALTH

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT

THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A

ASBESTOS CONSULTANT-INSPECTOR

JOHN R. HOBBS

CERTIFICATE NO
000700
CURRENT THROUGH
01/31/23
VALIDATION NO
03-931820

SIGNATURE:

COMMISSIONER:

EMPLOYER'S COPY

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME
JOHN R. HOBBS
PROFESSION
ASBESTOS CONSULTANT-INSPECTOR
VALIDATION NO
03-931820
CERTIFICATE NO
000700
CURRENT THROUGH
01/31/23

SIGNATURE:

COMMISSIONER:

INSTRUCTIONS:

1. Detach and sign each of the cards on this form
2. Display the large card in a prominent place in your office or place of business.
3. The wallet card is for you to carry on your person. If you do not wish to carry the wallet card, place it in a secure place.
4. The employer's copy is for persons who must demonstrate current licensure/certification in order to retain employment or privileges. The employer's card is to be presented to the employer and kept by them as a part of your personnel file. Only one copy of this card can be supplied to you.

WALLET CARD

STATE OF CONNECTICUT
DEPARTMENT OF PUBLIC HEALTH

NAME
JOHN R. HOBBS
PROFESSION
ASBESTOS CONSULTANT-INSPECTOR
VALIDATION NO
03-931820
CERTIFICATE NO
000700
CURRENT THROUGH
01/31/23

SIGNATURE:

COMMISSIONER:

Big Apple Occupational Safety Inc

505 Eighth Avenue, #2305, New York, NY 10018
(212) 564-7656

This Is To Certify That

John R Hobbins

SS#: xxx-xx-xxxx

has successfully completed the New York State Department of Health approved course entitled
This course meets requirements of TSCA Title II

Asbestos Inspector Refresher - ONLINE WEBINAR

*(The official record of successful completion is the DOH 2832 Certificate of completion
New York State Department of Health Certificate of Asbestos Safety Training)*

Course Date: 09/27/2022

Expiration Date: 09/27/2023

Certificate Number: 918039

Examination Date: 09/27/2022

Examination Grade: 84%


Radha Reddy
Training Director



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com> / cinnaslab@EMSL.com

EMSL Order: 042301429

Customer ID: TIGH62

Customer PO:

Project ID:

Attention: J. Hobbins
Tighe & Bond
213 Court Street
Suite 1100
Middletown, CT 06457

Phone: (860) 704-4760

Fax: (860) 704-4775

Received Date: 01/18/2023 9:15 AM

Analysis Date: 01/19/2023

Collected Date: 01/17/2023

Project: AWC Brush Reservoir Dam / 10-1000-195 Barn Hill Rd, Greenwich, CT

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
23-0117-PLM-BH-01 <small>042301429-0001</small>	Dam Crest - Asphalt Coating	Black Non-Fibrous Homogeneous	HA: 1	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-02 <small>042301429-0002</small>	Dam Crest - Asphalt Coating	Black Non-Fibrous Homogeneous	HA: 1	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-03 <small>042301429-0003</small>	Dam Face (Downstream Side) - Shot-Crete Coating	Gray Non-Fibrous Homogeneous	HA: 2	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-04 <small>042301429-0004</small>	Dam Face (Upstream Side) - Shot-Crete Coating	Gray Non-Fibrous Homogeneous	HA: 2	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-05 <small>042301429-0005</small>	Dam Face (Downstream Side) - Base Coating	Gray Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-06 <small>042301429-0006</small>	Dam Face (Upstream Side) - Base Coating	Gray Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
23-0117-PLM-BH-07 <small>042301429-0007</small>	Spillway Wall - Base Coating	Gray Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected

Analyst(s)

Corinne Lunden (3)

Michelle Quach (4)

Samantha Rundstrom, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA LAP, LLC-IHLAP Lab 100194, NJ DEP 03036, PA ID# 68-00367, LA #04127

Initial report from: 01/19/2023 11:04:39

Tighe&Bond

042301429

213 Court Street, Suite 1100, Middletown, CT 06457

Phone 860-704-4760

SAMPLE LOG FOR ASBESTOS BULKS

Sheet 1 of 1

Project Name: AWC Brush Reservoir Dam

Project No. 10-1000-195

Building: Barn Hill Rd., Greenwich, CT

Project Manager: Dan Valentine

Sample ID	HA #	Material Description	Color	Sample Location
23-0117-PLM-BH-01	01	Asphalt Coating	Black	Dam Crest
23-0117-PLM-BH-02	01	Asphalt Coating	Black	Dam Crest
23-0117-PLM-BH-03	02	Shot-Crete Coating	Gray	Dam Face (downstream side)
23-0117-PLM-BH-04	02	Shot-Crete Coating	Gray	Dam Face (upstream side)
23-0117-PLM-BH-05	03	Base Concrete	Gray	Dam Face (downstream side)
23-0117-PLM-BH-06	03	Base Concrete	Gray	Dam Face (upstream side)
23-0117-PLM-BH-07	03	Base Concrete	Gray	Spillway Wall

TOTAL # OF SAMPLES: 7 State sample collected in: CT Customer ID: TIGH62
 Analysis Method: PLM TEM-NOB Point CT - 400 Other Stop Positive - Homogeneous Areas (HA#)

Turnaround Time (check one): 3-hr 6-hr 24-hr 48-hr 72-hr 96-hr 1-week 2-week
 Please call the office if analyses will be late at: _____

Email Results to: jhobbins@tighebond.com **Do Not Mail Hard Copy Report**

Special Instructions: Do not layer samples unless indicated. Do Not Point Count.

Samples collected by: Bob Hobbins **Date:** 1/17/23 **Time:** _____

Samples Relinquished by: BH **Date:** 1/17/23 **Time:** _____

Samples Received by: MB-EX **Date:** 1-18-23 **Time:** 9:5A

Shipped To: EMSL State NJ Other _____

Method of Shipment: Overnight (Check one: Fed Ex / UPS) Other _____

RECEIVED
 EMSL
 GINNAMINSON, N.J.
 2023 JAN 18 AM 10:26

731

AWC Brush Reservoir Dam— Existing Conditions

Client: Aquarion Water Company (AWC)

Job Number: A-1000-195

Site: Brush Reservoir Dam



AWC Brush Reservoir Dam— Existing Conditions

Client: Aquarion Water Company (AWC)

Job Number: A-1000-195

Site: Brush Reservoir Dam



AWC Brush Reservoir Dam— Existing Conditions

Client: Aquarion Water Company (AWC)

Job Number: A-1000-195

Site: Brush Reservoir Dam



AWC Brush Reservoir Dam— Existing Conditions

Client: Aquarion Water Company (AWC)

Job Number: A-1000-195

Site: Brush Reservoir Dam

Photograph No.: 7

Date: 1/17/2023

Direction Taken: South

Description: Washed Out Area Below Downstream Face



Photograph No.: 8

Date: 1/17/2023

Direction Taken: South

Description: Damaged Shot-Crete on Downstream Face



AWC Brush Reservoir Dam— Existing Conditions

Client: Aquarion Water Company (AWC)

Job Number: A-1000-195

Site: Brush Reservoir Dam



Hazardous Building Material Assessment (HBMA) Limitations

Tighe&Bond

1. This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in accordance with the Agreement and the provisions thereof. Documents provided on this project shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party without the prior written consent of Tighe & Bond. Reuse of documents by Client or others without Tighe & Bond's written permission and mutual agreement shall be at the user's sole risk, without liability on Tighe & Bond's part and Client agrees to indemnify and hold Tighe & Bond harmless from all claims, damages, and expenses, including attorney's fees, arising out of such unauthorized use or reuse.
2. Tighe & Bond performed the HBMA in accordance with our Agreement (including any stated scope and schedule limitations) and used the degree of care and skill ordinarily exercised under similar circumstances by members of the profession practicing in the same or similar locality. The HBMA may not identify all regulated building materials as our scope may be limited to certain locations within an identified structure(s). Tighe & Bond performed the HBMA using reasonable methods to access and identify the presence of suspect materials. Therefore, additional suspect materials may be enclosed/hidden in inaccessible areas, including within the interior of walls, beneath slabs, above fixed ceilings or otherwise not readily accessible. Occupied buildings spaces, including the presence of tenant/building owner's materials may have restricted our access or observations of suspect materials. Tighe & Bond did not access or disassemble electrical/mechanical equipment. If applicable and to the extent feasible, we recommend supplemental evaluations following full building vacancy.
3. Unless otherwise noted, sampling of building materials for polychlorinated biphenyls (PCBs) was not performed and the evaluation of the potential presence of mold was not completed.
4. If an Opinion of Probable Construction Costs (OPCC) is provided, Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the contractor's method of pricing, and that the opinion of probable costs is made on the basis of Tighe & Bond's professional judgment and experience is based on currently available information. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the actual costs of the construction work will not vary from the OPCC.
5. This report is not intended to be utilized as a bidding document or as a project specification document. This report was prepared for use by the building owner and project team (i.e. architect, construction manager, general contractor, demolition contractor, abatement contractor) for locating identified hazardous regulated building materials within the contracted limits of the scope of services.

APPENDIX C – PERMITS AND APPROVALS

STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
DRINKING WATER SECTION

www.ct.gov/dph/publicdrinkingwater

WATER COMPANY LAND PERMIT APPLICATION

This application must be submitted when a water company intends to sell, lease, transfer or assign Class I or II water company land or intends to change the use of Class I or II water company land per Connecticut General Statutes (CGS) Section 25-32. The following information should be supplied by the current administrative official of the water company. Refer to the Regulations of Connecticut State Agencies (RCSA) Sec. 25-37d-1 through 9 for information on the water company land application review process. Electronic submission of applications and attachments is permissible, provided that the applications include signatures.

Section A. Public Water System and Applicant Information

PWS Name: Aquarion Water Co of CT - Main System

Project Name: Brush Reservoir Dam Improvements

Project Address: E Middle Patent Rd, Stamford, CT 06831

PWSID Number: CT150011 PWS Type (select one): Community NTNC TNC

Town: Stamford DPH Project Number (if known): _____

Print Name of PWS Administrative Official: Robert J. Ulrich

Title: Vice President - Supply Operations and Sustainability

Address: 505 Huntington St.

Shelton, CT 06484

Phone Number: (203) 926-4320

Fax Number: _____

E-mail Address: rulrich@aquarionwater.com

Name of Consultant (if applicable) Daniel Valentine

Company Name: Tighe & Bond

Address: 213 Court Street, Suite 1100

Middletown, CT 06457

Phone Number: (860) 704-4760

E-mail Address: DFValentine@tighebond.com

Section B. Basis for Requesting Approval or Permit (select all that apply)

- Formal Enforcement Action (Administrative Order, Consent Order, Notice of Violation (Civil Penalty))
- Violation Identified in Sanitary Survey Report
- Project Identified in Approved Water Supply Plan
- Federal or State Grants or Loans DWSRF STEAP Funds STAG Funds
- Proactive (system improvements or enhancements)
- Other: _____

Section C. Type of Approval or Permit Requested (select all that apply)

- Water Company Land Sale, Lease, Transfer or Assignment (Complete Sections D, E and G)
Check one of the following: Sale Lease Transfer Assignment
- Water Company Owned Lands Change in Use (Complete Sections D, F and G)

Section D. Project Description

Provide a general summary of the proposed project, including the total acreage of each class of water company land to be disturbed or the total acreage of each class of water company land which will be subject to the sale, lease, transfer or assignment or change in use. Refer to CGS Sec. 25-37c for land classification definitions. You may attach additional sheets, if necessary.

See attached sheet for Section D - Project Description

Section E. Supporting Information- Sale, Lease, Transfer or Assignment

Each of the following items should be labeled with the section and number (i.e. Section E – #4). If the item is not applicable, provide the number and indicate “N/A”.

1. Provide a scaled site plan that shows all water company land to be sold, leased, transferred or assigned.
2. Indicate the proposed methods of protective restrictions and enforcement the applicant or other parties will impose on the parcel to be subject to the permit. (If restrictions do not apply uniformly throughout a parcel, attach a map that shows the restrictions that apply to each portion of the parcel.)
3. Provide a draft copy of the sale, lease, transfer or assignment agreement.
4. Provide copies of the notification letter sent to the chief elected and chief executive officials of the towns in which the proposed sale, lease, transfer or assignment will occur. Submit both sides of the certified mail green return receipt or United States Postal Service delivery confirmation.
5. Provide a copy of the “Capacity Evaluation for Water Company Purchase”, completed by the entity to which the land will be sold, leased, transferred or assigned.
6. Provide copies of any deed restrictions or variances.
7. If the applicant is required to prepare a water supply plan pursuant to CGS Section 25-32d, indicate whether the proposed sale, lease, transfer or assignment is consistent with the current approved plan.
8. Provide the sale of a source notification letter required by CGS Section 25-33l and any subsequent correspondence, if applicable.
9. For the lease of Class I water company land associated with groundwater sources, provide copies of the sanitary easements indicating restrictions within the affected sanitary radius.

Section F. Supporting Information- Change in Use

Each of the following items should be labeled with the section and number (i.e. Section F – #4). If the item is not applicable, provide the number and indicate “N/A”.

1. Provide a final scaled project site plan including existing conditions, horizontal and vertical extent of site disturbance including access and permanent and temporary land disturbance. Describe the nature and necessity of the impervious materials used at the site (i.e. pavement). Include any evaluation conducted to determine the impact of the impervious area on the recharge of the water supply sources.
2. Provide copies of the notification letter sent to the chief elected and chief executive officials of the towns in which the proposed project is located. Submit both sides of the certified mail green return receipt or United States Postal Service delivery confirmation.
3. Provide a brief outline of the project (i.e. site preparation, demolition, construction, stabilization); include a spill prevention and emergency response plan or drinking water quality management plan.
4. Indicate the proposed methods of protective restrictions and enforcement that the applicant or other parties will impose on the parcel to be subject to permit, and demonstrate that such change will not have a significant adverse impact upon the present and future purity and adequacy of the public drinking water supply. (If restrictions do not apply uniformly throughout parcel, attach a map which shows the restrictions which apply to each portion of the parcel.)
5. Indicate alternatives that were considered and why this option was chosen.
6. Describe the benefit to the water system as a result of the proposed change to the water company land.
7. Provide copies of any deed restrictions, variances or permits required by other regulatory agencies.
8. Provide a copy of the Revocable License Agreement, if applicable.
9. If any part of the sanitary radius of a groundwater source wellhead is owned by another entity, provide copies of the sanitary easements, if applicable.
10. If the applicant is required to prepare a water supply plan pursuant to CGS Section 25-32d, indicate whether the proposed change in use is consistent with the most current approved plan.
11. Describe the short and long term land improvements designed to protect the water source(s), such as primary or secondary stormwater treatment, addition of native vegetative buffers or other low impact development management practices.

Section G. Certification Statement

I certify to the best of my knowledge that the information provided in this application is complete and correct. I understand that the information I provide will be used by the Department of Public Health, Drinking Water Section to determine if a Permit for the Sale, Lease, Transfer or Assignment or Change in Use of Water Company Land can be granted.

Signature of PWS Administrative Official

Date

Name of PWS Administrative Official (print or type)

Title

Water Company Land Permit Application

Section D – Project Description

Brush Reservoir Dam consists of a concrete gravity dam with a broad crested concrete weir spillway that discharges to an exposed bedrock channel. The reservoir is currently drawn down for dam safety and will continue throughout construction. Once the work is completed the normal pool elevation will be 4.5 feet lower than the current spillway elevation (364.5' vs. 360'). Additional improvements include: replacement of unsound concrete on the face and crest, lowering of concrete crest by one foot, rip rap buttress on the downstream face, extending the low-level outlet pipe, replacing the valve and slide gate, and wetland buffer plantings in the formerly inundated area.

The proposed improvements will result in approximately 0.69 acres of disturbance to Class I Water Company Owned Land. This work includes temporary disturbance to rehabilitate the upstream face, replace the concrete crest, and widen the spillway. This area also includes the formerly inundated area to be planted to establish a wetland buffer.

The proposed improvements will result in approximately 0.20 acres of disturbance of Class II Water Company Owned Land. This work includes construction of the spillway channel and restoration of the downstream channel. Additional disturbance will occur during the placement of rip rap and outlet pipe extension.

Refer to Attachment A for figures of approximate Class I & II land disturbance and scaled site plans.

Water Company Land Permit Application

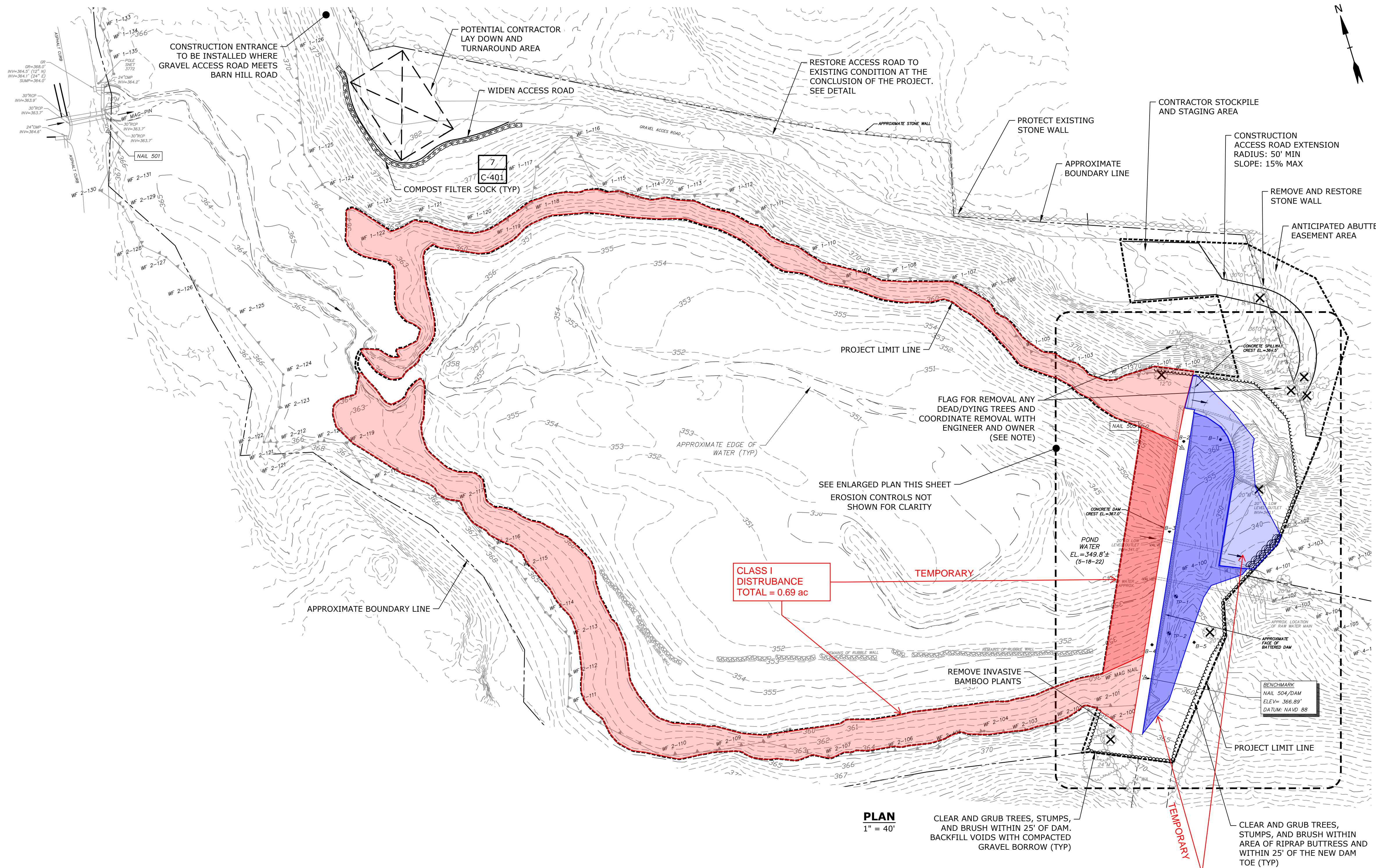
Section F – Supporting Information – Change in Use

1. **Scaled Site Plans:** Refer to Attachment A.
2. **Copy of notification letter and certified receipt:** Refer to Attachment B.
3. **Project Outline:** See attached Executive Summary, DPH’s General Construction Best Management Practices for Sites within Public Water Supply Areas, and DEEP’s Policy Governing Decontamination Procedures for IFD Equipment Used in or on Public Water Supply Reservoirs. Refer to Attachment C.
4. **Proposed methods of protective restrictions and enforcement:** This project is proposed to be constructed within the parcels owned by Aquarion Water Company. The parcel is currently used for water supply and will continue to be used for water supply as a result of this project, as such no significant adverse impact on the present and future purity and adequacy of the public drinking water supply is anticipated.
5. **Alternatives Considered:** Refer to Attachment D.
6. **Benefits to the Water System:** The repairs and upgrades to the dam will allow preservation of the public water system by protecting the reservoir.
7. **Deed Restriction:** N/A
8. **Revocable License Agreement:** N/A
9. **Sanitary Radius Easements:** N/A
10. **Water Supply Plan:** N/A
11. **Long and Short-Term Improvements to Protect Water Sources:** During construction, erosion, sediment control, and spill containment measures will be taken to protect water sources. Long term measures include permanently lowering the spillway elevation normal pool elevation to provide freeboard during the spillway design flood.

Attachment A

NOTE:

1. SEE SPEC SECTION 02200 SITE PREPARATION FOR CLEARING AND GRUBBING DETAILS.
2. TREE REMOVAL SHALL BE TO THE MINIMUM EXTENT PRACTICAL FOR TEMPORARY ACCESS. NOT ALL TREES TO BE REMOVED ARE SHOWN. INSPECT WITH ENGINEER PRIOR TO REMOVAL.



DISTRUBANCE TOTALS:

CLASS I TOTAL = 0.69 ac
(TEMPORARY) = 0.09 ac

CLASS II TOTAL = 0.20 ac
(TEMPORARY) = 0.14 ac

Brush Reservoir Dam Improvements

Aquarion Water Company

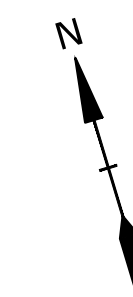
Stamford, Connecticut

MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195A	
DATE:	02/2024	
FILE:	A1000-195A-D-101.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

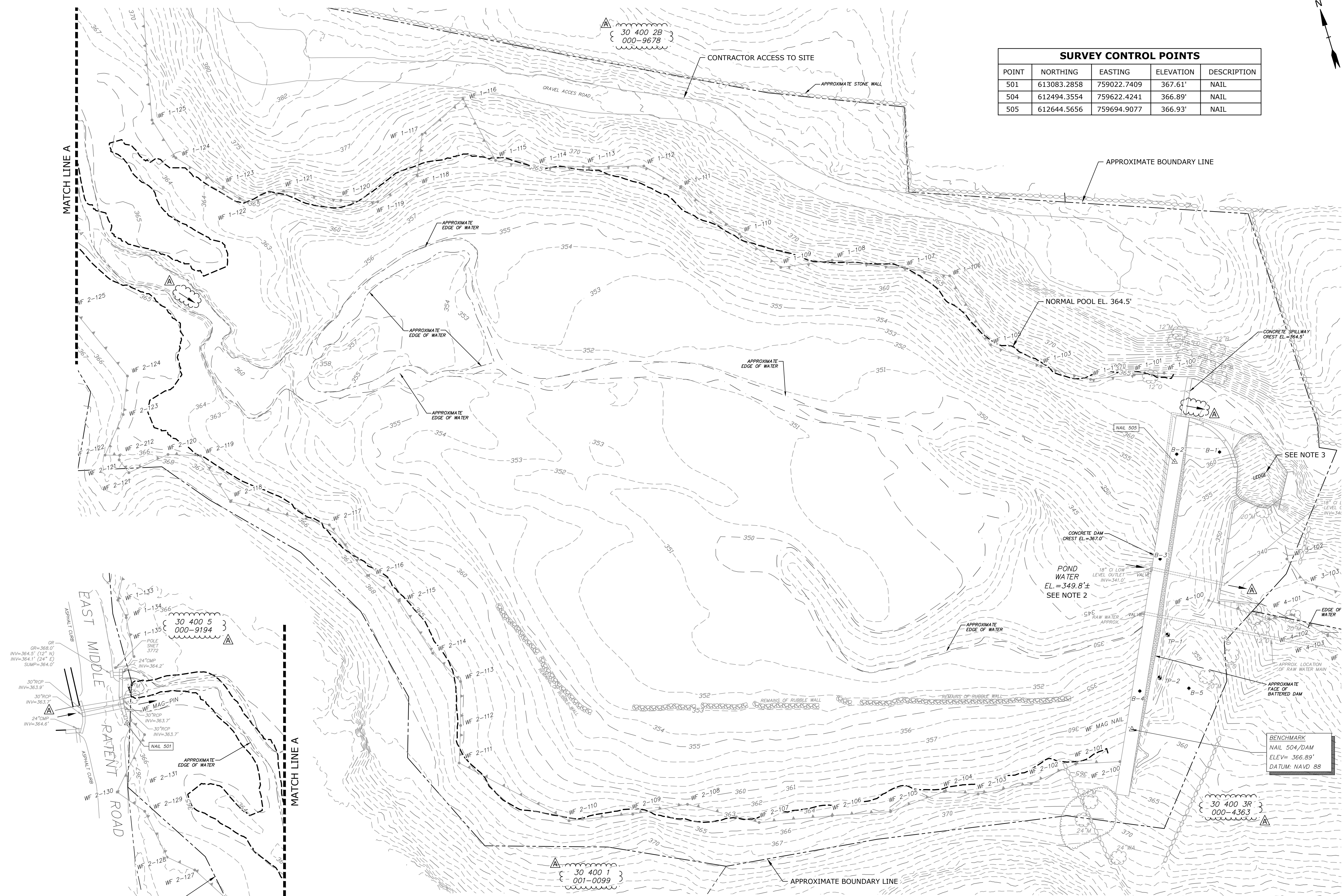
CLASS I & II LAND DISTURBANCE FIGURE

SCALE: AS SHOWN

FIGURE 1

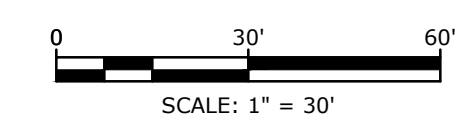


SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	613083.2858	759022.7409	367.61'	NAIL
504	612494.3554	759622.4241	366.89'	NAIL
505	612644.5656	759694.9077	366.93'	NAIL



NOTES

- BOUNDARY LINE SURVEYED BY OTHERS. THIS DRAWING MAKES NO CLAIM TO THE ACCURACY OF THE BOUNDARY SHOWN. BOUNDARY LINES ARE APPROXIMATE AND ARE SHOWN FOR SCHEMATIC PURPOSES ONLY.
- CONTOURS SHOWN BELOW THE POND WATER LINE ON THE DAY OF THE TOPOGRAPHIC SURVEY ON 5-8-22 ARE APPROXIMATE IN NATURE BASED ON AVAILABLE DATA AND SHOULD BE FIELD VERIFIED.
- CONTOURS SHOWN ON THE LEDGE ARE INTERPOLATED BASED ON ELEVATIONS AT THE BORDER AND SHOULD BE FIELD VERIFIED.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
B	1/22/2024	REV PER CTDEEP COMMENTS
A	10/23/2023	REV PER CTDEEP COMMENTS

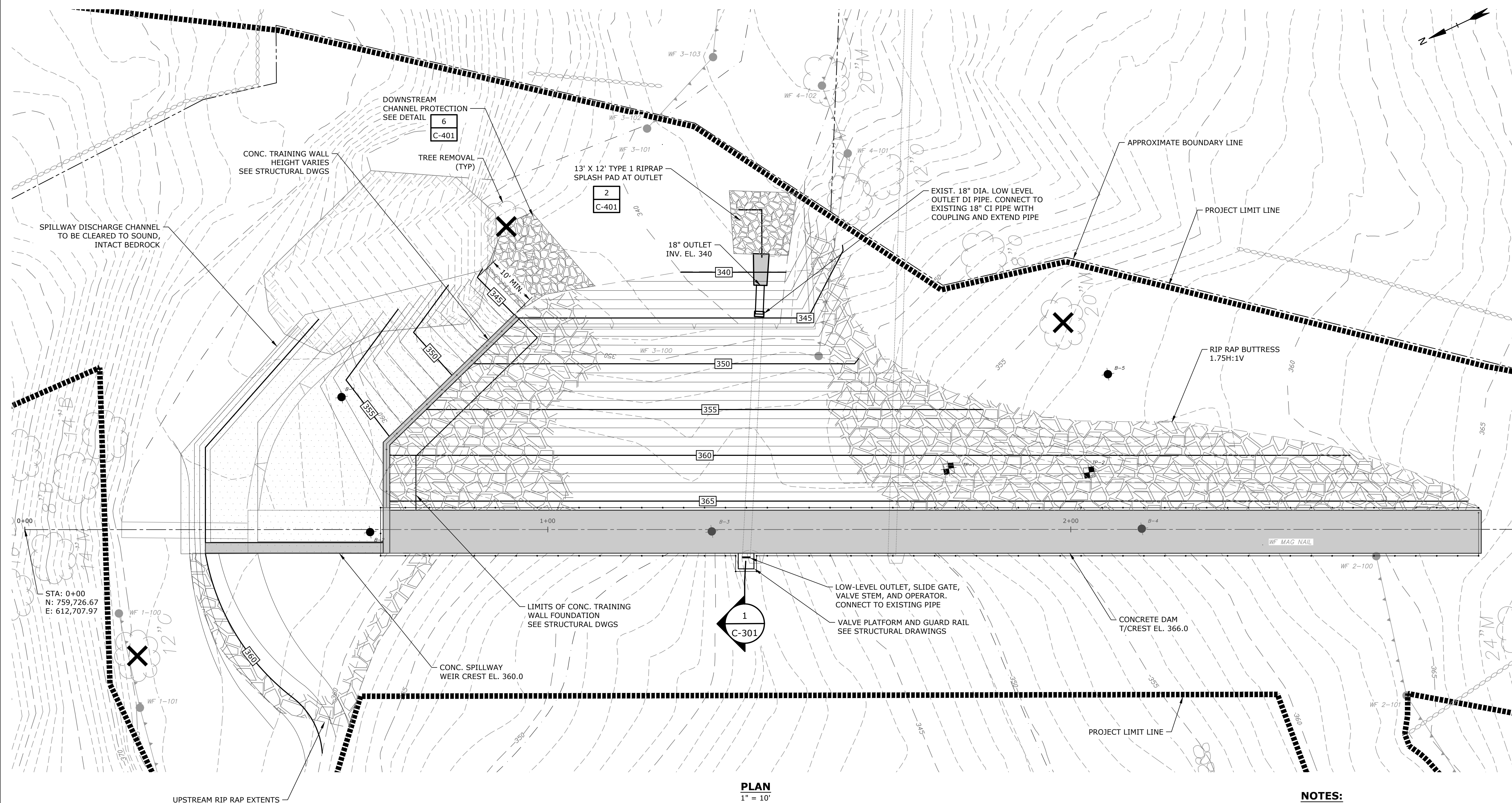
PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-G-004.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: RS/DFV
 APPROVED BY: CDH

EXISTING CONDITIONS SITE PLAN

SCALE: 1" = 30'

G-004

Last Saved: 1/30/2024 10:44:47 AM By: RStamford
 Plotted On: Jan 30, 2024 10:44:47 AM
 Tighe & Bond 33 W Main St, Stamford, CT 06901
 Figures AutoCAD Active 90 percent SHEET A1000-195A-G-004.dwg



STA: 0+00
 N: 759,726.67
 E: 612,707.97

PLAN
 1" = 10'

- NOTES:**
- SEE SHEET C-201 FOR PROFILE VIEWS.
 - RESTORE DOWNSTREAM CHANNEL DISTURBED BY CONSTRUCTION PER DETAIL.
 - EROSION AND SEDIMENTATION CONTROLS NOT SHOWN FOR CLARITY.

Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

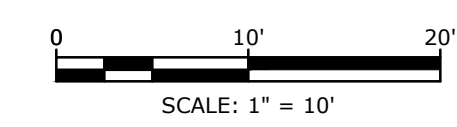
MARK	DATE	DESCRIPTION
B	1/22/2024	REV PER CTDEEP COMMENTS
A	10/23/2023	REV PER CTDEEP COMMENTS

PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-C-101.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: RS/DFV
 APPROVED BY: CDH

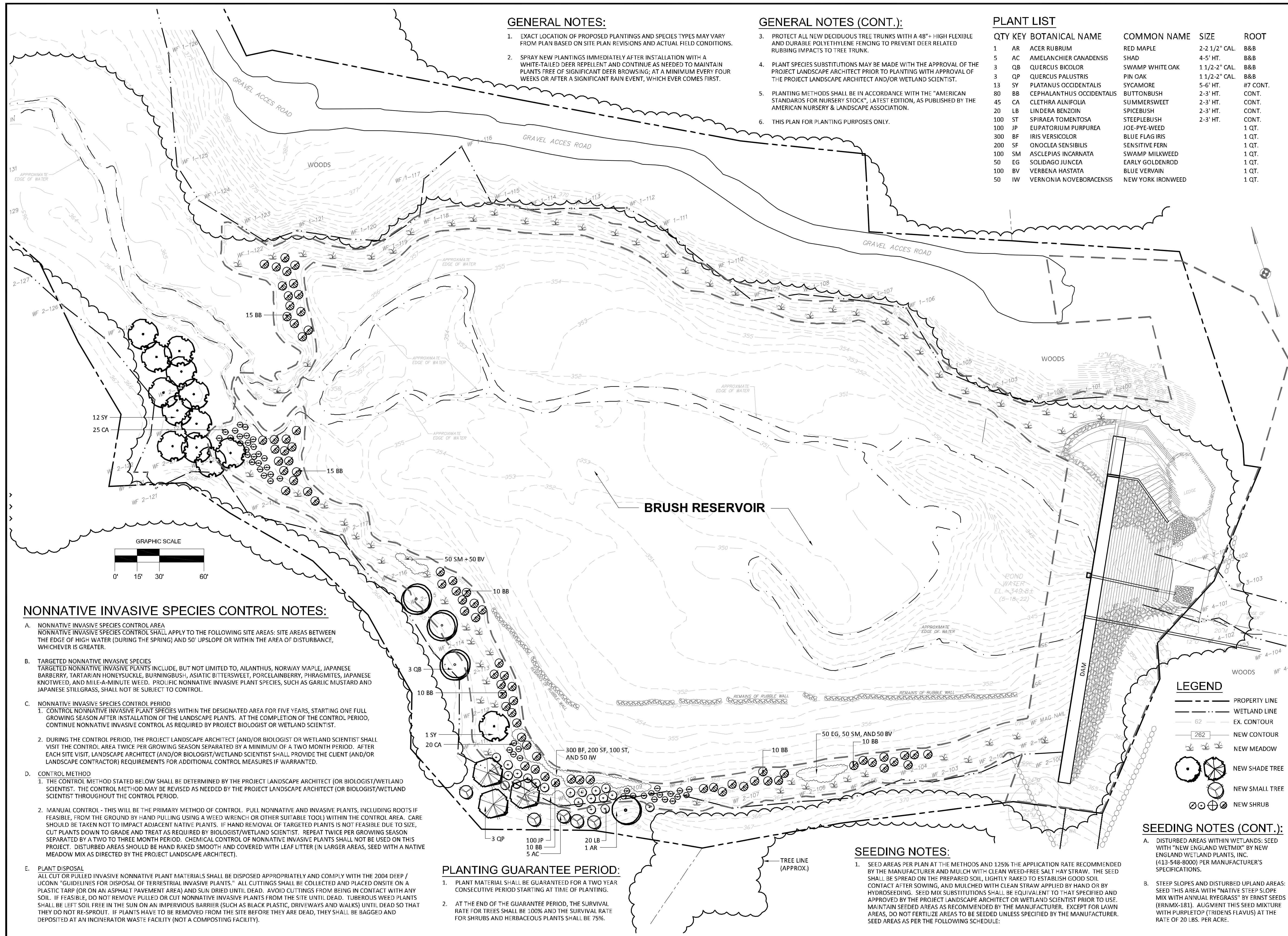
SITE PLAN

SCALE: 1" = 10'

C-101



Last Saved: 1/29/2024 8:53am By: rsanford
 Plotted On: Jan 30, 2024 8:53am
 Tighe & Bond: A:\1000 ANCL\195 - Brush Reservoir Dam\Drawings - Figures\AutoCAD\Active\90 percent SHEET A\1000-195A-C-101.dwg



GENERAL NOTES:

1. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM PLAN BASED ON SITE PLAN REVISIONS AND ACTUAL FIELD CONDITIONS.
2. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING; AT A MINIMUM EVERY FOUR WEEKS OR AFTER A SIGNIFICANT RAIN EVENT, WHICH EVER COMES FIRST.

GENERAL NOTES (CONT.):

3. PROTECT ALL NEW DECIDUOUS TREE TRUNKS WITH A 48" x HIGH FLEXIBLE AND DURABLE POLYETHYLENE FENCING TO PREVENT DEER RELATED RUBBING IMPACTS TO TREE TRUNK.
4. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING WITH APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT AND/OR WETLAND SCIENTIST.
5. PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
6. THIS PLAN FOR PLANTING PURPOSES ONLY.

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
1	AR	ACER RUBRUM	RED MAPLE	2-2 1/2" CAL.	B&B
5	AC	AMELANCHIER CANADENSIS	SHAD	4-5' HT.	B&B
3	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	1 1/2-2" CAL.	B&B
3	QP	QUERCUS PALUSTRIS	PIN OAK	1 1/2-2" CAL.	B&B
13	SY	PLATANUS OCCIDENTALIS	SYCAMORE	5-6' HT.	#7 CONT.
80	BB	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	2-3' HT.	CONT.
45	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	2-3' HT.	CONT.
20	LB	LINDERA BENZOIN	SPICEBUSH	2-3' HT.	CONT.
100	ST	SPIRAEA TOMENTOSA	STEEPLEBUSH	2-3' HT.	CONT.
100	JP	EUPATORIUM PURPUREA	JOE-PYE-WEED		1 QT.
300	BF	IRIS VERSICOLOR	BLUE FLAG IRIS		1 QT.
200	SF	ONOCLEA SENSIBILIS	SENSITIVE FERN		1 QT.
100	SM	ASCLEPIAS INCARNATA	SWAMP MILKWEED		1 QT.
50	EG	SOLIDAGO JUNCEA	EARLY GOLDENROD		1 QT.
100	BV	VERBENA HASTATA	BLUE VERVAIN		1 QT.
50	IW	VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED		1 QT.

NONNATIVE INVASIVE SPECIES CONTROL NOTES:

- A. NONNATIVE INVASIVE SPECIES CONTROL AREA**
NONNATIVE INVASIVE SPECIES CONTROL SHALL APPLY TO THE FOLLOWING SITE AREAS: SITE AREAS BETWEEN THE EDGE OF HIGH WATER (DURING THE SPRING) AND 50' UPSLOPE OR WITHIN THE AREA OF DISTURBANCE, WHICHEVER IS GREATER.
- B. TARGETED NONNATIVE INVASIVE SPECIES**
TARGETED NONNATIVE INVASIVE PLANTS INCLUDE, BUT NOT LIMITED TO, AILANTHUS, NORWAY MAPLE, JAPANESE BARBERRY, TARTARIAN HONEYSUCKLE, BURNINGBUSH, ASIATIC BITTERSWEET, PORCELAINBERRY, PHRAGMITES, JAPANESE KNOTWEED, AND MILE-A-MINUTE WEED. PROLIFIC NONNATIVE INVASIVE PLANT SPECIES, SUCH AS GARLIC MUSTARD AND JAPANESE STILLGRASS, SHALL NOT BE SUBJECT TO CONTROL.
- C. NONNATIVE INVASIVE SPECIES CONTROL PERIOD**
1. CONTROL NONNATIVE INVASIVE PLANT SPECIES WITHIN THE DESIGNATED AREA FOR FIVE YEARS, STARTING ONE FULL GROWING SEASON AFTER INSTALLATION OF THE LANDSCAPE PLANTS. AT THE COMPLETION OF THE CONTROL PERIOD, CONTINUE NONNATIVE INVASIVE CONTROL AS REQUIRED BY PROJECT BIOLOGIST OR WETLAND SCIENTIST.
2. DURING THE CONTROL PERIOD, THE PROJECT LANDSCAPE ARCHITECT (AND/OR BIOLOGIST OR WETLAND SCIENTIST) SHALL VISIT THE CONTROL AREA TWICE PER GROWING SEASON SEPARATED BY A MINIMUM OF A TWO MONTH PERIOD. AFTER EACH SITE VISIT, LANDSCAPE ARCHITECT (AND/OR BIOLOGIST/WETLAND SCIENTIST) SHALL PROVIDE THE CLIENT (AND/OR LANDSCAPE CONTRACTOR) REQUIREMENTS FOR ADDITIONAL CONTROL MEASURES IF WARRANTED.
- D. CONTROL METHOD**
1. THE CONTROL METHOD STATED BELOW SHALL BE DETERMINED BY THE PROJECT LANDSCAPE ARCHITECT (OR BIOLOGIST/WETLAND SCIENTIST). THE CONTROL METHOD MAY BE REVISED AS NEEDED BY THE PROJECT LANDSCAPE ARCHITECT (OR BIOLOGIST/WETLAND SCIENTIST) THROUGHOUT THE CONTROL PERIOD.
2. MANUAL CONTROL - THIS WILL BE THE PRIMARY METHOD OF CONTROL. PULL NONNATIVE AND INVASIVE PLANTS, INCLUDING ROOTS IF FEASIBLE, FROM THE GROUND BY HAND PULLING USING A WEED WRENCH OR OTHER SUITABLE TOOL) WITHIN THE CONTROL AREA. CARE SHOULD BE TAKEN NOT TO IMPACT ADJACENT NATIVE PLANTS. IF HAND REMOVAL OF TARGETED PLANTS IS NOT FEASIBLE DUE TO SIZE, CUT PLANTS DOWN TO GRADE AND TREAT AS REQUIRED BY BIOLOGIST/WETLAND SCIENTIST. REPEAT TWICE PER GROWING SEASON SEPARATED BY A TWO TO THREE MONTH PERIOD. CHEMICAL CONTROL OF NONNATIVE INVASIVE PLANTS SHALL NOT BE USED ON THIS PROJECT. DISTURBED AREAS SHOULD BE HAND RAKED SMOOTH AND COVERED WITH LEAF LITTER (IN LARGER AREAS, SEED WITH A NATIVE MEADOW MIX AS DIRECTED BY THE PROJECT LANDSCAPE ARCHITECT).
- E. PLANT DISPOSAL**
ALL CUT OR PULLED INVASIVE NONNATIVE PLANT MATERIALS SHALL BE DISPOSED APPROPRIATELY AND COMPLY WITH THE 2004 DEEP / UCONN "GUIDELINES FOR DISPOSAL OF TERRESTRIAL INVASIVE PLANTS". ALL CUTTINGS SHALL BE COLLECTED AND PLACED ON SITE ON A PLASTIC TARP (OR ON AN ASPHALT PAVEMENT AREA) AND SUN DRIED UNTIL DEAD. AVOID CUTTINGS FROM BEING IN CONTACT WITH ANY SOIL. IF FEASIBLE, DO NOT REMOVE PULLED OR CUT NONNATIVE INVASIVE PLANTS FROM THE SITE UNTIL DEAD. TUBEROUS WEED PLANTS SHALL BE LEFT SOIL FREE IN THE SUN ON AN IMPERVIOUS BARRIER (SUCH AS BLACK PLASTIC, DRIVEWAYS AND WALKS) UNTIL DEAD SO THAT THEY DO NOT RE-SPROUT. IF PLANTS HAVE TO BE REMOVED FROM THE SITE BEFORE THEY ARE DEAD, THEY SHALL BE BAGGED AND DEPOSITED AT AN INCINERATOR WASTE FACILITY (NOT A COMPOSTING FACILITY).

PLANTING GUARANTEE PERIOD:

1. PLANT MATERIAL SHALL BE GUARANTEED FOR A TWO YEAR CONSECUTIVE PERIOD STARTING AT TIME OF PLANTING.
2. AT THE END OF THE GUARANTEE PERIOD, THE SURVIVAL RATE FOR TREES SHALL BE 100% AND THE SURVIVAL RATE FOR SHRUBS AND HERBACEOUS PLANTS SHALL BE 75%.

SEEDING NOTES:

1. SEED AREAS PER PLAN AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE MANUFACTURER AND MULCH WITH CLEAN WEED-FREE SALT HAY STRAW. THE SEED SHALL BE SPREAD ON THE PREPARED SOIL, LIGHTLY RAKED TO ESTABLISH GOOD SOIL CONTACT AFTER SOWING, AND MULCHED WITH CLEAN STRAW APPLIED BY HAND OR BY HYDROSEEDING. SEED MIX SUBSTITUTIONS SHALL BE EQUIVALENT TO THAT SPECIFIED AND APPROVED BY THE PROJECT LANDSCAPE ARCHITECT OR WETLAND SCIENTIST PRIOR TO USE. MAINTAIN SEED AREAS AS RECOMMENDED BY THE MANUFACTURER. EXCEPT FOR LAWN AREAS, DO NOT FERTILIZE AREAS TO BE SEED UNLESS SPECIFIED BY THE MANUFACTURER. SEED AREAS AS PER THE FOLLOWING SCHEDULE:

SEEDING NOTES (CONT.):

- A. DISTURBED AREAS WITHIN WETLANDS: SEED WITH "NEW ENGLAND WETMIX" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000) PER MANUFACTURER'S SPECIFICATIONS.
- B. STEEP SLOPES AND DISTURBED UPLAND AREAS: SEED THIS AREA WITH "NATIVE STEEP SLOPE MIX WITH ANNUAL RYEGRASS" BY ERNST SEEDS (ERNMX-181). AUGMENT THIS SEED MIXTURE WITH PURPLETOP (TRIDENS FLAVUS) AT THE RATE OF 20 LBS. PER ACRE.

LEGEND

- PROPERTY LINE
- - - WETLAND LINE
- EX. CONTOUR
- 62 — NEW CONTOUR
- 262 — NEW MEADOW
- — NEW SHADE TREE
- — NEW SMALL TREE
- ⊗ — NEW SHRUB

Tighe&Bond

ENVIRONMENTAL
LAND SOLUTIONS, LLC

8 KNIGHT STREET
SUITE 203
NORWALK, CT 06851

T: (203) 855-7879
F: (203) 855-7836

info@elsllc.net
www.elsllc.net

Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

12.15.23 NOTES (PER MICHAEL KLEIN)

A-1000-195A
05/2023
A1000-195-G-BORD.dwg

MJP
MJP
MJP

C-102

SCALE: 1"=30'

LANDSCAPE PLAN

Attachment B

February 26, 2024

Caroline Simmons
Mayor, Town of Stamford
888 Washington Boulevard
10th Floor
Stamford, CT 06901

Re: **Aquarion Water Company
Brush Reservoir Dam Improvements**

Dear Ms. Simmons:

The purpose of this letter is to notify you that as part of the improvements proposed to the Brush Reservoir Dam site at E Middle Patent Rd, Stamford, CT, work will be performed within Class I and Class II Water Company Owned Land of Aquarion Water Company.

Brush Reservoir Dam is a concrete gravity dam. The proposed improvements will result in temporary disturbance to Class I and Class II Lands but will not reduce drinking water quality or quantity to the public drinking water system. The proposed improvements include addition of a riprap buttress downstream of the dam, concrete repairs, permanent lowering of the spillway, extension of the downstream outlet pipe and replacement of the upstream low-level outlet control valve.

Temporary erosion control and spill containment measures have been incorporated into the design of this project.

If you have any questions regarding the project, please contact Dan Valentine at 845-516-5872 or dfvalentine@tighebond.com.

Very truly yours,

TIGHE & BOND, INC.



Daniel Valentine, PE
Senior Project Manager

Shipment Receipt: Page #1 of 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORDS.

SHIP DATE:
MON 26 FEB 2024

EXPECTED DELIVERY DATE:
TUES 27 FEB 2024 EOD

SHIP FROM:
RYAN SANFORD
47 WEST MARKET STREET
RHINEBECK, NY 12572
(845) 516-5638

SHIP TO:
STAMFORD GOVERNMENT CENTER
OFFICE OF THE MAYOR
888 WASHINGTON BOULEVARD
10TH FLOOR
STAMFORD CT 06901
BUSINESS

SHIPPED THROUGH:
THE UPS STORE #4861
RHINEBECK, NY 12572-3726
(845) 876-3357

SHIPMENT INFORMATION:
UPS GROUND COMMERCIAL
0 lb 3.1 oz actual wt
1.000 lb billable wt
DIMS: 12.00X9.00X1.00 IN

TRACKING NUMBER: 1Z86U2080341541949
SHIPMENT ID: MNSGR9ZDNSUQH
SHIP REF 1: - -
SHIP REF 2: - -

DESCRIPTION OF GOODS:
LETTER

SHIPMENT CHARGES:	
GROUND COMMERCIAL	12.45
SERVICE OPTIONS	0.00
CMS PROCESSING FEE	0.22

TOTAL **\$12.67**

COMPLETE ONLINE TRACKING: ENTER THIS ADDRESS IN YOUR WEB BROWSER TO TRACK:
[HTTP://THEUPSSTORE.COM](http://THEUPSSTORE.COM) (SELECT TRACKING, ENTER SHIPMENT ID #) SHIPMENT
QUESTIONS? CONTACT SHIPPED THROUGH ABOVE.
NEED PACKAGE HELP? (LOST/DAMAGED). PROVIDE DETAILS SO WE CAN HELP:
[HTTPS://ONLINE.UPSCAPITAL.COM/TCCP](https://ONLINE.UPSCAPITAL.COM/TCCP)

CUSTOMER ACKNOWLEDGEMENT: I ACKNOWLEDGE AND ACCEPT TERMS & CONDITIONS IN FORCE
FOR TENDERING SHIPMENTS THROUGH THIS LOCATION AND CERTIFY THAT ADDRESS, CONTENTS
AND VALUES PROVIDED FOR THIS SHIPMENT ARE ACCURATE IN ALL RESPECTS.

Signature:

SHIPMENT ID: MNSGR9ZDNSUQH



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02/26/2024 05:22 PM Pacific Time F

The UPS Store



SEE NOTICE ON REVERSE regarding UPS Terms, and notice of limitation of liability. Where allowed by law, shipper authorizes UPS to act as forwarding agent for export control and customs purposes. If exported from the US, shipper certifies that the commodities, technology or software were exported from the US in accordance with the Export Administration Regulations. Diversion contrary to law is prohibited.
RRD R 1023

Your shipment
1Z86V2080341541949

✓ Delivered On
Tuesday, February 27 at 10:34

Delivered To
 STAMFORD, CT US

You're Seeing Everything
 You have the same information as our cu

[Get Updates >](#)
[File a Cl](#)

02/27/2024 10:34 A.M.	Delivered DELIVERED STAMFORD, CT, US
02/27/2024 9:32 A.M.	Out for Delivery Out For Delivery Today Norwalk, CT, United States
02/27/2024 7:12 A.M.	On the Way Loaded on Delivery Vehicle Norwalk, CT, United States
02/27/2024 6:15 A.M.	Processing at UPS Facility Norwalk, CT, United States
02/27/2024 4:47 A.M.	Arrived at Facility Norwalk, CT, United States
02/27/2024 3:21 A.M.	Departed from Facility Saddle Brook, NJ, United States
02/26/2024 11:15 P.M.	Arrived at Facility Saddle Brook, NJ, United States
02/26/2024 9:33 P.M.	Departed from Facility Kingston, NY, United States
02/26/2024 6:56 P.M.	We have your package Kingston, NY, United States
02/26/2024 6:00 P.M.	Label Created Shipper created a label, UPS has not received the package yet. United States

Attachment C

**Aquarion Water Company
Brush Reservoir Dam Improvements Project
E Middle Patent Road
Stamford, Connecticut**

EXECUTIVE SUMMARY

Attachment C

Brush Reservoir Dam (CT Dam ID #13504) is a concrete gravity dam located on Gray's Pond Brook in Stamford, Connecticut. Brush Reservoir Dam is an inactive water supply reservoir, located upstream of Bargh Reservoir. The dam consists of an approximately 235-foot-long concrete gravity section with an approximately 25-foot-long broad crested concrete weir spillway that discharges to an exposed bedrock channel. The top of the dam is bituminous with shotcrete on the upstream and downstream faces. An unmortared stone masonry section of the dam is located at the toe and connects the spillway training wall to the low-level outlet pipe discharge point. Two gate controls exist at the upstream face of the dam. A 6-inch blowoff outlet pipe protrudes from the toe of the masonry section of the dam. A reducer and valve are retrofit near the downstream end of the pipe and a 6-inch diameter pipe extends from the valve.

In accordance with the Army Corps of Engineers' "Recommended Guidelines for Safety Inspections of Dams", Brush Reservoir Dam is considered a small size structure based on storage. Per the CTDEEP Dam Safety Program, the Brush Reservoir Dam is classified as a Low Hazard (A) potential dam due to the potential damage to normally unoccupied storage structures, damage to paved local roadways or moderate economic loss given failure.

The proposed work includes the following maintenance activities:

- Drawdown of the reservoir by approximately 23.5 feet to access submerged areas of the dam for repairs. Due to concerns with the existing dam condition, the water level has been controlled by the full open low-level outlet pipe since 2022.
- Permanent lowering of the spillway elevation normal pool elevation from 364.5 feet to 360 feet.
- Modifications to the existing spillway to lengthen and deepen it to provide freeboard during the spillway design flood (SDF).
- Replacement of unsound concrete in approximately the same configuration.
- Addition of an upstream face seepage cutoff through the concrete dam.
- Addition of a riprap buttress on the downstream face of the concrete dam to improve stability.
- Extend the low-level outlet pipe downstream past the proposed riprap buttress.
- Replacement of the upstream low-level outlet control valve.
- Planting water tolerant plantings in the formerly inundated area.

It is our understanding that CT DEEP considers the SDF for a small size low hazard dam to be the 1-percent annual exceedance probability (AEP) flood event (also known as the 100-year frequency storm event) based on USACE guidelines. Based on a Hydrologic & Hydraulic Analysis (H&H) conducted by Tighe & Bond, the existing dam is incapable of passing flows

generated from the SDF without overtopping the concrete gravity section. Brush Reservoir Dam is anticipated to overtop by 1.2 feet during the SDF of the 1% AEP storm event. Brush Reservoir Dam currently provides negligible flood attenuation during the 1% AEP storm event with an inflow and outflow of approximately 1,316 cfs.

The project includes the construction of a riprap downstream buttress on the downstream side of the dam, a concrete cap on the crest of the dam, and a concrete facing wall on the upstream portion of the dam. The top 2.5 feet of the dam crest (including the bituminous coating) will be removed and replaced to the existing crest elevation with a reinforced concrete cap. A fall protection railing will be installed on the dam crest. To limit seepage through the concrete dam, an upstream seepage cut-off is proposed to be installed all along the upstream face of the dam from the crest to bedrock. A downstream riprap buttress is proposed to be installed downstream of the dam. Riprap will extend from the existing training wall to the right abutment and out towards the low-level outlet area. The low-level outlet discharge pipe is proposed to be extended beyond the riprap buttress.

The removal of small diameter trees and brush within the area of the riprap buttress and within 25' of the new dam toe will improve the long-term structural integrity of the dam and will bring the dam into compliance with CTDEEP regulations.

The spillway crest is proposed to be lowered 4.5 feet to elevation 360 feet. The new spillway will be formed by a concrete weir founded on bedrock at elevation 360 feet. The existing short concrete spillway weir will be removed to bedrock and the bedrock will be exposed. The exposed bedrock to the left of the concrete spillway weir will provide additional hydraulic capacity during heavy rainfall events. The proposed lengthening and deepening of the spillway will provide more than 1 foot of free board during the Spillway Design Flood. The contractor will be responsible for providing control of water to protect the work area from inundation and allow for a safe work area.

As part of the spillway widening, the existing training wall will be removed. A new concrete training wall is proposed along the right edge of the spillway, from the dam crest to the downstream channel. The high bedrock elevation in the spillway area will act as the left training wall.

Vehicle parking, refueling, and routine equipment maintenance shall only be performed in the designated staging areas and shall not be performed within the reservoir watershed. Minor servicing and refueling equipment shall be completed on a fueling pad with containment. All major equipment repairs must be made off site. Onsite fuel storage is discouraged.

See attached "General Construction Best Management Practices for Sites Within a Public Drinking Water Supply Area," provided by DPH and included in the Construction Project Manual.

**ATTACHMENT C – DPH GENERAL CONSTRUCTION BMP FOR SITES WITH
PDWS**



General Construction Best Management Practices for Sites within a Public Drinking Water Supply Area

DRINKING WATER SECTION • JULY 2014

Emergency Response Plan

A response plan should be written for actions to be taken for the containment of accidental fuel or chemical spills or the failure of temporary erosion and sedimentation controls that may occur during construction. Spill response equipment should be available on-site at all times along with personnel trained in the proper use of such equipment. A person or persons should be designated by the contractor for emergency response coordination on a 24/7 basis.

** All contractors and their employees should be informed that they are working in an important public water supply area. Fuel or other hazardous material spills must be reported immediately to the CT DEEP Oil and Chemicals Spills Unit (860-424-3338) and to Aquarion (203-445-7310).*

Vehicles and Machinery

Designate one area for auto parking, vehicle refueling and routine equipment maintenance. The designated area should be well away from exposed surfaces or storm drains. Methods and locations of refueling, servicing, and storage of vehicles and machinery should be addressed and included as notes on the final site plans. Minor servicing and refueling of machinery should be completed on a fueling pad with containment. All major equipment repairs must be made off site. Onsite fuel storage should be discouraged.

General Site Conditions

Keep pollutants off exposed surfaces. The burying of stumps or construction debris must not be allowed on the job site. Sediment fences and hay bales must be strategically placed, inspected and maintained to prevent sedimentation and erosion. Temporary storm water ponds and basins must be routinely inspected and maintained. If unexpected conditions occur, additional fences and hay bales should be available for use as needed to prevent runoff. Protect exposed stockpiles of soil to prevent runoff. Use as little water as possible for dust control. Clean up leaks, drips and other spills immediately to prevent or minimize soil contamination. Never hose down "dirty" pavement or surfaces where materials have spilled. Use dry cleanup methods whenever possible.

Hazardous Materials Storage

Paints, paint products and other hazardous materials should be removed from the site during non-work hours or otherwise stored in a secure area to prevent vandalism. Place covered trashcans and recycling receptacles around the site. Cover and maintain dumpsters, check frequently for leaks, and never clean a dumpster by hosing it down on site.

Sanitation

Make sure portable toilets are in good working order. Check frequently for leaks.

Notification

Notification of the project start date should be sent to the Public Water System as soon as it has been determined. Public Water System personnel should be granted daily site access to review compliance with site best management practices. The Public Water System, DPH Drinking Water Section (860-509-7333 OR after hours at 860-509-8000), and appropriate sections of the Department of Energy and Environmental Protection must be notified immediately of any chemical/fuel spill or any major failure of an erosion and sedimentation control at the construction site. Emergency telephone numbers and a statement identifying the construction site as a sensitive public water supply area should be posted where they are readily visible to contractors and other on-site personnel. A note should be added to the construction documents stating the sensitivity of the area.

**ATTACHMENT C – DEEP POLICY GOVERNING DECONTAMINATION
PROCEDURE IN PDWS**

**State of Connecticut
Department of Environmental Protection
Inland Fisheries Division**

MEMORANDUM

April 15, 2011

To All Inland Fisheries Division staff

From Peter Aarrestad, Director



Re: Policy governing decontamination procedures for IFD equipment used in or on public water supply reservoirs.

This policy is established to ensure that all reasonable procedures and precautions are followed to prevent the unintentional introduction of invasive flora, fauna, or pathogens into public water supply reservoirs whenever the Inland Fisheries Division is conducting sampling operations or related activities on such waters. The policy is established in recognition of the need to take extra precautions while operating in or on these waters given the unique nature of public water supplies. These waters are typically removed from some of the risks of ANS introduction, in part due to the limited access, and public water supply managers require a heightened level of concern over water quality and purity. As such, our staff must be especially vigilant when operating in or on public water supply reservoirs, thus the need for this policy.

I expect all staff to become familiar with and to fully implement this policy without modification or exception. Further, it shall be the responsibility of all supervisors and crew leaders to ensure that the procedures described herein have been taken before launching any boats on or otherwise placing equipment in contact with the waters subject to this policy.

Intermittent Sampling Activities

Prior to sampling a water supply reservoir, the following sequential steps shall be taken for all equipment that will come in contact with the water (i.e., boats, trailers, outboard motors, nets, mooring and anchor lines, etc.). These procedures shall be accomplished on DEP property (i.e., District field offices) where there is no threat of introducing flora, fauna, or pathogens to surface waters. These procedures do not negate the need for standard procedures to be enacted prior to leaving any boat launch, regardless of whether it is public or private (i.e., draining bilges and live wells, and removing any visible organic matter).

1. All residual organic matter shall be removed.
2. All residual bilge or live-well water in any boat shall be drained.

3. The water cooling system on outboard motors shall be thoroughly flushed.
4. All equipment shall be thoroughly sprayed with, or where possible soaked in, a 5% bleach solution.
5. All equipment shall be sprayed down with a pressure washer.
6. All equipment shall be desiccated for a minimum of 48 hrs.

Personal gear - staff

1. All personal gear (boots, waders, gloves) shall be thoroughly sprayed with, or soaked in, a 5% bleach solution (as per current protocols for stream sampling).
2. The use of felt-soled boots/waders by staff is prohibited.

Personal gear – guests (non-IFD individuals)

1. All non-IFD individuals shall be notified of the following well in advance of the scheduled sampling:
 - a. Use of felt-soled boots/waders is prohibited.
 - b. All personal gear (boots, waders, gloves) shall be thoroughly sprayed with, or soaked in, a 5% bleach solution (as per current protocols for stream sampling).
2. All non-IFD personal gear will be inspected by staff prior to sampling. If necessary IFD gear shall be provided.

Routine Sampling Activities

For sampling activities that require routine trips to a public water supply reservoir, dedicated equipment can be set aside for use in that specific reservoir. Prior to its first use in the reservoir, the equipment shall be subjected to the decontamination protocols detailed above.

Please contact me if you have any questions regarding this important matter.

Attachment D

**Aquarion Water Company
Brush Reservoir Dam Improvements Project
E Middle Patent Road
Stamford, Connecticut**

ALTERNATIVES ASSESSMENT

Attachment D

The following alternatives were considered in development of an overall proposed approach for Brush Reservoir Dam. Tighe & Bond evaluated five alternatives for Brush Reservoir Dam:

1. No Action
2. Dam Removal
3. Downstream Riprap Buttress
4. New Spillway at Elevation 360'
5. Concrete Buttress

Alternatives Analysis

No Action Alternative

Brush Reservoir Dam was visually inspected by Tighe & Bond during multiple site visits in February and April 2022. The reservoir has been drawn down and the water level currently is maintained in the impoundment by the fully open low-level outlet given concerns of significant seepage through the concrete dam and scouring of the downstream embankment soils.

In general, Brush Reservoir Dam was determined to be in Poor condition. Substantial transverse cracking across the crest of the dam was observed, as well as longitudinal cracking on the upstream face. Significant spalling and efflorescence were also noted. Seepage from the downstream face occurs during high pool elevations in the reservoir. The downstream face of the dam has significant scouring ranging from sections one foot deep to six feet deep. The shotcrete face is failing at multiple points and the concrete structure behind is visible. The low-level outlet pipe is broken at the reducer and the downstream control valve is no longer attached to the pipe. The upstream control valve has been forced open allowing water into the low-level outlet pipe.

As the dam owner, Aquarion Water Company is liable for damages caused by a failure of Brush Reservoir Dam. Due to the current poor condition of the dam, the "No Action" alternative was not considered a viable option.

Dam Removal Alternative

The dam removal alternative assumes the entire length of the concrete dam above grade will be removed and a channel will be constructed through the impoundment, dam, and downstream areas. Following the natural curvature of the channel and the natural streambed elevation, while using the H&H analysis to determine the channel geometry, we developed a conceptual dam breach design.

The dam removal option would drain Brush Reservoir leaving only a stream channel. Initial conversations with the abutters to the existing reservoir have led Aquarion to believe that if this alternative is advanced, they would bring legal suits against Aquarion. The existing abutters have made it clear they do not wish to remove the dam, but instead would like to have the dam and the pond it creates remain. Aquarion has faced similar legal challenges in the past and the cost to defend such suits can range from \$100,000 to \$500,000. The dam removal alternative would have lowest maintenance cost, in addition to the least long-term liability for Aquarion.

The water courses upstream and downstream of Brush Reservoir Dam are encumbered in both directions with dams. Removal of Brush Reservoir Dam would provide limited benefit to diadromous species.

Downstream Riprap Buttress Alternative

This alternative provides the minimal viable repair solution, with the shortest design life, and least initial capital cost, without removing the dam. This option includes a concrete cap on the crest of the dam, seepage cutoff on the upstream face of the dam, and rip rap buttress on the downstream side of the dam. The existing spillway elevation and normal pool will be maintained at 364.5 feet and the dam is anticipated to overtop during the Spillway Design Flood and lower rainfall events.

The downstream riprap buttress alternative would have the lowest capital cost of the alternatives evaluated but has the shortest design life and would likely cost more in maintenance than the other repair alternatives.

New Spillway at Elevation 360' Alternative

Brush Reservoir Dam does not meet current factors of safety for stability under existing conditions. The height of the water in the impoundment adds to instability. The goal of this repair alternative is to lower the water level in the impoundment, specifically the normal pool elevation, by lowering and widening the spillway. This alternative would lower the spillway to elevation 360 feet and widen the spillway to provide adequate capacity to safely pass the SDF without overtopping. This repair alternative also includes a concrete cap on the crest of the dam, seepage cutoff on the upstream face of the dam, and a downstream riprap buttress as a cost-effective solution to provide additional stability.

This alternative has a higher capital cost than the downstream riprap buttress alternative, but lower than the concrete buttress alternative. This option would lower the normal pool by 4.5 feet below existing conditions and provide for a wetland buffer planting zone in the area of Brush Reservoir historically inundated, increasing the biodiversity of impounded area.

Concrete Buttress Alternative

This repair option includes significant concrete addition to both the upstream, crest, and downstream faces of the dam to upgrade the condition to "Good" and improve factors of safety for stability to acceptable levels. The spillway configuration and elevation would remain unchanged from the existing condition, with some minor concrete repairs. This alternative would address deteriorated concrete and add a reinforced concrete buttress upstream and downstream of the dam would maintain the existing normal pool and general dam configuration.

This alternative would have the highest capital cost of any alternative presented. Yet, this option would provide the longest service life of the repair alternatives presented.

Conclusion

Tighe & Bond performed an alternatives analysis to develop a proposed solution for addressing the condition at Brush Reservoir Dam. The analysis used the hydrologic/hydraulic and stability analyses to develop concept designs and opinions of probable construction cost to analyze five alternatives. Aquarion ultimately selected the New Spillway at Elevation 360' Alternative as it balances the project goals in the following ways:

- improves the dam's condition and address seepage through the concrete dam
- provides adequate freeboard during the Spillway Design Flood
- meets current ACOE factors of safety for stability
- provides wetland buffer plantings to enhance the environmental resource
- addresses the community's concerns with dam removal
- is not the highest capital or long-term maintenance alternative

The proposed dam repair design presented in this permit application was advanced based on the conclusion of this alternatives analysis.



PERMIT

Permittee: Aquarion Water Company of Connecticut
600 Lindley Street
Bridgeport, CT 06606
Attn: Dennis Fields, dfields@aquarionwater.com

Permit No: DS-202304368

Town: Stamford

Project: Brush Reservoir Dam Repairs, Dam ID #13504, Hazard Class: A, Low Hazard

Waters: Gray's Pond Brook

Pursuant to Connecticut General Statutes Section 22a-403, the Commissioner of Energy and Environmental Protection ("Commissioner") hereby grants a permit to the Aquarion Water Company of Connecticut ("the Permittee") to conduct regulated activities associated with Brush Reservoir Dam Repairs, Dam ID # 13504. The purpose of said activities is to repair/ rehabilitate the Brush Reservoir Dam.

AUTHORIZED ACTIVITY

Specifically, the permittee is authorized to do the following: widen, deepen, and lower the existing spillway, lower the dam crest by 1 foot, replace unsound concrete on the dam, add a riprap buttress on the downstream face of the dam, and replace the low-level outlet control valve. The normal pool elevation will be lowered by 4.5 feet and wetland plantings will be placed in the former inundated area.

The proposed activities will impact 9,055 square feet of wetlands associated with Gray's Pond Brook. Additionally, 25,030 square feet of open water in the impoundment will be converted to vegetated wetland.

All activities shall be conducted in accordance with plans entitled: "Brush Reservoir Dam Improvements, Stamford, Connecticut", dated May 2023, prepared by Daniel Valentine, P.E. of Tighe & Bond, Inc., signed and sealed on February 1, 2024 and submitted as a part of the application.

This authorization constitutes the licenses and approvals required by Section 22a-403 of the Connecticut General Statutes. This authorization is subject to and does not derogate any present or future property rights or other rights or powers of the State of Connecticut, conveys no property rights in real estate or material nor any exclusive privileges, and is further subject to any and all

public and private rights and to any federal, state, or local laws or regulations pertinent to the property or activity affected thereby.

The permittee's failure to comply with the terms and conditions of this permit shall subject the permittee, including the permittee's agents or contractor(s) to enforcement actions and penalties as provided by law.

This authorization is subject to the following conditions:

CONDITIONS:

1. **Expiration.** This permit shall expire three years following the date of issue unless this permit is specifically renewed.
2. **Construction Commencement and Completion.** If construction of any structures or facilities authorized herein is not completed within three years of issuance of this permit or within such other time as may be provided by this permit, or if any activity authorized herein is not commenced within three years of issuance of this permit or within such other time as may be provided by this permit, this permit shall expire three years after issuance or at the end of such time as may be authorized by the Commissioner.
3. **Notification of Project Initiation.**
 - a. The permittee shall notify the Commissioner in writing no less than seven (7) days prior to commencement of permitted activities and no less than seven (7) days following completion of permitted activities.
 - b. The permittee shall, pursuant to Section 22a-377(b)-1(a)(16)C of the Regulations of Connecticut State Agencies, notify the Commissioner and any potentially affected water company in writing at least seven (7) days prior to the lowering of Brush Reservoir for the purpose of undertaking permitted activities.
 - c. Additionally, the Department of Energy and Environmental Protection (DEEP) Fisheries Division shall be separately notified at least forty-eight (48) hours prior to drawdown of the impoundment, in accordance with Section 26-138 of the Connecticut General Statutes. Such notification shall be made to the Fisheries Division, 79 Elm Street, Hartford, CT 06106-5127, Telephone No. 860-424-3474.
4. **De minimis Alteration.** The permittee may not make any alterations, except de minimis alterations, to any structure, facility, or activity authorized by this permit. A de minimis alteration means a change in the design, construction or operation authorized under this permit that does not increase environmental impacts or substantively alter the construction of the project as authorized. If during the process of construction, unforeseen conditions are found on the site and the permittee and their engineer determine that it would be appropriate to modify the design, then the permittee shall notify DEEP within 24 hours of any potential design changes. DEEP shall determine if

the design modifications will be an activity that can be categorized as a de minimis activity when compared to the permitted design. No work shall take place which was not included as part of the permitted design until DEEP responds to this determination request.

- 5. Maintenance of Structures.** All structures, facilities, or activities constructed, maintained, or conducted pursuant hereto shall be consistent with the terms and conditions of this permit, and any structure, facility or activity not specifically authorized by this permit, or exempted pursuant to Section 22a-377 of the Connecticut General Statutes or Section 22a-377(b)-1 of the Regulations of Connecticut State Agencies, or otherwise exempt pursuant to other Connecticut General Statutes, shall constitute a violation hereof which may result in modification, revocation or suspension of this permit or in the institution of other legal proceedings to enforce its terms and conditions.
- 6. Accuracy of Documentation.** In issuing this permit, the Commissioner has relied on information provided by the permittee. If such information was false, incomplete, or misleading, this permit may be modified, suspended or revoked and the permittee may be subject to any other remedies or penalties provided by law.
- 7. Best Management Practices & Notification of Adverse Impact.** The permittee shall utilize engineered erosion and sediment controls to prevent pollution of wetlands and watercourses in accordance with Best Management Practices. Best Management Practices include, but are not limited to, the *Connecticut Guidelines for Soil Erosion and Sediment Control*¹ as revised, the *Connecticut Stormwater Quality Manual* as revised, the Department of Transportation's *ConnDOT Drainage Manual* as revised, and the Department of Transportation Standard Specifications as revised.

The permittee shall deploy controls prior to the commencement of construction, and regularly inspect and maintain controls as needed for effectiveness. Said controls shall be inspected by the permittee for deficiencies at least once per week and immediately after each rainfall and at least daily during prolonged rainfall. The permittee shall correct any such deficiencies within forty eight (48) hours of said deficiencies being found.

The permittee shall immediately inform the Commissioner of any adverse impact or hazard to the environment which occurs or is likely to occur as the direct result of the construction, maintenance, or conduct of structures, facilities, or activities authorized herein.

¹ For guidance on the use of erosion and sediment controls, refer to the *2002 Connecticut Guidelines For Soil Erosion and Sediment Control* document (update pending). URL: <https://portal.ct.gov/-/media/DEEP/water/sesc/sescintrotcpdf.pdf>.

8. Reporting of Potential Violations.

a. The permittee shall, no later than 48 hours after the permittee learns of a violation of this permit, report in writing to the Commissioner. Such written report shall contain the following information, and be submitted to DEEP.DamSafety@ct.gov:

- a. The provision(s) of this permit that has been violated;
- b. The date and time the violation(s) was first observed and by whom;
- c. The cause of the violation(s), if known
- d. If the violation(s) has ceased, the duration of the violation(s) and the exact date(s) and times(s) it was corrected;
- e. If the violation(s) has not ceased, the anticipated date when it will be corrected;
- f. Steps taken and steps planned to prevent a reoccurrence of the violation(s) and the date(s) such steps were implemented or will be implemented; and
- i. The best telephone number where DEEP can reach the engineering consultant in a timely manner.

9. Material Storage in the Floodplain. The storage of any materials at the site which are buoyant, hazardous, flammable, explosive, soluble, expansive, radioactive, or which could in the event of a flood be injurious to human, animal or plant life, below the elevation of the five-hundred (500) year flood is prohibited. Any other material or equipment stored at the site below said elevation by the permittee or the permittee's contractor must be firmly anchored, restrained or enclosed to prevent flotation. The quantity of fuel stored below such elevation for equipment used at the site shall not exceed the quantity of fuel that is expected to be used by such equipment in one day.

10. Permit Transfer. This permit is not transferable without the prior written consent of the Commissioner.

11. Contractor Notification. The permittee shall give a copy of this permit to the contractor(s) who will be carrying out the activities authorized herein prior to the start of construction and shall receive a written receipt for such copy, signed and dated by such contractor(s). The permittee's contractor(s) shall conduct all operations at the site in full compliance with this permit and, to the extent provided by law, may be held liable for any violation of the terms and conditions of this permit.

12. Certification of Documents. Any document, including but not limited to any notice, which is required to be submitted to the Commissioner under this permit shall be signed by the permittee or a responsible corporate officer of the permittee, a general partner of the permittee, and by the individual or individuals responsible for actually preparing such document, each of whom shall certify in writing as follows:

“I have personally examined and am familiar with the information submitted in this document and all attachments thereto and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement in the submitted information may be punishable as a criminal offense in accordance with Section 22a-6 of the General Statutes, pursuant to Section 53a-157b and in accordance with any other applicable statute.”

- 13. Submission of Documents.** Any document or notice required to be submitted to the Commissioner under this permit shall, unless otherwise specified in writing by the Commissioner, be directed to:

DEEP.DamSafety@ct.gov

The date of submission to the Commissioner of any document required by this permit shall be the date such document is received by the Commissioner. The date of any notice by the Commissioner under this permit, including but not limited to notice of approval or disapproval on any document or other action, shall be the date such notice is personally delivered or the date three days after it is mailed by the Commissioner, whichever is earlier. Except as otherwise specified in this permit, the word "day" means any calendar day. Any document or action which is required by this permit to be submitted or performed by a date which falls on a Saturday, Sunday or legal holiday shall be submitted or performed by the next business day thereafter.

- 14. Rights.** This permit is subject to and does not derogate any rights or powers of the State of Connecticut, conveys no property rights or exclusive privileges, and is subject to all public and private rights and to all applicable federal, state, and local law. In constructing or maintaining any structure or facility or conducting any activity authorized herein, the permittee may not cause pollution, impairment, or destruction of the air, water, or other natural resources of this State. The issuance of this permit shall not create any presumption that this permit should be renewed.

15. Dam Safety Conditions

- a. This permit and a copy of the approved plans and specifications shall be kept at the project site and made available to the Commissioner at any time during the construction of permitted activities.
- b. Permitted activities shall be performed under the supervision of an engineer who is licensed to practice in the State of Connecticut and who has expertise in dam construction. Said engineer shall, upon completion of the permitted activities, certify to the Commissioner in writing that the permitted activities have been completed according to the approved plans and specifications.

- c. Within thirty (30) days of completion of the permitted activities, permittee shall submit to the Commissioner record drawings depicting the dam construction as completed, including any deviations from the approved plans and specifications. Said drawings shall be prepared and sealed by the engineer who oversaw the construction. In addition, the permittee shall arrange for submission of an electronic copy of the final record drawings in Adobe Acrobat “pdf” format.
 - d. Nothing in this chapter and no order, approval or advice of the Commissioner, shall relieve any owner or operator of this dam from his legal duties, obligations and liabilities resulting from such ownership or operation. No action for damages sustained through the partial or total failure of any structure or its maintenance shall be brought or maintained against the state, the Commissioner of Energy and Environmental Protection, or his employees or agents.
 - e. The Sequence of Construction and Water Handling Plan provided in the application shall be reviewed by the contractor repairing the dam. If the plan is revised or updated, a copy of the revised plan must be submitted to the Dam Safety Program at its email address: DEEP.DamSafety@ct.gov before beginning repair or within 48 hours of its revision after the work has started.
 - f. The flood contingency plan submitted with the application shall be reviewed by the contractor and if any revisions are made to the plan, a copy of the revised plans must be submitted to the Dam Safety Program at DEEP.DamSafety@ct.gov within 48 hours.
- 16. Wetland Plantings.** The permittee shall plant the approximately 25,030 square feet newly exposed pond bottom with native wetland species as shown on the Landscape Plan sheet C-102 titled Brush Reservoir Dam Improvements, dated May 2023, and prepared by Tighe & Bond, Inc.
- 17. Management of Materials.** Any dredged/excavated sediment removed from the site shall be managed in accordance with all federal, state, and local requirements, including Chapter 446K Water Pollution Control, Chapter 445 Hazardous Waste, and Chapter 446d Solid Waste of the Connecticut General Statutes.

Issued by the Commissioner of Energy and Environmental Protection on:

Date

Graham J. Stevens
Bureau Chief
Water Protection and Land Reuse

TRANSMITTAL

Tighe&Bond

Project No.: A-1000-195A
Date: November 21, 2023

Re: Army Corps of Engineers Pre-Construction Notification Application for Brush Reservoir Dam Improvements Project

To: US Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, MA 01742

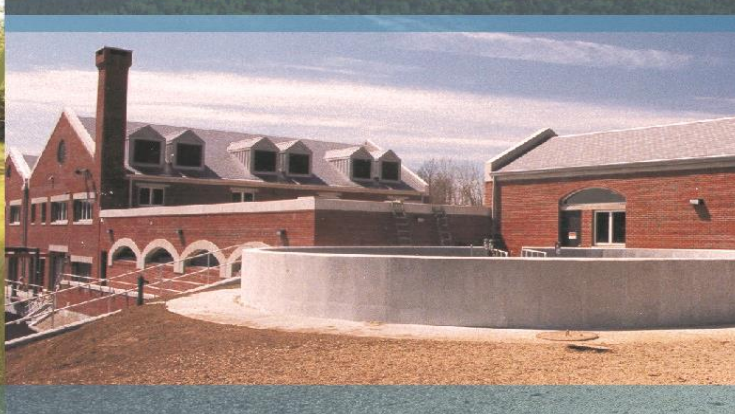
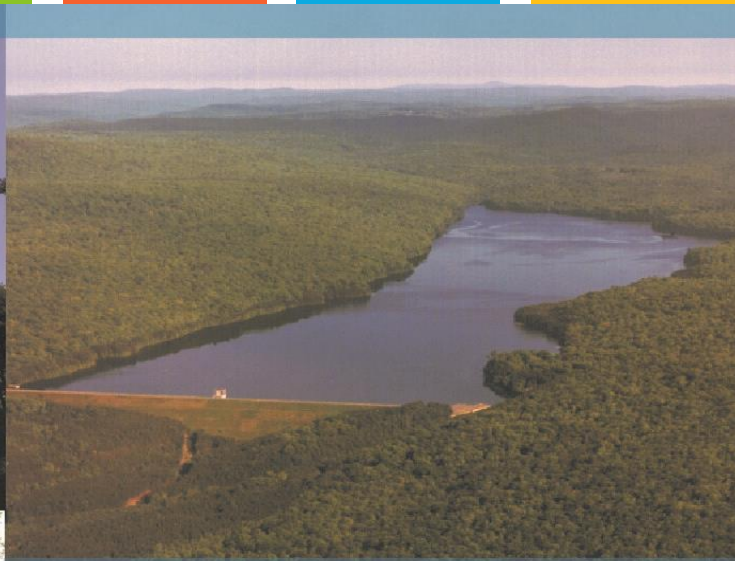
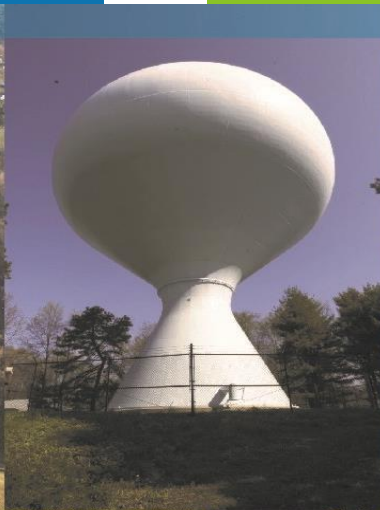
Copy:
 FOR SIGNATURE FOR FILE AS REQUESTED FOR REVIEW PLEASE REPLY

No. COPIES	DESCRIPTION
1	Pre-Construction Notification application for work within federally regulated wetlands for Brush Reservoir Dam Improvement Project located at E Middle Patent Road, Stamford, CT 06831

Very truly yours,
Tighe & Bond, Inc.



Matthew Regan, PWS
Project Environmental Scientist



Brush Reservoir Dam Improvements
CT Dam ID# 13504
Stamford, CT

Pre-Construction Notification

Aquarion Water Company

November 2023

Tighe & Bond

A-1000-195A
November 21, 2023

U.S. Army Corps of Engineers
Regulatory Division
696 Virginia Road
Concord, MA 01742

Re: **Pre-Construction Notification (PCN)
Brush Reservoir Dam Improvements Project
Stamford, Connecticut**

Dear Reviewer:

On behalf of Aquarion Water Company (Aquarion), Tighe & Bond is submitting this Pre-Construction Notification (PCN) to receive authorization for the Brush Reservoir Dam Improvements Project in Stamford, Connecticut in accordance with Section 404 of the Clean Water Act (33 U.S.C. 1251 et seq) and the Connecticut General Permits (33 CFR 320-332). This submittal describes activities necessary to conduct maintenance work at the Brush Reservoir Dam and its appurtenant works.

The proposed maintenance work is in accordance with the Army Corps of Engineers' "Recommended Guidelines for Safety Inspections of Dams," as the Brush Reservoir Dam is considered to have a Moderate hazard potential by the by the Connecticut Department of Energy & Environmental Protection (CTDEEP) Dam Safety Program.

Authorization under Section 404 from the Army Corps of Engineers is required as the project will result in a discharge of dredged or fill material to Waters of the United States within the State of Connecticut. This PCN has been prepared for authorization under the Connecticut General Permit (GP) 2 (repair or maintenance of existing currently serviceable, authorized, or grandfathered structures & fills and removal of structures).

Should you have any questions or require additional information, please contact Daniel Valentine at (860) 704-4772 or DFValentine@tigheBond.com or me at (716) 949-9131 or MRegan@tighebond.com.

Sincerely,

TIGHE & BOND, INC.



Matthew Regan, PWS
Project Environmental Scientist

Enclosures

Copy: Dennis Fields, Aquarion Water Company
Daniel Valentine, PE, Tighe & Bond
Connecticut Department of Energy and Environmental Protection

J:\A\A1000 AWC\195 - Brush Reservoir Dam\Permitting\ACOE\PCN\1.1_PCN Cover Letter.docx



U.S. Army Corps of Engineers (USACE)
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT
 33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved -
OMB No. 0710-0003
Expires: 02-28-2022

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: <http://dpcld.defense.gov/Privacy/SORNS/Index/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx>

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO. _____	2. FIELD OFFICE CODE _____	3. DATE RECEIVED _____	4. DATE APPLICATION COMPLETE _____
-----------------------------	-------------------------------	---------------------------	---------------------------------------

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME First - _____ Middle - _____ Last - _____ Company - _____ E-mail Address - _____	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required) First - _____ Middle - _____ Last - _____ Company - _____ E-mail Address - _____
6. APPLICANT'S ADDRESS: Address- _____ City - _____ State - _____ Zip - _____ Country - _____	9. AGENT'S ADDRESS: Address- _____ City - _____ State - _____ Zip - _____ Country - _____
7. APPLICANT'S PHONE NOS. w/AREA CODE a. Residence _____ b. Business _____ c. Fax _____	10. AGENTS PHONE NOS. w/AREA CODE a. Residence _____ b. Business _____ c. Fax _____

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Dennis Fields
 SIGNATURE OF APPLICANT

 DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions) _____	
13. NAME OF WATERBODY, IF KNOWN (if applicable) _____	14. PROJECT STREET ADDRESS (if applicable) Address _____ City - _____ State - _____ Zip - _____
15. LOCATION OF PROJECT Latitude: °N _____ Longitude: °W _____	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) State Tax Parcel ID _____ Municipality _____ Section - _____ Township - _____ Range - _____	

17. DIRECTIONS TO THE SITE

18. Nature of Activity (Description of project, include all features)

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

24. Is Any Portion of the Work Already Complete? Yes No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- [Redacted]
 City - [Redacted] State - [Redacted] Zip - [Redacted]

b. Address- [Redacted]
 City - [Redacted] State - [Redacted] Zip - [Redacted]

c. Address- [Redacted]
 City - [Redacted] State - [Redacted] Zip - [Redacted]

d. Address- [Redacted]
 City - [Redacted] State - [Redacted] Zip - [Redacted]

e. Address- [Redacted]
 City - [Redacted] State - [Redacted] Zip - [Redacted]

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]	[Redacted]

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

[Redacted] *Dennis Fields* [Redacted] [Redacted] [Redacted]
 SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

Executive Summary

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A Figures / Project Drawings

Figure 1 – Site Location Map

Figure 2 – Aerial Imagery

Figure 3 – Overview Plan – Wetland Impact

Figure 4 – Proposed Plan – Wetland Impact

Project Drawings: Brush Reservoir Dam Improvements (April 2023)

B Site Photographs

C Wetland Determination Data Forms

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F List of Abutters

G Engineering Report

Section 1

Executive Summary

Tighe & Bond is filing this Pre-Construction Notification (PCN) on behalf of the Aquation Water Company (Aquarion) for proposed improvements to Brush Reservoir (Grays Pond) Dam (CT Dam ID #13504) (Project) in Stamford, Connecticut. References to left and right in this application are oriented looking downstream. The Brush Reservoir Dam (dam) is considered to have a Moderate (Class BB) hazard potential by the CTDEEP Dam Safety Program because of the potential damage to unoccupied storage structures, moderate economic loss, and/or damage to paved local roadways in the event of a failure of the dam or its appurtenance works.

The Brush Reservoir and Grays Pond Brook are Waters of the United States (WOTUS) and subject to Section 404 of the Clean Water Act (33 U.S.C. 1251 et seq). The following Connecticut General Permit (GP), requiring submittal of an application for work in regulated natural resources, applies to the Project:

GP 2- Repair or Maintenance of Existing Currently Serviceable, Authorized or Grandfathered Structures & Fills, Removal of Structures: Improvements to the dam will permanently disturb 30,020 square feet (sf) and temporarily disturb 4,065 sf of regulated wetlands and waterbodies. Approximately 260 cubic yards (cy) of permanent fill will be placed in wetlands, resulting in a permanent loss of 390 sf of wetland.

Tighe & Bond is submitting a copy of this PCN application to the Connecticut Department of Energy and Environmental Protection (CTDEEP) as required for 401 Water Quality Certification (Individual). Tighe & Bond is concurrently applying for a CTDEEP Individual Dam Safety Permit for this project.

1.1 Project Locus

Brush Reservoir Dam is located at 41.1389° N, -73.6225°. The dam is located approximately 525 feet east of E Middle Patent Road, along Piping Brook and Gray's Pond Brook. Access to the abutment is from an access road off Barn Hill Rd. The Project location is shown on the Site Location Map (Figure 1) and Orthophotograph Aerial Map (Figure 2) in Attachment A.

Section 2

Existing Conditions

This section provides a site description and wetland characterization of the Project area. Land use near the proposed Project consists of Grays Pond and associated wetlands, single family residences, E Middle Patent Road, and forested and herbaceous uplands.

2.1 Project Site

Brush Reservoir Dam has a maximum structural height of approximately 27 ft. The dam is approximately 260 ft long, including the spillway. The dam has a maximum storage capacity of 18.4 acre-feet. The drainage area is 1.6 square miles and the impoundment area is approximately 6 acres. In accordance with the U.S. Army Corps of Engineers (ACOE) *Recommended Guidelines for Safety Inspections of Dams* (1979), Brush Reservoir Dam is considered a Small size structure based on both height and storage.

The dam serves to impound water, also known as Grays Pond, a former water supply reservoir. The pond serves to store a relatively small volume of water in the watershed that contributes to the Greenwich Reservoir System through Bargh or Rockwood Reservoirs. The dam's spillway discharges to Grays Pond Brook, which conveys flow to Bargh Reservoir.

Brush Reservoir Dam is a concrete dam with a broad crested concrete overflow weir spillway at the left abutment. The crest of the concrete dam consists of a bituminous concrete overlay over the deteriorating concrete crest. The concrete dam is constructed directly on a bedrock foundation.

The concrete overflow weir spillway is founded on bedrock, has 2.2 ft of normal freeboard, and is 25 ft in length. The spillway weir discharges to a bedrock spillway discharge channel with a concrete training wall on the right side and bedrock on the left side. The spillway discharge channel arcs from the impoundment around the area of downstream earthen fill trained by the dry laid stone masonry wall to discharge into the downstream channel, downstream of the low-level outlet discharge point. The spillway channel has a steep slope downstream of the weir and the channel is filled with large boulders and exposed bedrock. The spillway discharge channel width is approximately 28 ft.

The low-level outlet consists of a 12-inch diameter cast iron outlet pipe, which reduces to a 6-inch diameter outlet with an inoperable gate valve at the downstream end. An outlet pipe exits the dam at the downstream stone masonry wall. The existing 12-inch x 6-inch reducer and gate valve are broken at the outlet and detached from the main pipe. Upstream control of the low-level outlet consists of an inoperable slide gate located on the upstream face of the dam with a hand wheel valve operator located on the crest. The upstream control valve has been forced open by jacking up the valve operator and stem on the crest allowing water into the low-level outlet pipe.

Another valve operator on the crest and slide gate on the upstream face exist for a former raw water intake pipe that conveys water downstream along the west side of the downstream channel.

Brush Reservoir Dam was determined to be in poor condition based on visual inspection by Tighe & Bond. Substantial transverse cracking across the crest of the dam was observed, as well as longitudinal cracking on the upstream face. Significant spalling and efflorescence were also noted. Seepage from the downstream face occurs during high pool elevations in the reservoir. The downstream face of the dam has significant scouring ranging from sections 1 to 6 feet deep. The shotcrete face is failing at multiple points and the concrete structure behind is visible. The low-level outlet pipe is broken at the reducer and the downstream control valve is no longer attached to the pipe. The upstream control valve has been forced open allowing water into the low-level outlet pipe. As a result, the low-level outlet cannot open and close easily to control the water level.

The upstream and downstream faces of the dam are covered by a deteriorating shotcrete repair of the concrete. Significant seepage was observed at the downstream face of the concrete dam. Downstream of the concrete dam is earthen fill with a dry stacked, un-mortared stone masonry wall located at the toe of the dam above the outlet pipe. Seepage was observed in the stone masonry wall around the outlet pipe. The downstream earthen fill is covered with grass, herbaceous, and small diameter woody vegetation and slopes from approximately 5 horizontal to 1 vertical (5H:1V) to 1.5H:1V.

Significant erosion exists from an overtopping event or prolonged heavy seepage, with an erosion channel cut up to 15 ft wide and 6 ft deep on the right half of the dam and an erosion channel approximately 2 ft wide and 2 ft deep on the left half of the dam.

2.2 Resource Area Investigation

A Tighe & Bond wetland scientist and qualified soil scientist delineated wetland resources within the limits of the proposed Project area on June 6, 2022. Tighe & Bond conducted the delineation in accordance with federal, state, and local guidelines; including the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2.0)* (U.S. Army Corps of Engineers, 2011), and the Connecticut Inland Wetlands and Watercourses Act (CGS § 22a-36 to 22a-45).

The wetland resource areas are shown on Plan Sheet G-004 in Appendix A. Photographs of the resource areas are in Appendix B, and Wetland Delineation Data Forms are provided in Appendix C.

2.3 Wetland Descriptions

The on-site wetlands, upland transition, and landscape are described below.

2.3.1 Wetland 1

Wetland 1, Grays Pond, is located northwest of the dam and classified as an excavated palustrine unconsolidated bottom wetland with a permanently flooded water regime (PUBHx) by the U.S. Fish & Wildlife Service (USFWS) National Wetland Inventory (NWI). Vegetation observed in the drained portions of the pond included swamp smartweed (*Polygonum hydropiperoides*), and arrow-leaved tearthumb (*Persicaria sagittata*). Soils in the exposed portions of the pond consisted of drying muck over gravelly sandy loam. Vegetation observed in a palustrine emergent (PEM) portion of the wetland along the bank of the pond included skunk cabbage (*Symplocarpus foetidus*), sedge (*Carex* sp.), honeysuckle (*Lonicera* sp.), and spicebush (*Lindera benzoin*). There is a wetland classified

by the USFWS NWI as a palustrine forested broad leaved deciduous wetland with a seasonally flooded/saturated water regime (PFO1E) immediately upstream of the pond. Vegetation observed in this forested wetland fringe upstream of the pond included red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), skunk cabbage, speckled alder (*Alnus incana*), spicebush, and Japanese barberry (*Berberis thunbergii*). PEM vegetation observed in this forested wetland fringe included skunk cabbage, spotted touch-me-not (*Impatiens capensis*), and cinnamon fern (*Osmundastrum cinnamomeum*). Indicators of wetland hydrology included saturated soils and drainage patterns. Soils in the forested wetland fringe consisted of muck over clay and gravelly sandy loam.

2.3.2 Wetland 2

Wetland 2, Grays Pond Brook, is located downstream of the dam and is classified as a riverine upper perennial unconsolidated bottom wetland with a permanently flooded water regime (R3UBH). Vegetation observed included red maple and skunk cabbage. There is a channel in this wetland approximately 28 feet wide with steep slopes. Gravel bars and fallen trees were observed in the downstream channel.

2.4 Upland Description

The upland adjacent to Grays Pond consisted of maintained lawn and forested upland dominated by sugar maple (*Acer saccharum*) and shagbark hickory (*Carya ovata*), with a mix of invasive species, including Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), and Japanese barberry.

2.5 Functions and Values

Functions and values of the wetland system, which includes both wetlands and watercourse, were evaluated and conducted during the field investigation generally in accordance with *The Highway Methodology Workbook Supplement, Wetland Functions and Values: A Descriptive Approach* issued by the U.S. Army Corps of Engineers New England District (ACOE NED) (1999) (*Highway Methodology*). The *Highway Methodology* recognizes 13 separate wetland functions and values.

The principal functions and values include groundwater recharge and discharge, floodflow alteration, and wildlife habitat. Rational for these designations includes the following:

Groundwater recharge/ discharge

- Wells may occur downstream of wetland
- Gravel or sandy soils are present in the wetland
- Impervious soils occur in the wetland
- The wetland is associated with a perennial stream
- Signs of groundwater discharge are present- watercourse intersects with the water table and springs were observed
- Signs of groundwater recharge are present- wetland shows signs of variable water levels
- Groundwater quality meets drinking water standards
- Quality of water associated with the wetland is high

- Wetland shows signs of variable water levels

Floodflow alteration

- Effective flood storage is small above the wetland
- Wetland contains hydric soils which are able to absorb and retain water
- The wetland is concave and relatively flat, providing potential flood storage
- The wetland shows signs of varying water levels
- During flood events, the wetland system can retain higher volumes of water than under normal/ average rainfall conditions
- The wetland receives and retains overland and sheet flow runoff from surrounding uplands
- The wetland is associated with a watercourse
- Wetland contains a high density of vegetation

Wildlife Habitat

- Water quality of Grays Pond is high
- The wetland is contiguous with other wetland systems and connected via watercourse
- Overland access between wetlands is present
- Wildlife food sources are within the wetland or nearby
- The wetland exhibits a high degree of interspersed vegetation, classes, and water and includes shallow marsh and wooded swamp
- Density of wetland vegetation is high and exhibits a high degree of plant species diversity and community structure
- Wetland contains potential of a high insect population and avian utilization

2.6 Rare, Threatened, and Endangered Species

Tighe & Bond conducted a CTDEEP Natural Diversity Database (NDDB) map review (map dated December 2020) for potential endangered, threatened or special concern species or designated critical habitats within the Project Area. The project is not located within a known habitat. A fisheries consultation was submitted to CTDEEP as required under dam safety regulations.

The USFWS Information for Planning and Consultation (IPaC) system was reviewed for federally listed species. The consistency letter indicated critical habitats were not within the project area, however, the Northern Long-eared Bat (*Myotis septentrionalis*) and bog turtle (*Glyptemys muhlenbergii*) may occur within the area. A review of the NDDB Northern Long-Eared Bat map dated July 24, 2023, indicates the project is not within a municipality with known northern long-eared bat hibernacula. The project is adjacent to a municipality with known northern long-eared bat hibernacula. All tree-clearing will be completed in the inactive season of November 1 through April 14. It should be noted there are only historic records of bog turtles in Fairfield County, Connecticut. The project review request submitted to the USFWS is located in Appendix D.

Section 3

Project Description

This section provides a description of the proposed Dam improvements, proposed site stabilization measures, Best Management Practices (BMPs), and post-construction measures. Refer to the Engineering Report located in Appendix G for further details.

3.1 Proposed Activities

The dam does not meet current factors of safety for stability under existing conditions. The height of the water in the impoundment adds to the dam's instability. The goal is to lower the water level in the impoundment, specifically the normal pool elevation, by lowering and widening the spillway.

The proposed structural improvements to the dam, spillway, and low-level outlet will improve the condition, stability, and hydraulic capacity for the 100-year SDF.

The clearing and grubbing of trees and brush within 25 feet of the embankments and spillway will improve the long-term structural integrity of the dam and will bring the dam into compliance with CTDEEP regulations.

The construction at the dam will be completed in phases. Once the cofferdam is installed and dewatering is complete, demolition will begin on the existing training walls and sections of the low-level outlet pipe. Construction will then begin on the new training walls, upstream facing wall, and low-level outlet pipe.

Approximate locations of maximum drawdown allowed is shown on the design drawings included in Appendix D of this permit application. The contractor will be responsible for providing control of water and a cofferdam to protect the work area from inundation during heavy rainfall events and allow for a stable work area.

3.1.1 Proposed Improvements

The proposed work includes the following improvements at the Brush Reservoir Dam:

- Drawdown of the reservoir by approximately 23.5 feet to access submerged areas of the dam for repairs.
- Permanent lowering of the spillway elevation from 364.5 ft to 360 ft.
- Modifications to the existing spillway to widen and deepen it.
- Replacement of unsound concrete in approximately the same configuration.
- Addition of an upstream face seepage cutoff through the concrete dam.
- Addition of a rip rap buttress on the downstream face of the concrete dam to improve stability.
- Extend the low-level outlet pipe downstream past the proposed riprap buttress.
- Replacement of the upstream low-level outlet control valve.
- Lowering the normal pool elevation.

- Planting water tolerant plantings in the formerly inundated area.

3.2 Anticipated Project Schedule

We anticipate the following schedule for advancement of the proposed improvements to Nystrom Pond Dam. This schedule is dependent on the Town’s available funding and approval of permits.

- | | |
|----------------------|--|
| • December 28, 2023 | Solicit Public Construction Bids for Improvement |
| • February 14, 2024 | Award Construction to Selected Contractor |
| • March 14, 2024 | Begin Construction |
| • April 1, 2024 | Dewater Pond and Construct Improvements |
| • August 5, 2024 | Refill Pond |
| • September 13, 2024 | Construction Substantially Complete |

3.3 Protective Measures

Wetland resource areas at the site will be protected by erosion control barriers consisting of straw wattles, silt fence, and/or compost filter tubes. The control measures are to be installed along the edge of the work areas. These protective measures will be placed in a fashion that restricts access to the wetland resource areas while allowing the contractor to conduct work within the limits of the Project. The locations of the protective measures are shown on the Project Drawings provided in Appendix A of this PCN application. The Project Drawings also includes Erosion Control Notes on Sheets D-101 and C-102 and details on Sheet C-401.

- The contractor will be required to maintain a reserve supply of straw wattles and silt fence on-site to make repairs as necessary
- Protective measures will be inspected after significant precipitation events and repaired as necessary
- During dewatering, sediment must be treated with a sedimentation filter bag, or other approved method prior to the discharge of water in a stable upland area.

In the event that disturbed areas at the site are to be left un-worked for more than 14 days, the areas shall be mulched with straw at a rate of 100 pounds per 1,000 sf to reduce erosion. Two inches of wood chip mulch may also be used as temporary cover. In the event that disturbed areas at the site are to be left un-worked for more than one month, the areas shall be topsoiled and seeded.

Final stabilization will include restoration of all disturbed areas following construction. Restoration of upland areas consists of replacement of topsoil or placement of imported loam as needed, such that a minimum of 4 inches of suitable material is present and appropriately limed, fertilized, graded, and scarified. Disturbed upland areas will then be seeded. Final stabilization will be considered complete when all soil-disturbing activities have been completed and a uniform, perennial vegetative cover with a density of at least 80 percent has been established or equivalent stabilization measures have been employed on all unpaved areas and areas not covered with permanent structures.

Equipment fueling and other activities involving petroleum, oil, or other potentially hazardous substances are to be performed at pre-approved, designated areas with appropriate spill prevention and control measures. Fueling within wetland areas will be prohibited.

3.4 Post-Construction Restoration

The restoration measures along the dam and embankment upland areas will consist of stabilizing all disturbed areas by loaming and seeding. Disturbed wetland areas will be restored with native vegetation wetland seed mix. Erosion controls will not be removed from the site until revegetation and soil stabilization has occurred. The Project Drawings in Appendix A include a typical of an erosion control slope blanket (see Sheet C-401), which may be used to stabilize slopes until vegetation can establish.

3.5 Functions and Values

The groundwater discharge/recharge, wildlife habitat, and fish habitat functions may be temporarily disturbed during construction and drawdown period. However, the functions are expected to be fully restored at the conclusion of the project. No effect on the other functions and values listed in Section 2.5 is expected.

3.6 Area of Disturbance

The Project proposes temporary and permanent disturbance to Wetland 1 and Wetland 2. Work proposed will be in previously disturbed areas due to the existing impoundment and vegetation maintenance. Areas of disturbance by resource area are outlined in Table 3-1.

Brush Reservoir will be temporarily impacted by an approximately four-month long drawdown of approximately 23.5 feet below the spillway crest. This drawdown is necessary to access submerged areas in need of repair along the upstream side of the dam.

The spillway is proposed to be lowered 4.5 feet to elevation 360 feet. Instead of extensive rock removal in the location of the existing spillway, the new spillway will be formed by a concrete weir at elevation 360 feet, starting where the bedrock meets this elevation and extending approximately 34 feet to the right. The existing short concrete spillway weir will be removed to bedrock and the bedrock will be exposed to form the left spillway training wall to elevation 360 feet. Approximately 1,010 sf of permanent excavation in Brush Reservoir will occur along the upstream side of the dam for this rock removal. Approximately 75 cy of riprap is proposed to be added to this excavated area along the upstream side of the spillway. The final grade will be lower than the existing grade, with a net difference of 93 cy.

Lowering the spillway by 4.5 feet will permanently lower the normal pool elevation once the reservoir is refilled after the temporary drawdown. Approximately 25,030 sf of the PUB portion of Wetland 1 will be permanently dewatered. The drawdown is estimated to temporarily dewater approximately 4,065 sf of Wetland 1. Wetland plantings are proposed within the 25,030 sf of Wetland 1 exposed from lowering the normal pool elevation, resulting in a permanent wetland conversion from PUB to PEM/PSS cover type.

Disturbances to Wetland 2 are associated with installing a riprap buttress on the downstream side of the dam, excavating a spillway discharge channel, channel

restoration, and installing a riprap splash pad for the low-level outlet. Riprap will extend from the existing training wall to the right abutment and out towards the low-level outlet area. This riprap buttress will result in approximately 390 ft / 35 cy of permanent fill and wetland loss. Approximately 700 sf will be excavated to clear sound, intact bedrock for a spillway discharge channel. At the end of the excavated spillway discharge channel, approximately 2,890 sf of the downstream channel will be restored to existing grade by reusing existing rip rap to the extent possible. Approximately 150 cy of rip rap will be used for this downstream channel restoration. The low-level outlet discharge pipe is anticipated to be extended due to this large area of riprap. Approximately 156 sf / 23 cy will be temporarily excavated and filled with riprap for the splash pad at the extended outlet. The grade at the proposed riprap splash pad will remain the same as the existing grade, thus resulting in no net cut or fill. Approximately 700 sf of Grays Pond Brook will be temporarily impacted by the drawdown of Brush Reservoir.

Total temporary impacts to Brush Reservoir and Grays Pond Brook are 4,765 sf. Total permanent impacts to Brush Reservoir and Grays Pond Brook are 29,320 sf / 278 cy. Total wetland loss in Wetland 2 is 3,280 sf / 185 cy. Disturbances to Brush Reservoir and Grays Pond Brook have been minimized to the greatest extent practicable; however, this work is necessary for the dam's conformance with the CTDEEP Dam Safety regulations.

TABLE 3-1

Activities within Jurisdictional Areas

Resource Area	Activity	Temporary Impacts
Wetland 1, Brush Reservoir	Drawdown	4,065 sf
Wetland 2, Grays Pond Brook	Drawdown	700 sf
Total Temporary Impacts		4,765 sf
Resource Area	Activity	Permanent Impacts¹
Wetland 2, Grays Pond Brook	Riprap Buttress Fill	390 sf / 35 cy
Wetland 2, Grays Pond Brook	Spillway and Stream Channel	2,890 sf / 150 cy
Wetland 1, Brush Reservoir	Drawdown / Wetland Conversion	25,030 sf
Wetland 1, Brush Reservoir	Spillway Excavation	1,010 sf / 75 cy
Total Permanent Impacts		29,320 sf / 278 cy

¹ Permanent impact areas of permanent dewatering, wetland conversion, grading, or where aquatic substrate will be altered by riprap placement.

3.7 Restoration and Mitigation

The Project proposes 3,280 sf / 185 cy of wetland loss in Wetland 2. Mitigation for these wetland impacts is detailed below.

3.7.1 Restoration

Areas of temporary impacts will be restored to existing condition.

As noted in Section 3.4, post-construction restoration of disturbed areas will involve loaming and seeding. A wetland seed mix (New England Erosion Control/Restoration Mix for Detention Basin and Moist Sites by New England Wetland Plants) shall be applied to disturbed areas within wetlands.

Wetland plantings are proposed within the 25,030 sf area exposed from lowering the normal pool elevation. A summary of the planting plan is outlined in Table 3-2. The details of the planting plan can be found in Appendix A on Sheet LP.1.

TABLE 3-2

Summary of Wetland Buffer Area Plantings

Common Name	Botanical Name	Wetland Indicator Status	Quantity	Size
American Sycamore	<i>Platanus occidentalis</i>	FACW	13	5 – 6 ft tall
Canadian Service-berry	<i>Amelanchier canadensis</i>	FAC	13	4 – 5 ft tall
Coastal Sweet-Pepperbush	<i>Clethra alnifolia</i>	FAC	45	2 – 3 ft tall
Common Buttonbush	<i>Cephalanthus occidentalis</i>	OBL	80	2 – 3 ft tall
Harlequin Blueflag	<i>Iris versicolor</i>	OBL	300	1 quart
Northern Spicebush	<i>Lindera benzoin</i>	FACW	20	18 – 24 in. tall
Pin Oak	<i>Quercus palustris</i>	FACW	3	1 ½ - 2 in. caliper
Red Maple	<i>Acer rubrum</i>	FAC	1	2 – 2 1/2 in. caliper
Swamp White Oak	<i>Quercus bicolor</i>	FACW	3	1 ½ - 2 in. caliper
Sensitive Fern	<i>Onoclea sensibilis</i>	FACW	200	1 quart
Steeplebush	<i>Spiraea tomentosa</i>	FACW	100	1 quart
Sweet-scented Joe-Pye-Weed	<i>Eutrochium purpureum</i>	FAC	100	1 quart

3.7.2 In-Lieu Fee

This project proposes maintenance required under dam safety regulation. On behalf of Aquarion, Tighe & Bond is requesting that in-lieu fee mitigation be waived for temporary impacts and impacts that do not result in permanent wetland loss. The project proposes 4,765 sf of temporary impact. Additionally, the project proposes 26,040 sf of permanent impact that will not result in a permanent wetland loss. Based on the existing conditions of these areas and the proposed impacts, no loss of wetland functions or values is anticipated after restoration.

The Connecticut In-Lieu Fee (ILF) program is the current preferred approach for impacts to wetlands and Waters of the U.S. This project is in the Southwest Coast service area and would have a credit fee of \$9.12 per square foot. Based on the project permanent wetland loss of 0.08 acres (3,280 square feet) to Wetland 2, this results in an ILF of

\$29,914. We are proposing this ILF for mitigation under our ACOE permit and request that this fee and the improvements described above are adequate mitigation for this Water Quality Certification application. Tighe & Bond would be happy to further discuss this option for on-site wetland mitigation with the Corps.

Section 4

Regulatory Compliance

4.1 General Permit General Conditions

The project meets the general conditions outlined in the CT General Permit Appendix B.

4.1.1 Historic Properties

The Connecticut State Historic Preservation Office (SHPO), Historic Property Database was reviewed for the presence of properties near the Project Site in Stamford. Properties were not identified within the database. Letters describing the project were submitted to SHPO and Tribal Historic Preservation Officers (THPOs) for the Mohegan Tribe of Indians of Connecticut, Mashantucket Western Pequot Tribal Nation, and Wampanoag Tribe of Gay Head were delivered on March 23, 2023. The notifications are provided in Appendix E. Note that duplicate attachment materials have been omitted. A response was received from SHPO stating that no historic properties will be affected by this project. The response is provided in Appendix E. As of this application, responses from the THPOs have not yet been received.

4.2 Other Permits

Additional permits and reviews for the project, beyond this PCN application are listed in Table 4-2.

Table 4-2

Project Permits and Reviews

Regulatory Agency	Permit
Connecticut Department of Energy and Environmental Protection (CTDEEP)	Section 401 Water Quality Certification
	Individual Dam Safety Permit
	Fisheries Consultation Review

Section 5

Alternatives Analysis

Various alternative plans were considered prior to the current submission. Throughout the design process, impacts to existing wetland and watercourse areas were avoided or minimized to the extent practicable, resulting in the current proposal.

5.1 No Action

The No Action alternative would consist of leaving the dam and its appurtenant structures in place. This alternative was discarded because the Brush Reservoir Dam is in poor condition. If no improvements were undertaken, the dam would continue to deteriorate. Continued deterioration may result in failure and potential impacts to upstream and downstream infrastructure and resources. As the dam owner, Aquarion is liable for damages caused by a failure of Brush Reservoir Dam. The No Action alternative provides few benefits at the cost of increased likelihood of failure, safety concerns, and economic strain and is thus not preferred.

5.2 Dam Removal

The dam removal alternative assumes the entire length of the concrete dam above grade will be removed and a channel will be constructed through the impoundment, dam, and downstream areas. The dam removal alternative would drain Brush Reservoir leaving only a stream channel. In preliminary discussions, this alternative was met with substantial opposition from abutting property owners.

5.3 Downstream Riprap Buttress

This option includes a concrete cap on the crest of the dam, concrete facing wall on the upstream portion of the dam, and a riprap buttress on the downstream side of the dam.

To limit seepage through the concrete dam, an 8-inch-thick concrete facing wall is proposed on the upstream face of the dam. This wall will be installed on the entire upstream face of the dam, 8 inches thick, from the dam crest to bedrock.

Riprap will extend from the existing training wall to the right abutment and out towards the low-level outlet area. The low-level outlet discharge pipe is anticipated to be extended due to the large area of rip rap. This alternative was eliminated due to cost constraints.

5.4 Spillway Elevation 360 ft (Preferred Alternative)

The spillway is proposed to be lowered 4.5 feet to elevation 360 feet. Instead of extensive rock removal in the location of the existing spillway, the new spillway will be formed by a concrete weir at elevation 360 feet, starting where the bedrock meets this elevation and extending approximately 34 feet to the right. This will help the dam hydraulically by adding width to the spillway. This alternative provides 1-foot of freeboard during the Spillway Design Flood, thereby mitigating the risk of the dam overtopping. The existing short concrete spillway weir will be removed to bedrock and the bedrock will be exposed to form the left spillway training wall to elevation 360 feet.

As part of the spillway widening, the existing training wall will be removed. A new concrete training wall will be installed along the right edge of the spillway, from the dam crest to the downstream channel. The high bedrock elevation in the spillway area will act as the left training wall.

Riprap will be installed to the right of the new spillway training wall to the right abutment. Due to the slope of the riprap buttress, the low-level outlet pipe is anticipated to be extended to outlet downstream of the rip rap buttress.

5.5 Concrete Buttress

This repair option includes significant concrete addition to both the upstream and downstream faces of the dam to upgrade the condition to "Good" and improve factors of safety for stability to acceptable levels. The proposed additional concrete on the upstream and downstream sides of the dam required for improving stability will also function to infill and repair the deficiencies noted on the upstream dam face as well as reduce seepage through the dam. The isolated void at the spillway would be infilled with concrete. The isolated spalls would be repaired with polymer modified cementitious repair mortar. The full extent of the training wall would be covered with a polymer-modified cementitious coating system. This alternative was eliminated due to cost constraints.

Appendix A

Figures

Project Drawings

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Longitude: -73.622378

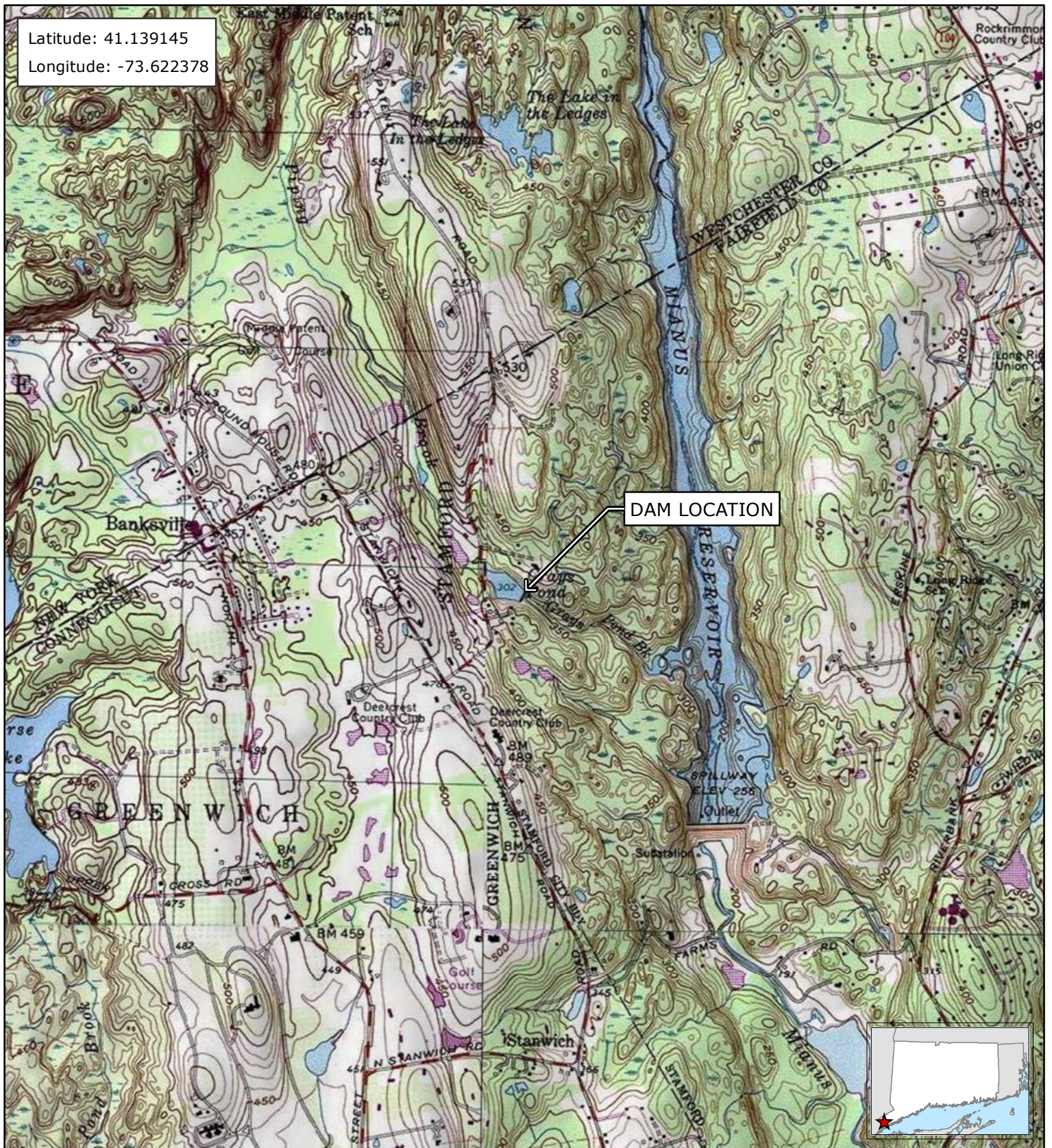
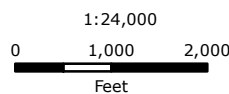


FIGURE 1
SITE LOCATION MAP

Brush Dam - CT13504
Aquarion Water Company
Stamford, Connecticut



Based on USGS Topographic Map for
Pound Ridge, NY [Site Quad]
Stamford, CT.
Glenville, NY.
Mount Kisco, NY.
Contour Interval Equals 10ft.
Circles indicate 500-foot and half-mile radii



March 2023



SUBJECT PROPERTY

EAST MIDDLEPATENT RD

CHERRY HILL RD

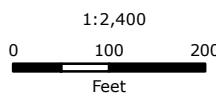


FIGURE 2
AERIAL IMAGERY

Brush Dam - CT13504
Aqurion Water Company
Stamford, Connecticut

Tighe & Bond

Based on 2019 Statewide Leaf-Off Orthophotography,
Courtesy of CTECO.



April 2023

PERMIT SUBMISSION NOT FOR CONSTRUCTION

THIS DOCUMENT IS INCOMPLETE AND IS RELEASED TEMPORARILY FOR PROGRESS REVIEW ONLY. IT IS NOT INTENDED FOR BIDDING OR CONSTRUCTION PURPOSES.

Brush Reservoir Dam Improvements

Aquarian Water Company

Stamford, Connecticut

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PROJECT NO:	A-1000-195A	
DATE:	05/2023	
FILE:	A1000-195-D-101-Figure 2.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

OVERVIEW PLAN - WETLAND IMPACT

SCALE: AS SHOWN

FIGURE 3

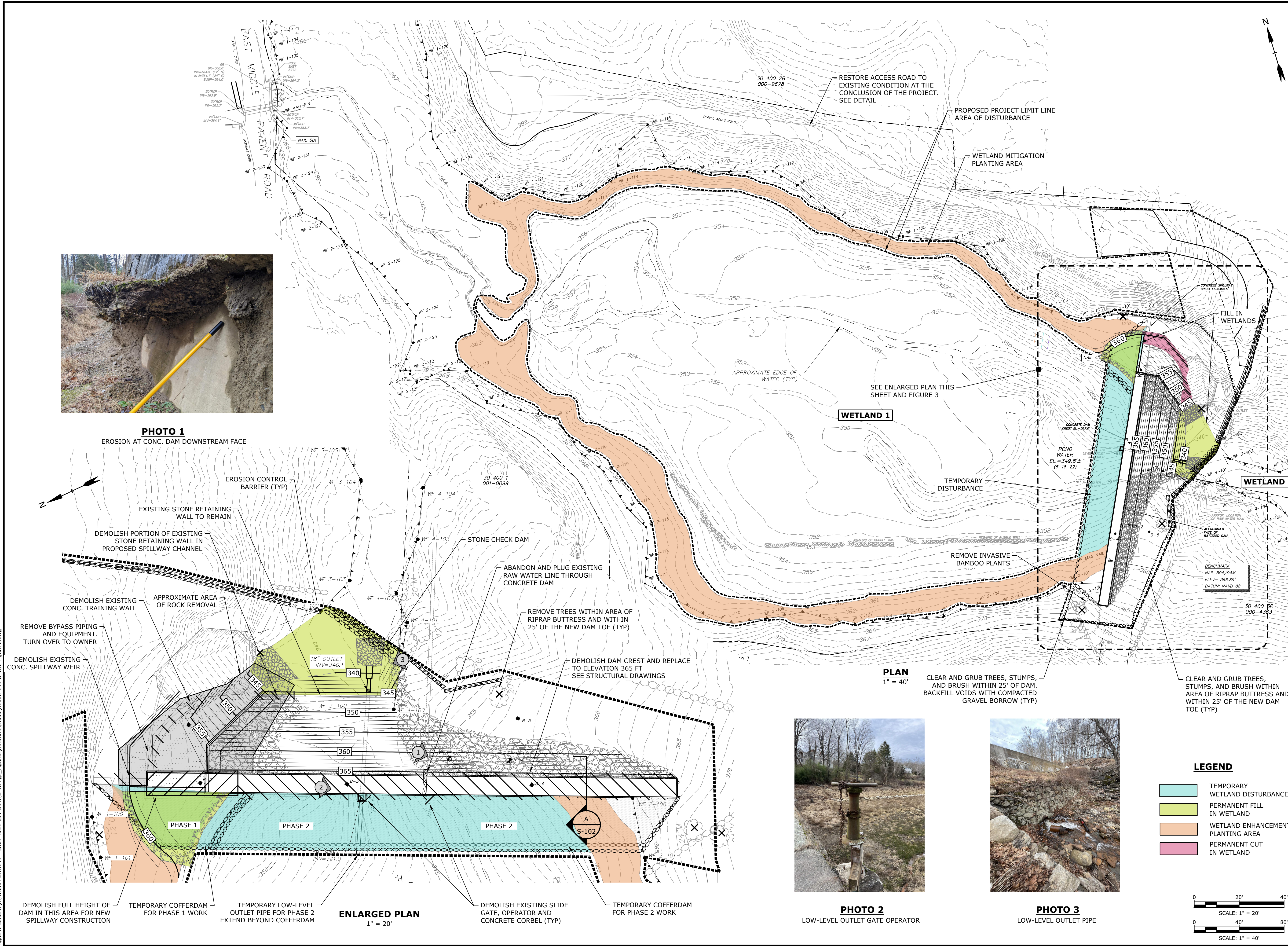


PHOTO 1
EROSION AT CONC. DAM DOWNSTREAM FACE



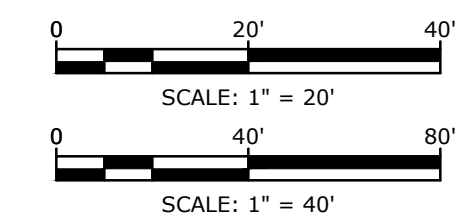
PHOTO 2
LOW-LEVEL OUTLET GATE OPERATOR



PHOTO 3
LOW-LEVEL OUTLET PIPE

LEGEND

[Light Blue Shaded Area]	TEMPORARY WETLAND DISTURBANCE
[Green Shaded Area]	PERMANENT FILL IN WETLAND
[Orange Shaded Area]	WETLAND ENHANCEMENT PLANTING AREA
[Pink Shaded Area]	PERMANENT CUT IN WETLAND

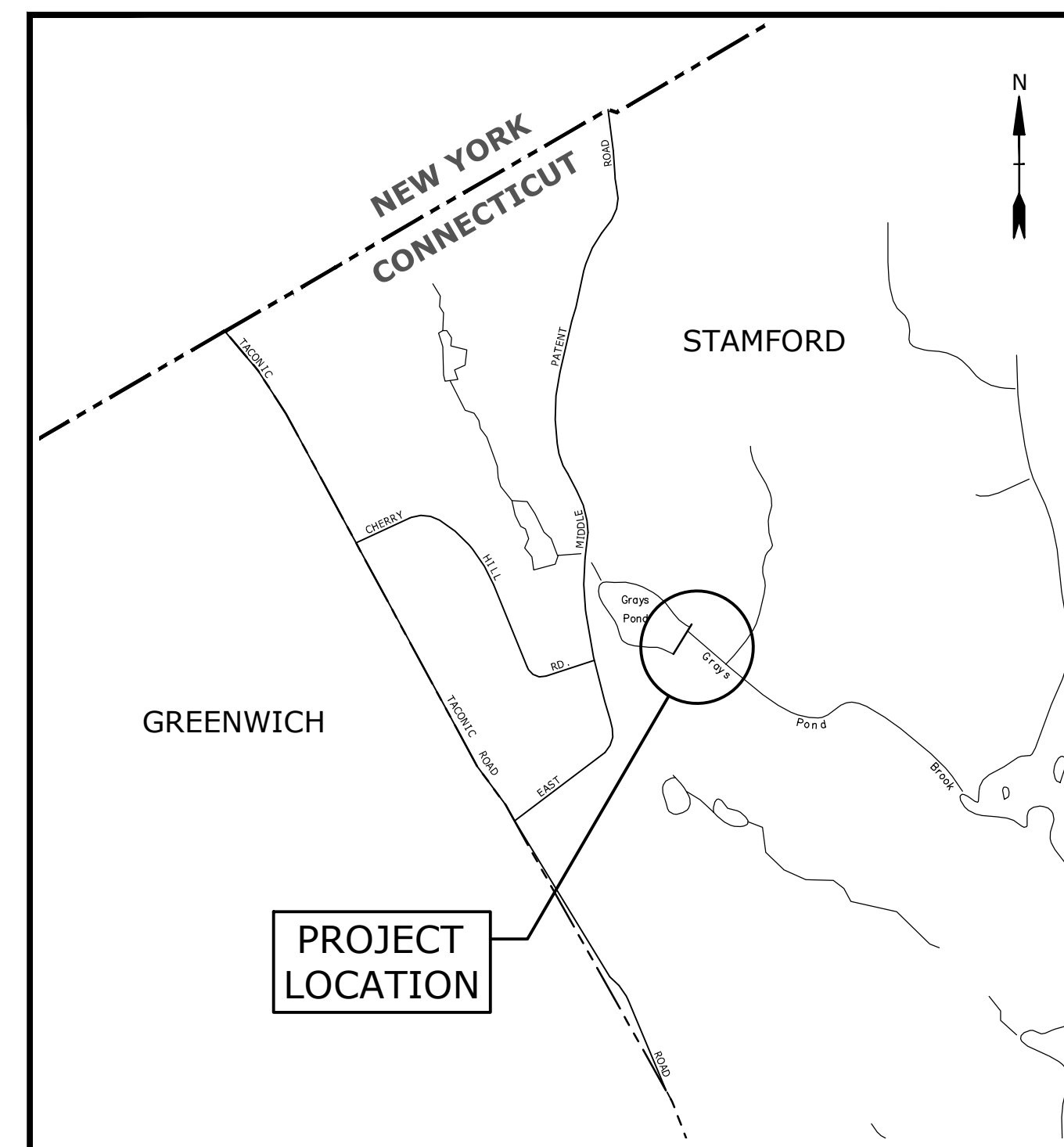


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BRUSH RESERVOIR DAM IMPROVEMENTS STAMFORD, CONNECTICUT

MAY 2023

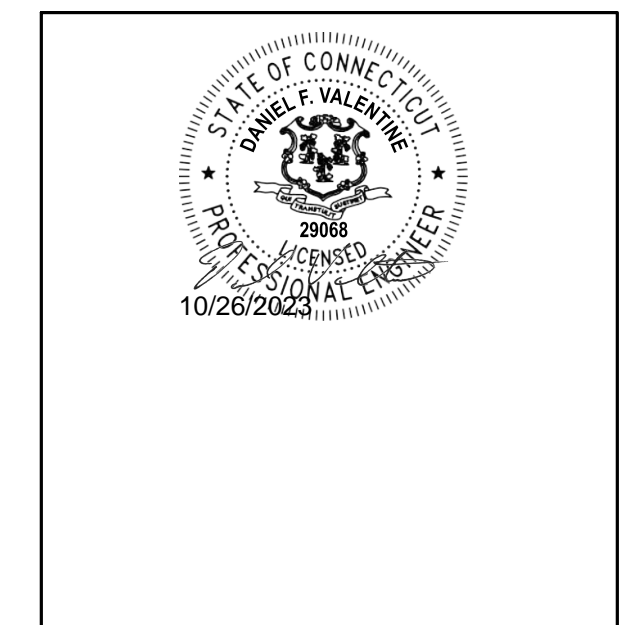
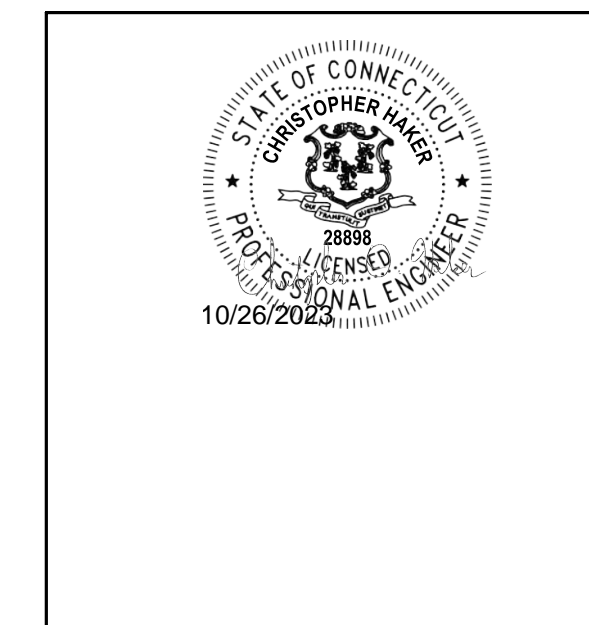
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GENERAL		
1	G-001	COVER SHEET AND LIST OF DRAWINGS
2	G-002	LEGEND AND ABBREVIATIONS
3	G-003	GENERAL NOTES
4	G-004	EXISTING CONDITIONS SITE PLAN
DEMOLITION		
5	D-101	SITE DEMOLITION AND EROSION CONTROL
CIVIL		
6	C-101	SITE PLAN
7	C-102	LANDSCAPE PLAN
8	C-201	DAM AND TRAINING WALL PROFILES
9	C-301	DAM SECTION
10	C-401	SITE DETAILS
STRUCTURAL		
11	S-001	STRUCTURAL NOTES
12	S-101	STRUCTURAL PLAN AND UPSTREAM ELEVATION
13	S-102	STRUCTURAL SECTIONS AND DETAILS - 1
14	S-103	STRUCTURAL SECTIONS AND DETAILS - 2
15	S-104	STRUCTURAL SECTIONS AND DETAILS - 3



LOCATION MAP
SCALE: 1" = 1000'

PREPARED BY:

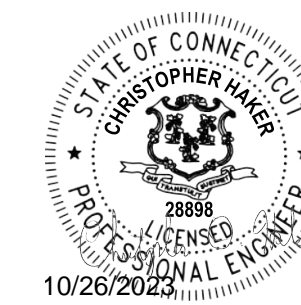
Tighe & Bond



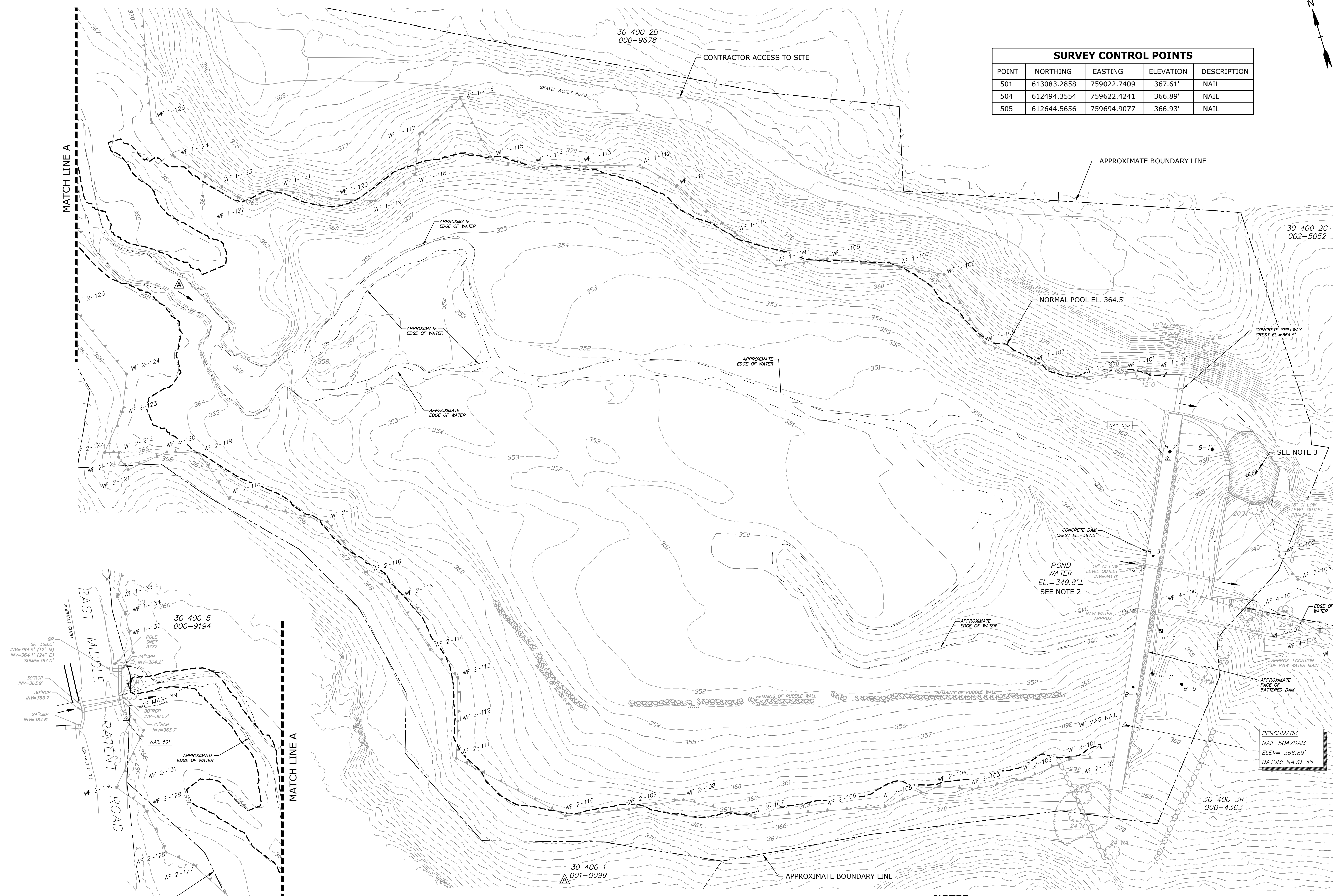
PREPARED FOR:

AQUARION WATER COMPANY

COMPLETE SET 15 SHEETS

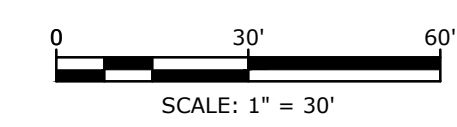


SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	613083.2858	759022.7409	367.61'	NAIL
504	612494.3554	759622.4241	366.89'	NAIL
505	612644.5656	759694.9077	366.93'	NAIL



NOTES

- BOUNDARY LINE SURVEYED BY OTHERS. THIS DRAWING MAKES NO CLAIM TO THE ACCURACY OF THE BOUNDARY SHOWN. BOUNDARY LINES ARE APPROXIMATE AND ARE SHOWN FOR SCHEMATIC PURPOSES ONLY.
- CONTOURS SHOWN BELOW THE POND WATER LINE ON THE DAY OF THE TOPOGRAPHIC SURVEY ON 5-8-22 ARE APPROXIMATE IN NATURE BASED ON AVAILABLE DATA AND SHOULD BE FIELD VERIFIED.
- CONTOURS SHOWN ON THE LEDGE ARE INTERPOLATED BASED ON ELEVATIONS AT THE BORDER AND SHOULD BE FIELD VERIFIED.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
A	10/23/2023	REV PER CTDEEP COMMENTS

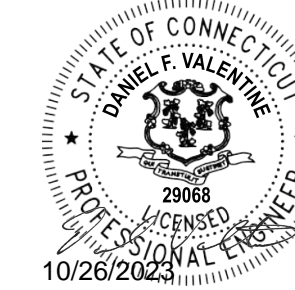
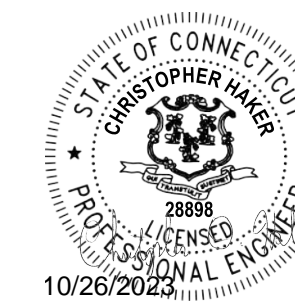
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DATE:	05/2023
FILE:	A1000-195A-G-004.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	RS/DFV
APPROVED BY:	CDH

EXISTING CONDITIONS SITE PLAN

SCALE: 1" = 30'

G-004

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 User: rsinclair
 Plotter: HP DesignJet T1100e
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NOTE:
SEE SPEC SECTION 02200 SITE PREPARATION FOR CLEARING AND GRUBBING DETAILS.

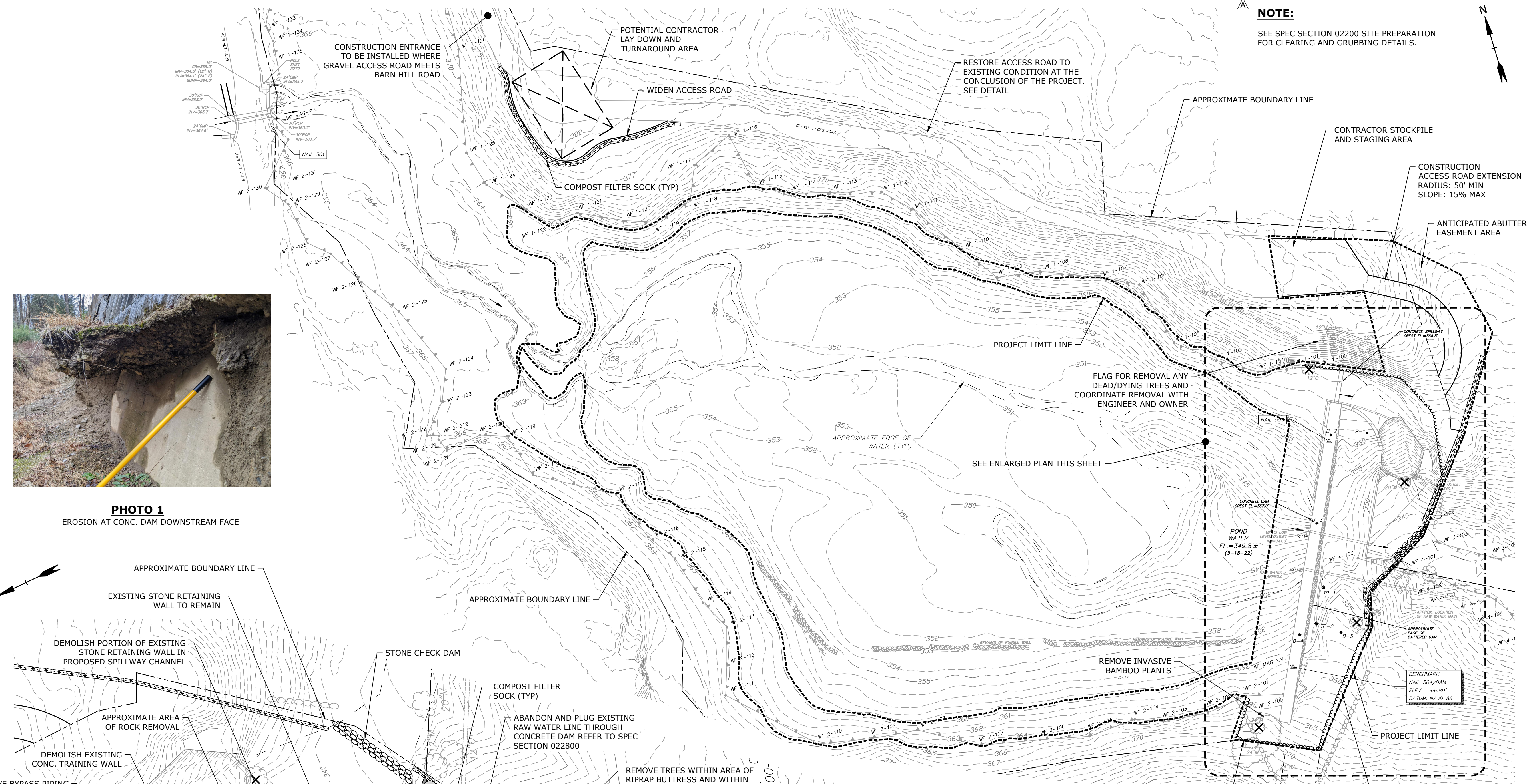
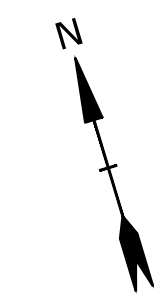
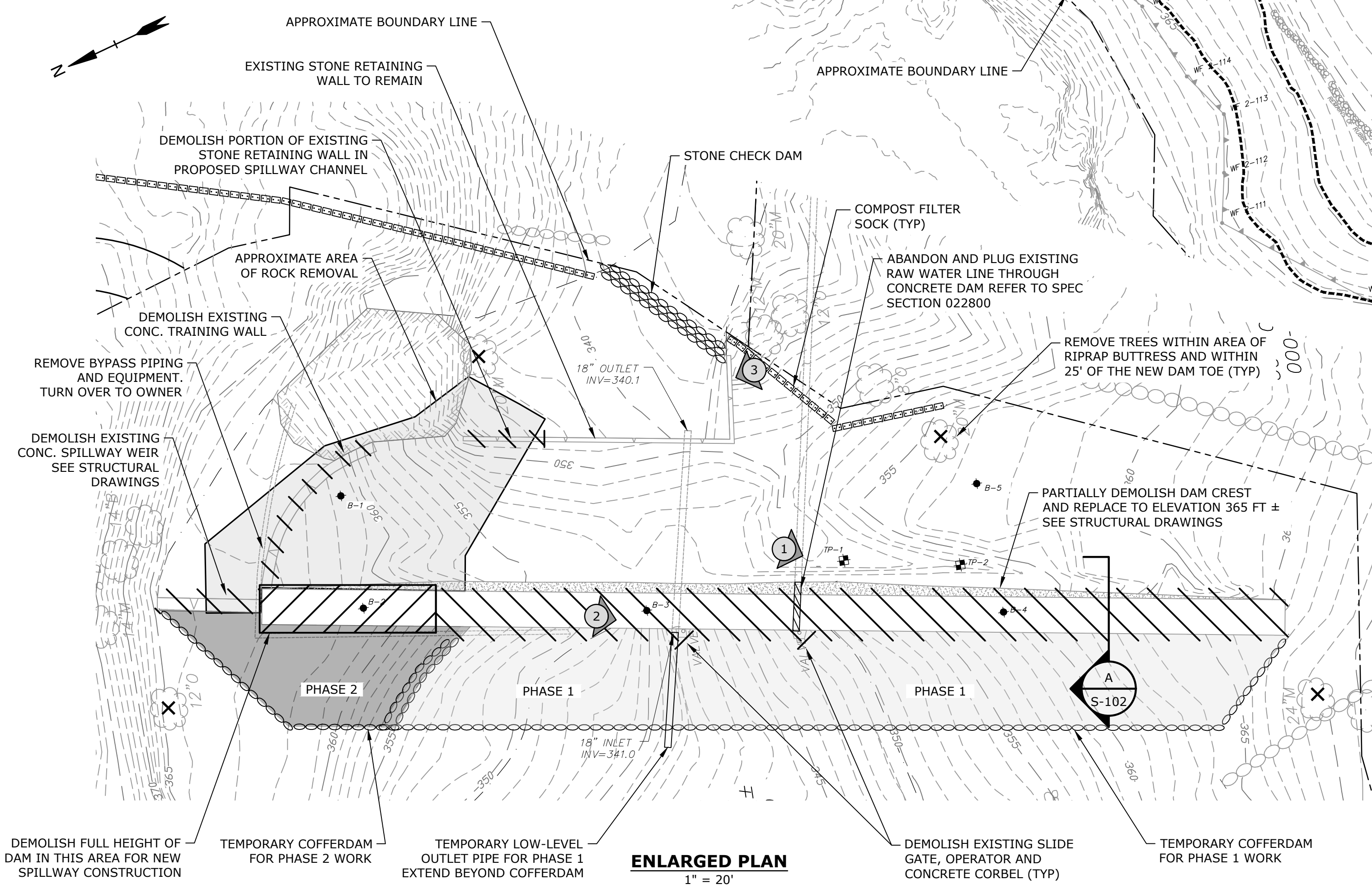


PHOTO 1
EROSION AT CONC. DAM DOWNSTREAM FACE



PLAN
1" = 40'

CLEAR AND GRUB TREES, STUMPS, AND BRUSH WITHIN 25' OF DAM. BACKFILL VOIDS WITH COMPACTED GRAVEL BORROW (TYP)

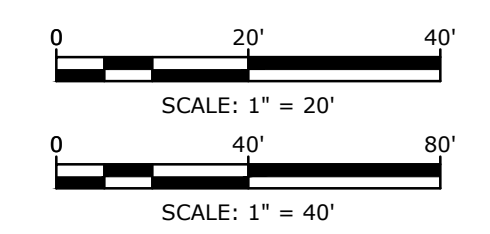
CLEAR AND GRUB TREES, STUMPS, AND BRUSH WITHIN AREA OF RIPRAP BUTTRESS AND WITHIN 25' OF THE NEW DAM TOE (TYP)



PHOTO 2
LOW-LEVEL OUTLET GATE OPERATOR



PHOTO 3
LOW-LEVEL OUTLET PIPE



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

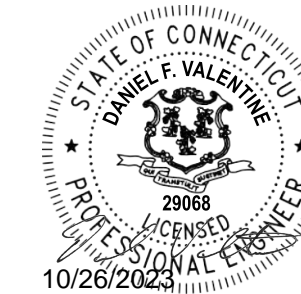
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A	10/23/2023	REV PER CTDEEP COMMENTS	

PROJECT NO: A-1000-195A
DATE: 05/2023
FILE: A1000-195A-D-101.dwg
DRAWN BY: MJC
DESIGNED/CHECKED BY: RS/DFV
APPROVED BY: CDH

SITE DEMOLITION AND EROSION CONTROL

SCALE: AS SHOWN

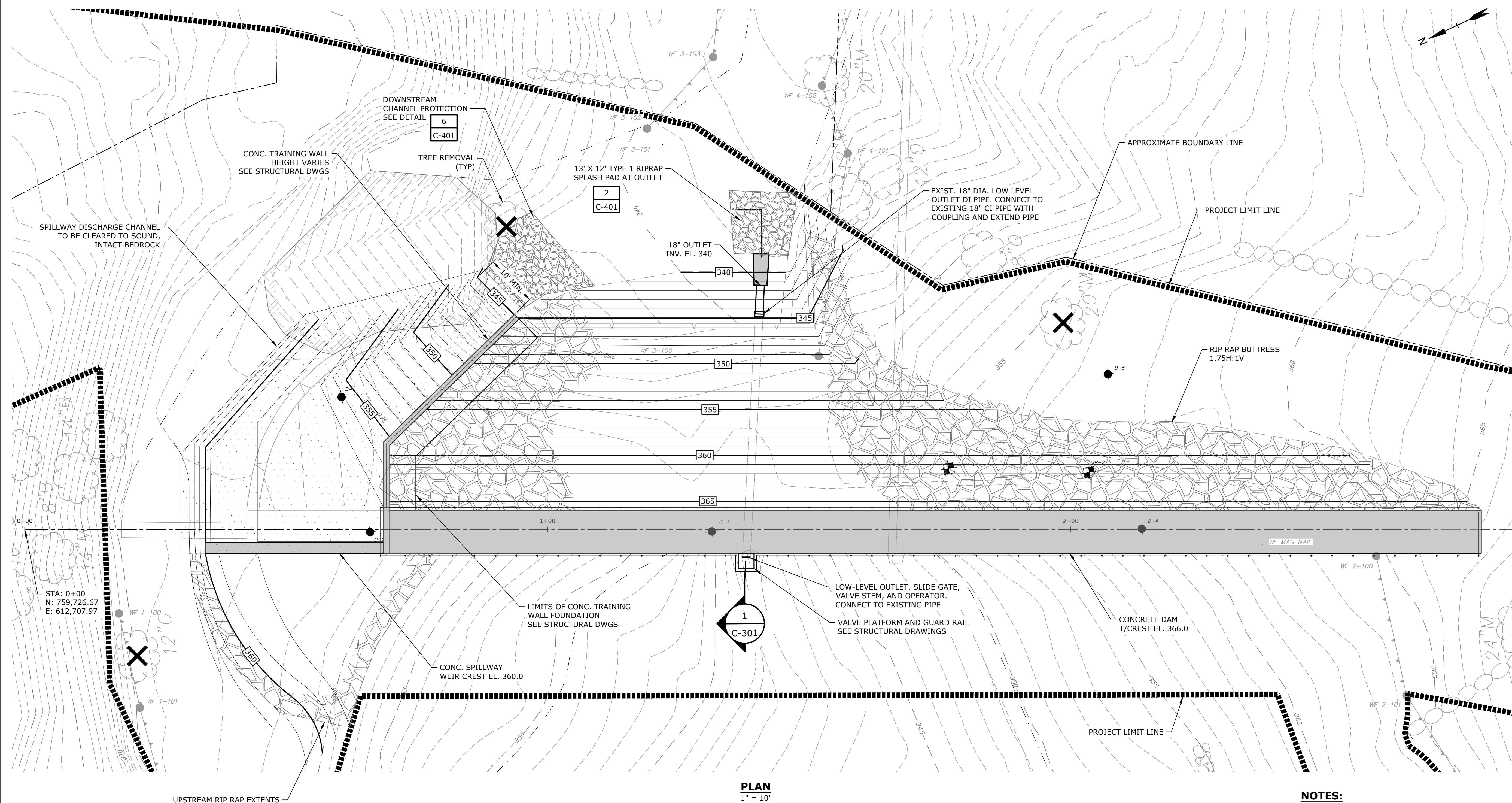
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Brush Reservoir Dam Improvements

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Stamford, Connecticut



PLAN
1" = 10'

- NOTES:**
- SEE SHEET C-201 FOR PROFILE VIEWS.
 - RESTORE DOWNSTREAM CHANNEL DISTURBED BY CONSTRUCTION PER DETAIL.
 - EROSION AND SEDIMENTATION CONTROLS NOT SHOWN FOR CLARITY.

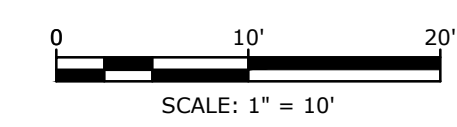
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PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-C-101.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: RS/DFV
 APPROVED BY: CDH

SITE PLAN

SCALE: 1" = 10'

C-101



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Brush Reservoir Dam Improvements

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A-1000-195A

05/2023

A1000-195-G-BORD.dwg

MJP

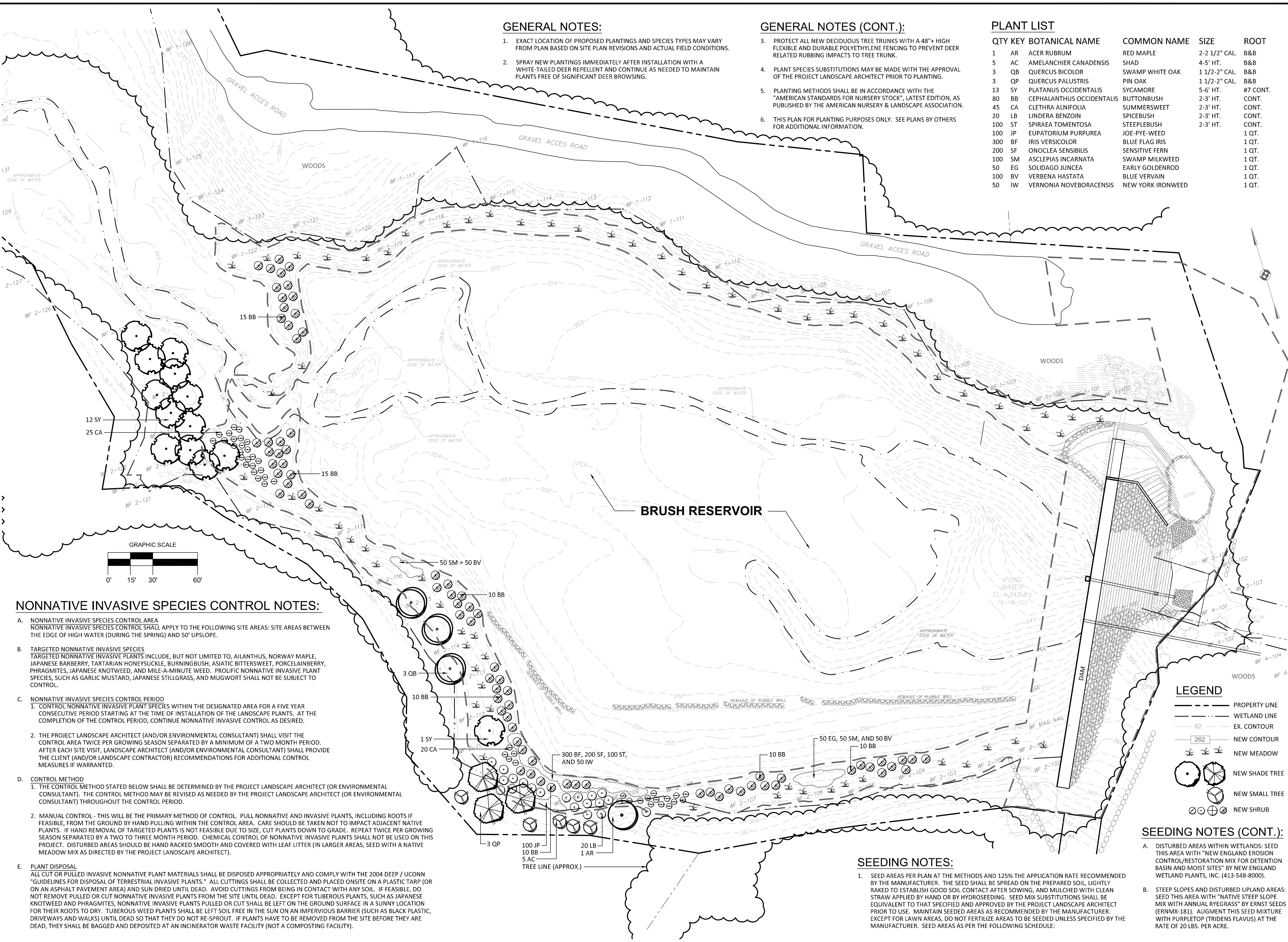
MJP

MJP

LANDSCAPE PLAN

SCALE: 1"=30'

C-102



GENERAL NOTES:

1. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM PLAN BASED ON SITE PLAN REVISIONS AND ACTUAL FIELD CONDITIONS.
2. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING.

GENERAL NOTES (CONT.):

3. PROTECT ALL NEW DECIDUOUS TREE TRUNKS WITH A 48" x HIGH FLEXIBLE AND DURABLE POLYETHYLENE FENCING TO PREVENT DEER RELATED RUBBING IMPACTS TO TREE TRUNK.
4. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING.
5. PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
6. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
1	AR	ACER RUBRUM	RED MAPLE	2-2 1/2" CAL.	B&B
5	AC	AMELANCHIER CANADENSIS	SHAD	4-5' HT.	B&B
3	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	1 1/2-2" CAL.	B&B
3	QP	QUERCUS PALUSTRIS	PIN OAK	1 1/2-2" CAL.	B&B
13	SY	PLATANUS OCCIDENTALIS	SYCAMORE	5-6' HT.	#7 CONT.
80	BB	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	2-3' HT.	CONT.
45	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	2-3' HT.	CONT.
20	LB	LINDERA BENZOIN	SPICEBUSH	2-3' HT.	CONT.
100	ST	SPIRAEA TOMENTOSA	STEEPLEBUSH	2-3' HT.	CONT.
100	JP	EUPATORIUM PURPUREA	JOE-PYE-WEED		1 QT.
300	BF	IRIS VERSICOLOR	BLUE FLAG IRIS		1 QT.
200	SF	ONOCLEA SENSIBILIS	SENSITIVE FERN		1 QT.
100	SM	ASCLEPIAS INCARNATA	SWAMP MILKWEED		1 QT.
50	EG	SOLIDAGO JUNCEA	EARLY GOLDENROD		1 QT.
100	BV	VERBENA HASTATA	BLUE VERVAIN		1 QT.
50	IW	VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED		1 QT.

NONNATIVE INVASIVE SPECIES CONTROL NOTES:

- NONNATIVE INVASIVE SPECIES CONTROL AREA**
NONNATIVE INVASIVE SPECIES CONTROL SHALL APPLY TO THE FOLLOWING SITE AREAS: SITE AREAS BETWEEN THE EDGE OF HIGH WATER (DURING THE SPRING) AND 50' UPSLOPE.
- TARGETED NONNATIVE INVASIVE SPECIES**
TARGETED NONNATIVE INVASIVE PLANTS INCLUDE, BUT NOT LIMITED TO, AILANTHUS, NORWAY MAPLE, JAPANESE BARBERRY, TARTARIAN HONEYSUCKLE, BURNINGBUSH, ASIATIC BITTERSWEET, PORCELAINBERRY, PHRAGMITES, JAPANESE KNOTWEED, AND MILE-A-MINUTE WEED. PROLIFIC NONNATIVE INVASIVE PLANT SPECIES, SUCH AS GARLIC MUSTARD, JAPANESE STILLGRASS, AND MUGWORT SHALL NOT BE SUBJECT TO CONTROL.
- NONNATIVE INVASIVE SPECIES CONTROL PERIOD**
 1. CONTROL NONNATIVE INVASIVE PLANT SPECIES WITHIN THE DESIGNATED AREA FOR A FIVE YEAR CONSECUTIVE PERIOD STARTING AT THE TIME OF INSTALLATION OF THE LANDSCAPE PLANTS. AT THE COMPLETION OF THE CONTROL PERIOD, CONTINUE NONNATIVE INVASIVE CONTROL AS DESIRED.
 2. THE PROJECT LANDSCAPE ARCHITECT (AND/OR ENVIRONMENTAL CONSULTANT) SHALL VISIT THE CONTROL AREA TWICE PER GROWING SEASON SEPARATED BY A MINIMUM OF A TWO MONTH PERIOD. AFTER EACH SITE VISIT, LANDSCAPE ARCHITECT (AND/OR ENVIRONMENTAL CONSULTANT) SHALL PROVIDE THE CLIENT (AND/OR LANDSCAPE CONTRACTOR) RECOMMENDATIONS FOR ADDITIONAL CONTROL MEASURES IF WARRANTED.
- CONTROL METHOD**
 1. THE CONTROL METHOD STATED BELOW SHALL BE DETERMINED BY THE PROJECT LANDSCAPE ARCHITECT (OR ENVIRONMENTAL CONSULTANT). THE CONTROL METHOD MAY BE REVISED AS NEEDED BY THE PROJECT LANDSCAPE ARCHITECT (OR ENVIRONMENTAL CONSULTANT) THROUGHOUT THE CONTROL PERIOD.
 2. MANUAL CONTROL - THIS WILL BE THE PRIMARY METHOD OF CONTROL. PULL NONNATIVE AND INVASIVE PLANTS, INCLUDING ROOTS IF FEASIBLE, FROM THE GROUND BY HAND PULLING WITHIN THE CONTROL AREA. CARE SHOULD BE TAKEN NOT TO IMPACT ADJACENT NATIVE PLANTS. IF HAND REMOVAL OF TARGETED PLANTS IS NOT FEASIBLE DUE TO SIZE, CUT PLANTS DOWN TO GRADE. REPEAT TWICE PER GROWING SEASON SEPARATED BY A TWO TO THREE MONTH PERIOD. CHEMICAL CONTROL OF NONNATIVE INVASIVE PLANTS SHALL NOT BE USED ON THIS PROJECT. DISTURBED AREAS SHOULD BE HAND RACKED SMOOTH AND COVERED WITH LEAF LITTER (IN LARGER AREAS, SEED WITH A NATIVE MEADOW MIX AS DIRECTED BY THE PROJECT LANDSCAPE ARCHITECT).
- PLANT DISPOSAL**
ALL CUT OR PULLED INVASIVE NONNATIVE PLANT MATERIALS SHALL BE DISPOSED APPROPRIATELY AND COMPLY WITH THE 2004 DEEP / UCONN "GUIDELINES FOR DISPOSAL OF TERRESTRIAL INVASIVE PLANTS." ALL CUTTINGS SHALL BE COLLECTED AND PLACED ONSITE ON A PLASTIC TARP (OR ON AN ASPHALT PAVEMENT AREA) AND SUN DRIED UNTIL DEAD. AVOID CUTTINGS FROM BEING IN CONTACT WITH ANY SOIL. IF FEASIBLE, DO NOT REMOVE PULLED OR CUT NONNATIVE INVASIVE PLANTS FROM THE SITE UNTIL DEAD. EXCEPT FOR TUBEROUS PLANTS, SUCH AS JAPANESE KNOTWEED AND PHRAGMITES, NONNATIVE INVASIVE PLANTS PULLED OR CUT SHALL BE LEFT ON THE GROUND SURFACE IN A SUNNY LOCATION FOR THEIR ROOTS TO DRY. TUBEROUS WEED PLANTS SHALL BE LEFT SOIL FREE IN THE SUN ON AN IMPERVIOUS BARRIER (SUCH AS BLACK PLASTIC, DRIVEWAYS AND WALKS) UNTIL DEAD SO THAT THEY DO NOT RE-SPROUT. IF PLANTS HAVE TO BE REMOVED FROM THE SITE BEFORE THEY ARE DEAD, THEY SHALL BE BAGGED AND DEPOSITED AT AN INCINERATOR WASTE FACILITY (NOT A COMPOSTING FACILITY).

SEEDING NOTES:

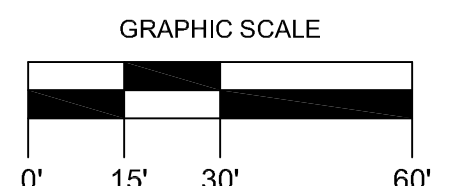
1. SEED AREAS PER PLAN AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE MANUFACTURER. THE SEED SHALL BE SPREAD ON THE PREPARED SOIL, LIGHTLY RAKED TO ESTABLISH GOOD SOIL CONTACT AFTER SOWING, AND MULCHED WITH CLEAN STRAW APPLIED BY HAND OR BY HYDROSEEDING. SEED MIX SUBSTITUTIONS SHALL BE EQUIVALENT TO THAT SPECIFIED AND APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE. MAINTAIN SEEDED AREAS AS RECOMMENDED BY THE MANUFACTURER. EXCEPT FOR LAWN AREAS, DO NOT FERTILIZE AREAS TO BE SEEDED UNLESS SPECIFIED BY THE MANUFACTURER. SEED AREAS AS PER THE FOLLOWING SCHEDULE:

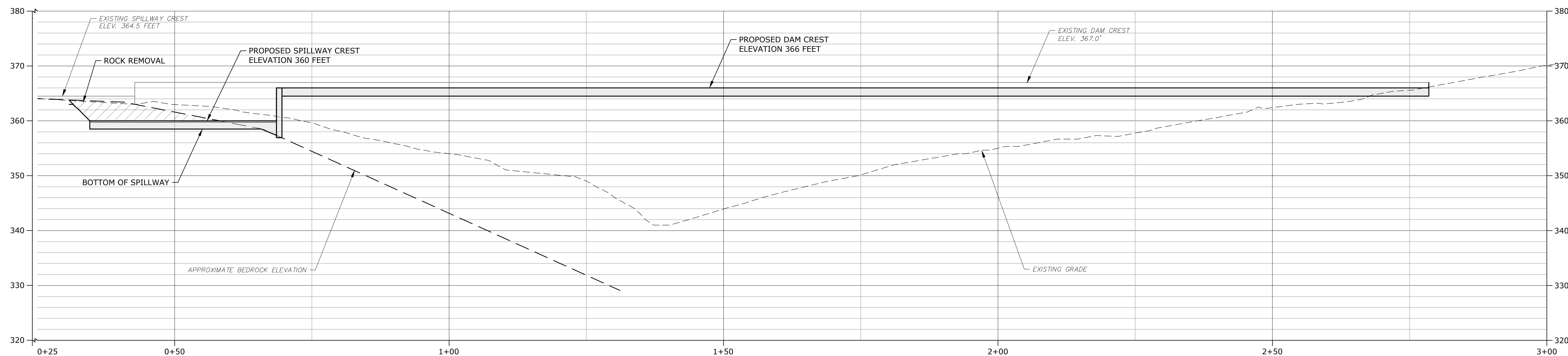
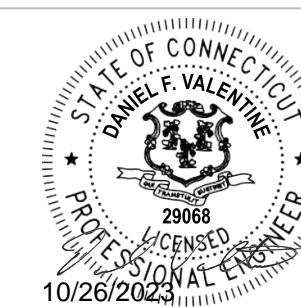
LEGEND

- PROPERTY LINE
- WETLAND LINE
- EX. CONTOUR
- 62
- NEW CONTOUR
- NEW MEADOW
- NEW SHADE TREE
- NEW SMALL TREE
- NEW SHRUB

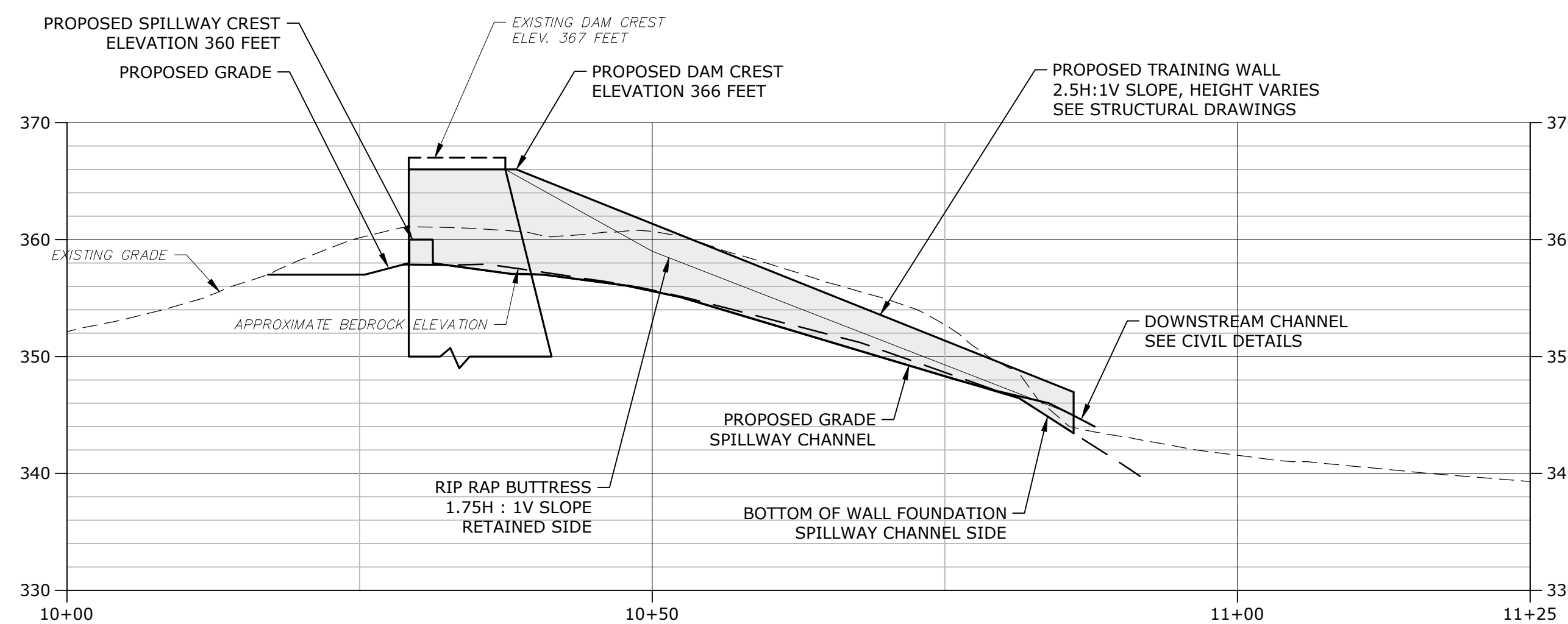
SEEDING NOTES (CONT.):

- A. DISTURBED AREAS WITHIN WETLANDS: SEED THIS AREA WITH "NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DETENTION BASIN AND MOIST SITES" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).
- B. STEEP SLOPES AND DISTURBED UPLAND AREAS: SEED THIS AREA WITH "NATIVE STEEP SLOPE MIX WITH ANNUAL RYEGRASS" BY ERNST SEEDS (ERNMX-181). AUGMENT THIS SEED MIXTURE WITH PURPLETOP (TRIDENS FLAVUS) AT THE RATE OF 20 LBS. PER ACRE.





UPSTREAM FACE OF DAM PROFILE
1" = 10'



TRAINING WALL PROFILE
1" = 10'

NOTES

1. SEE STRUCTURAL SHEETS FOR ADDITIONAL DETAIL ON DAM FACE AND CREST, SPILLWAY SECTION, AND TRAINING WALL.



Brush Reservoir Dam Improvements

Aquarion Water Company

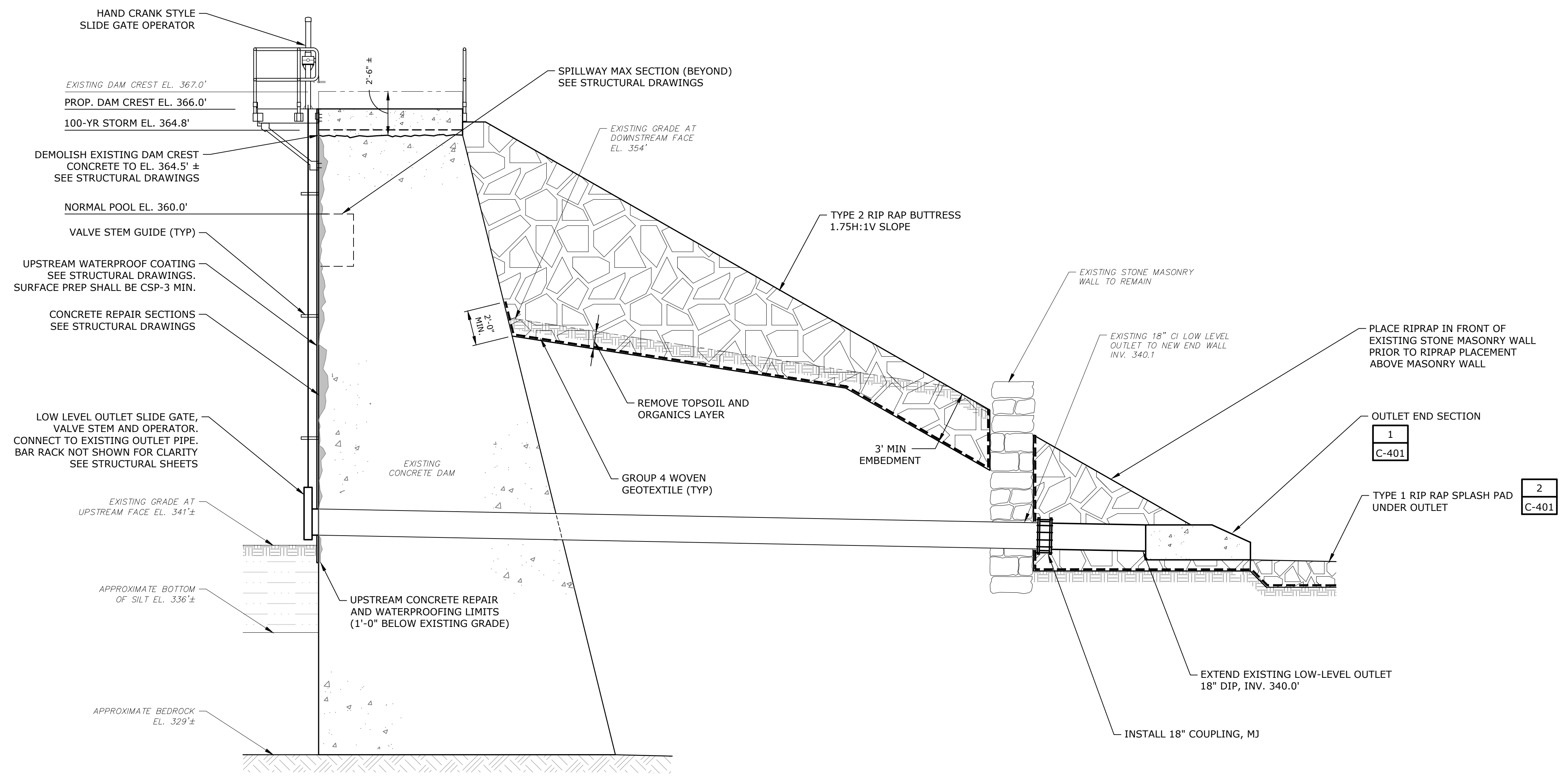
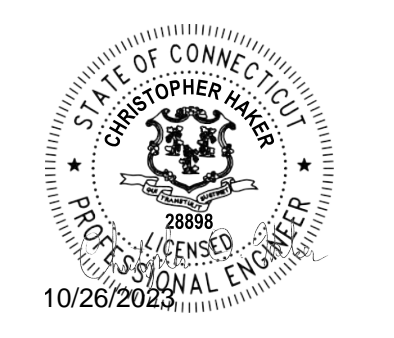
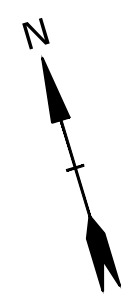
Stamford, Connecticut

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DATE: 05/2023		
FILE: A1000-195A-C-201.dwg		
DRAWN BY: MJC		
DESIGNED/CHECKED BY: RS/DFV		
APPROVED BY: CDH		

DAM PROFILES

SCALE: 1" = 10'

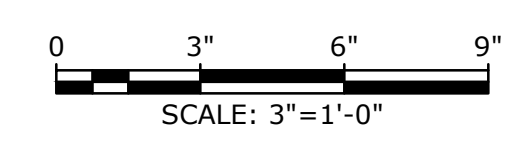
C-201



PROPOSED DAM MAX SECTION
3" = 1'-0"

NOTES

1. PROTECT EXISTING MASONRY STONE WALL DURING CONSTRUCTION. MASONRY STONE WALL TO BE LEFT IN PLACE. ANY STONES MOVED DURING CONSTRUCTION ACTIVITIES SHALL BE REPLACED.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

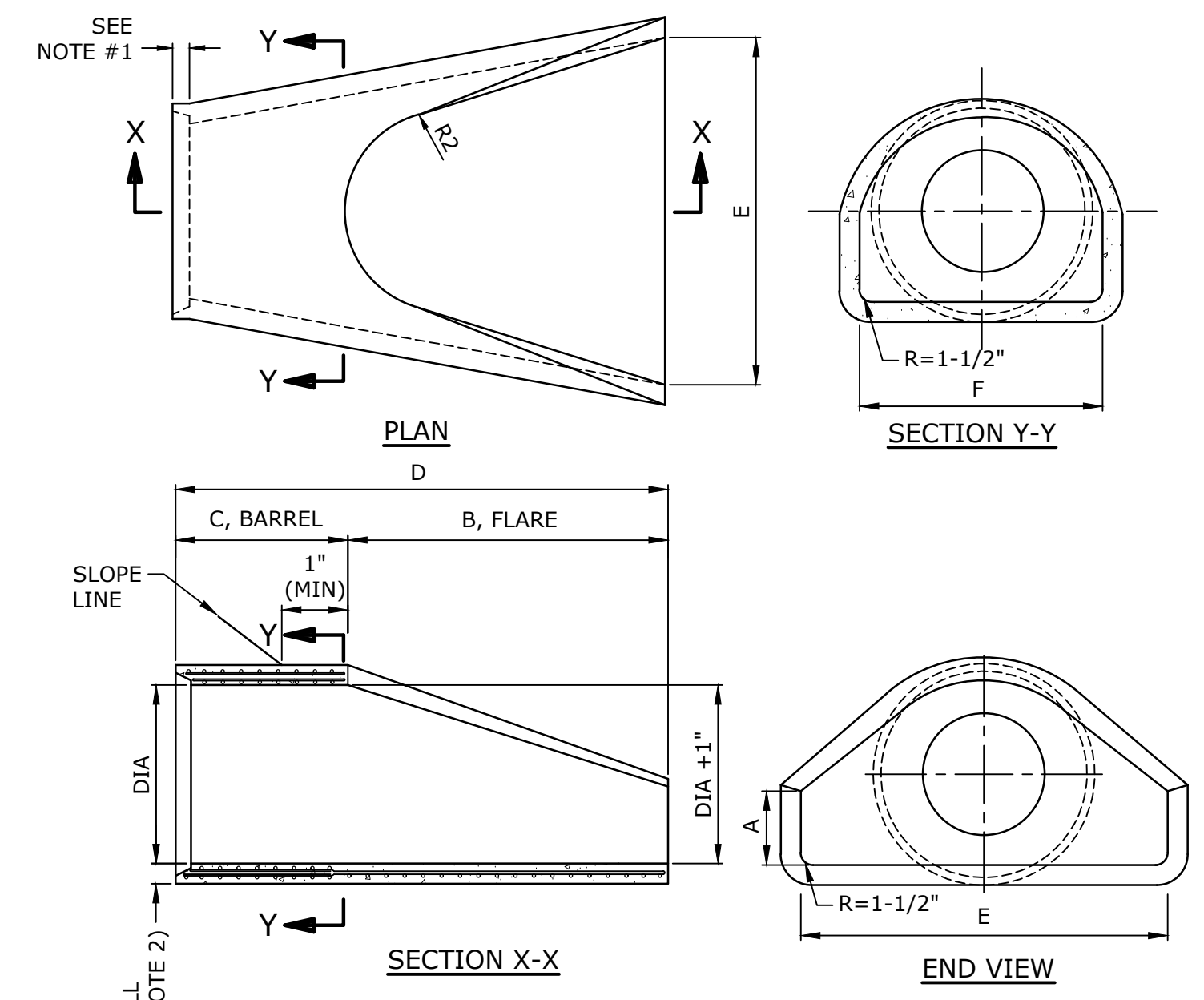
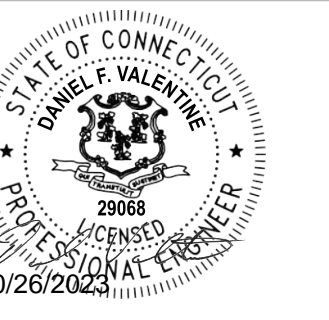
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DATE:	05/2023
FILE:	A1000-195A-C-301.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	RS/DFV
APPROVED BY:	CDH

DAM SECTIONS

SCALE: AS SHOWN

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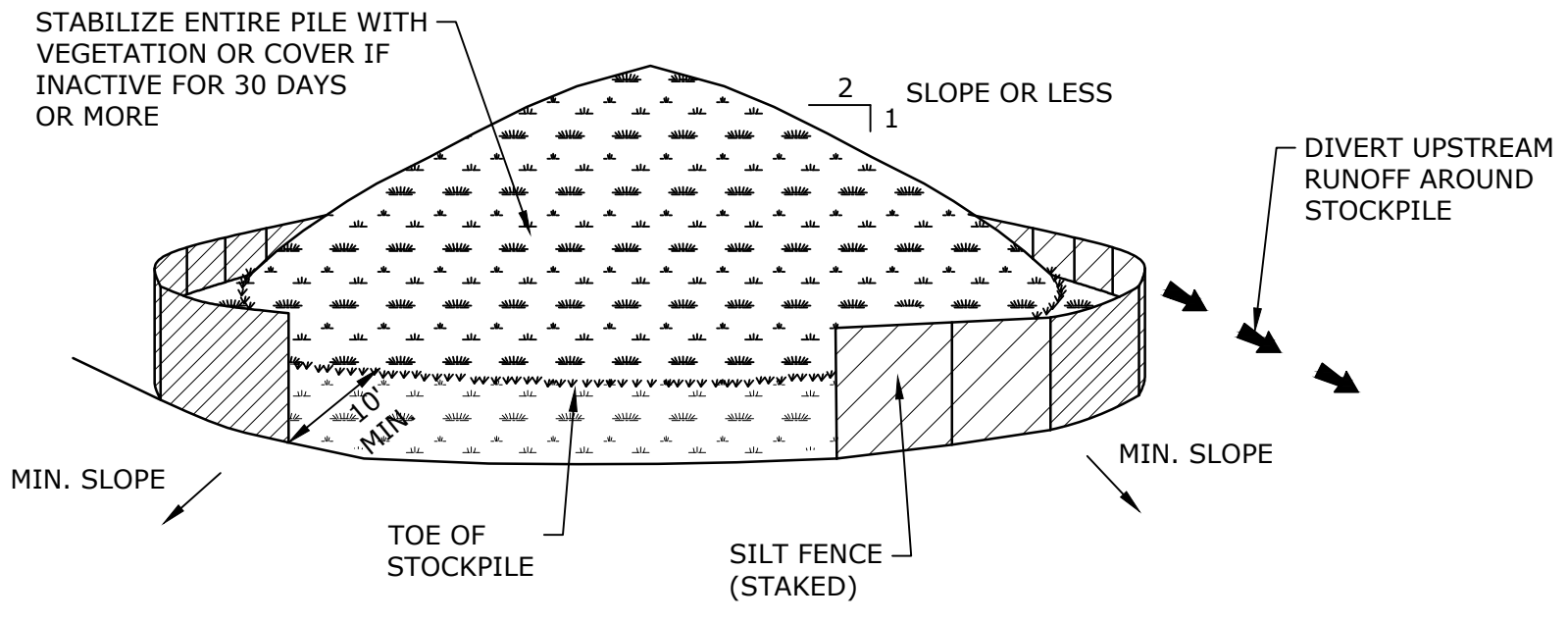


- NOTES:**
- JOINTS SHALL BE TONGUE AND GROOVE OR BELL AND SPIGOT AS REQUIRED TO CONFORM TO PIPE INSTALLED.
 - WALL THICKNESS SHALL CONFORM TO PIPE THICKNESS.

DIMENSIONS FOR REINFORCED CONCRETE CULVERT END									FLARE REINFORCEMENT ONE LAYER ONLY IN CENTER OF WALL	
DIA.	A	B	C	D	E	F	R ₁	R ₂	MIN. AREA OF LONGITUDINALS SQ. IN PER FT.	MIN. AREA OF TRANSVERSE STEEL SQ. IN PER FT.
30"	1'-0"	4'-6"	1'-7.75"	6'-1.75"	5'-0"	3'-1"	1'-6.5"	1'-3"	0.084	0.084

REINFORCED CONCRETE CULVERT END

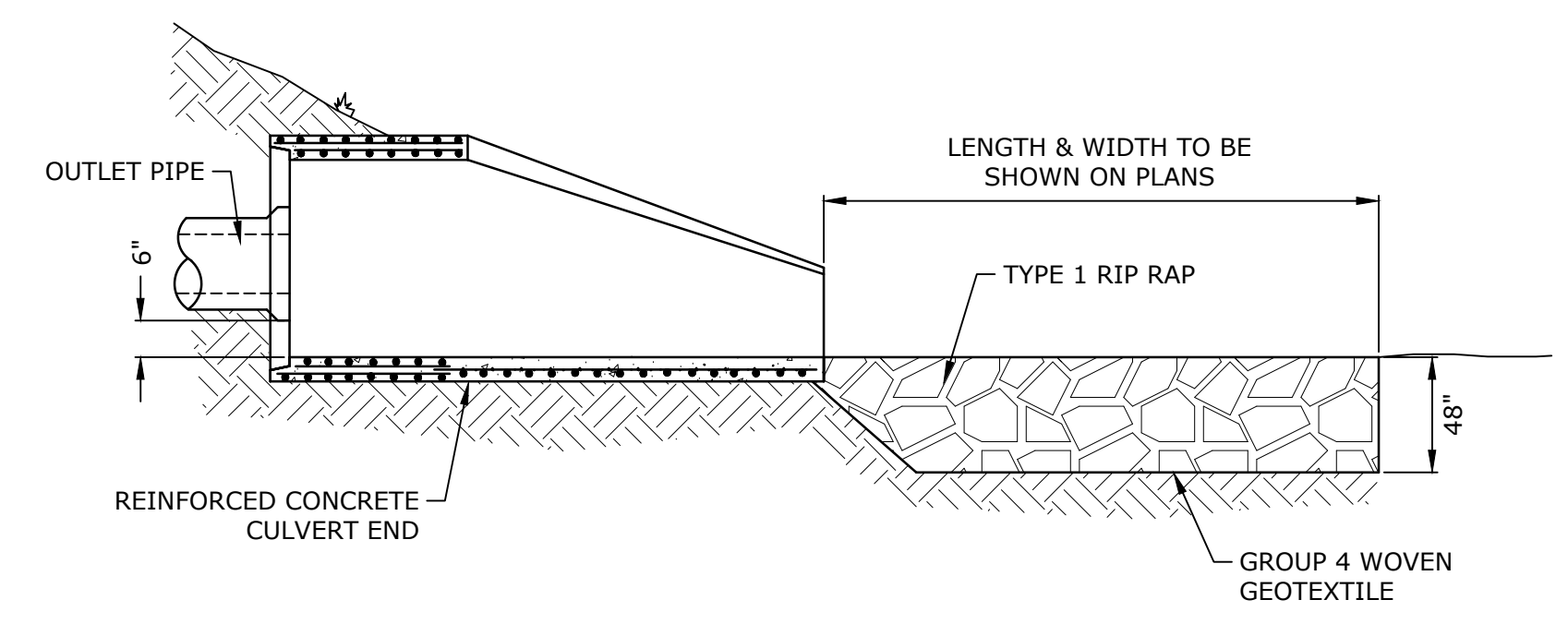
DETAIL	1
NO SCALE	C-301



- INSTALLATION NOTES:**
- AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
 - MAXIMUM SLOPE OF STOCKPILE SHALL BE 2H:1V.
 - UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR HAYBALES, THEN STABILIZED WITH VEGETATION OR COVERED.

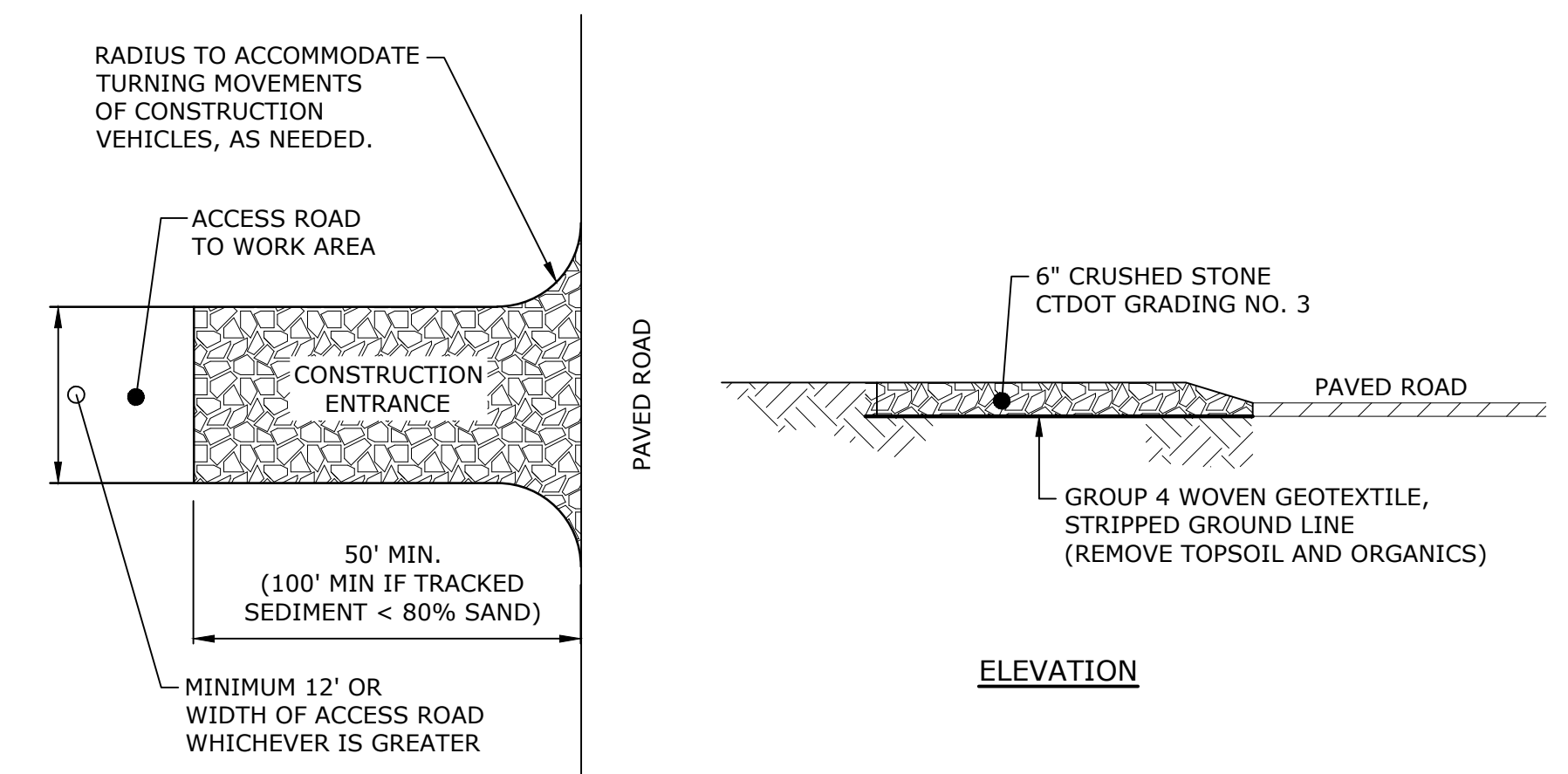
SOIL STOCKPILING

DETAIL	4
NO SCALE	-



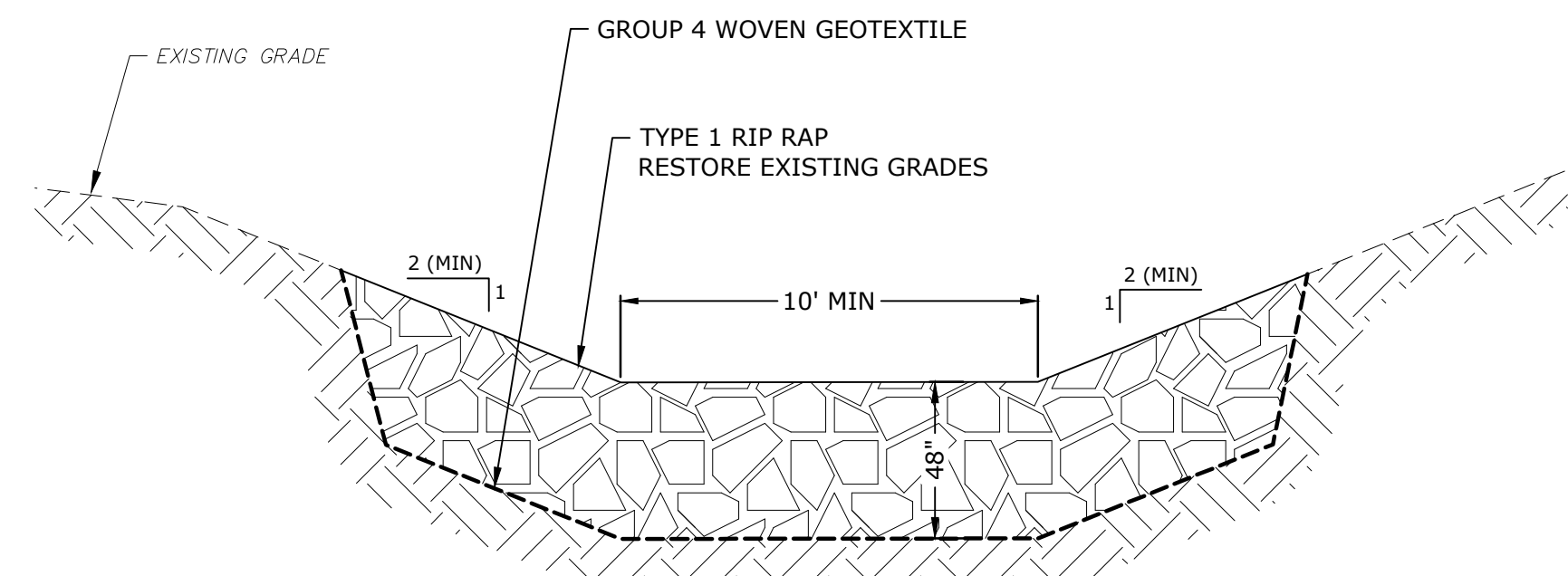
REINFORCED CONCRETE END SECTION AND SPLASH PAD

DETAIL	2
NO SCALE	C-101



CONSTRUCTION ENTRANCE

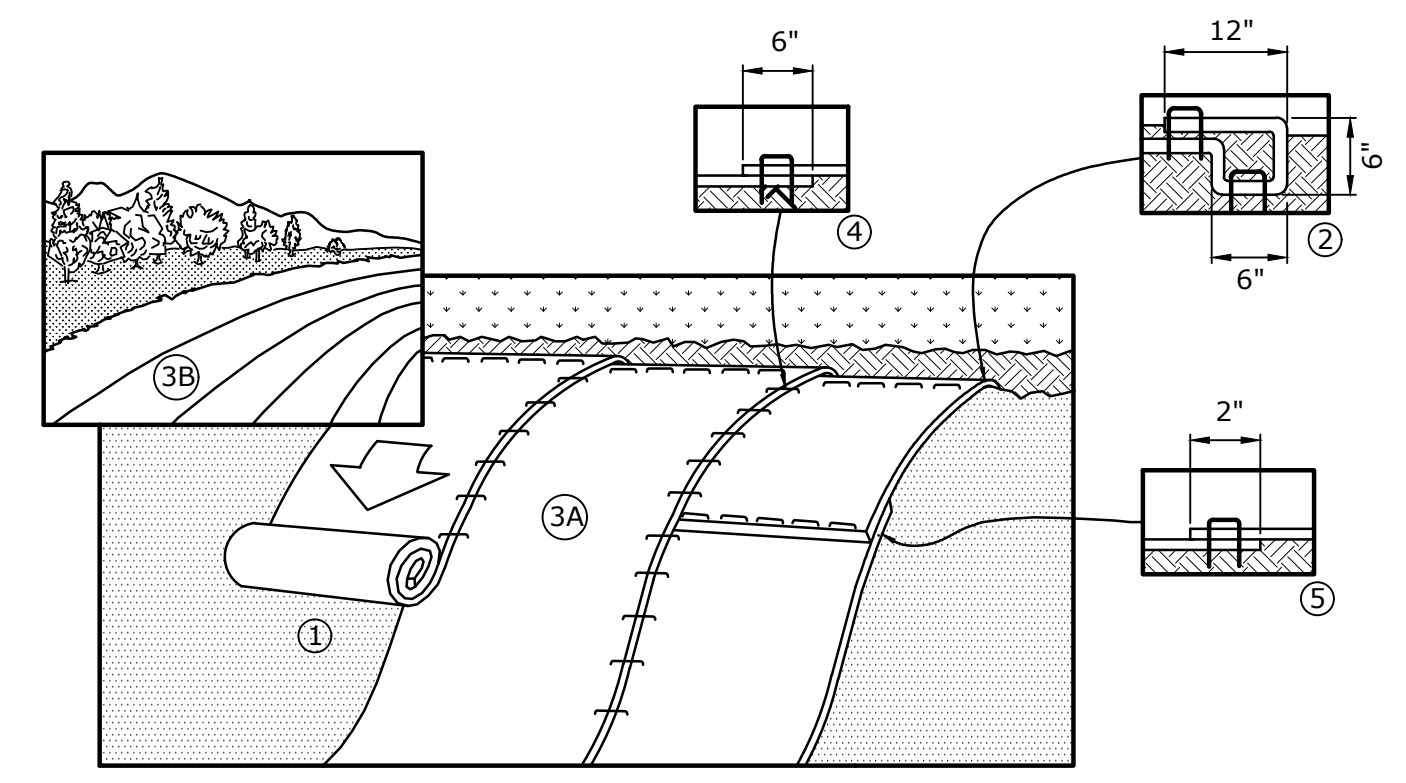
DETAIL	3
NO SCALE	D-101



- NOTES:**
- REUSE EXISTING RIP RAP TO THE EXTENT POSSIBLE. IF FULL DEPTH RECONSTRUCTION OF DOWNSTREAM CHANNEL IS NECESSARY, INSTALL PER THIS DETAIL, OTHERWISE SUPPLEMENT EXISTING RIP RAP AS REQUIRED OR DIRECTED BY ENGINEER.

DOWNSTREAM CHANNEL

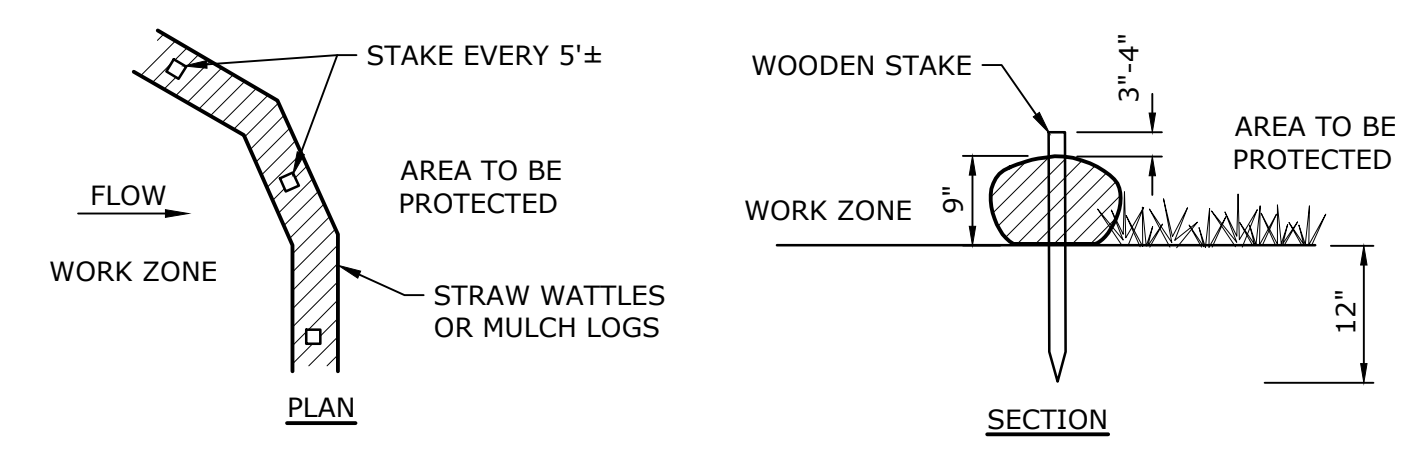
DETAIL	6
NO SCALE	C-101



- NOTES:**
- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
 - BEGIN AT THE TOP OF THE SLOPE, 36" OVER THE GRADE BREAK, BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
 - ROLL THE BLANKETS DOWN THE SLOPE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAPLE PATTERN GUIDE.
 - STAPLE LENGTHS SHALL BE A MINIMUM OF 8 INCHES.

EROSION CONTROL BLANKET FOR SLOPE PROTECTION

DETAIL	5
NO SCALE	-



COMPOST FILTER SOCK

DETAIL	7
NO SCALE	D-101

Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
A	10/23/2023	REV PER CTDEEP COMMENTS

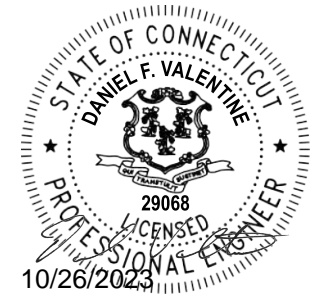
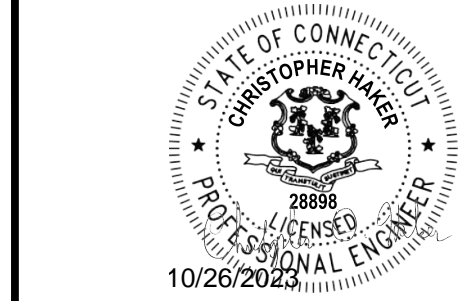
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 DRAWN BY: MJC
 DESIGNED/CHECKED BY: RS/DFV
 APPROVED BY: CDH

SITE DETAILS

SCALE: NO SCALE

C-401

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 Plotted On: Oct 24, 2023 3:28pm
 Tighe & Bond\3\A\1000-195A-C-401.dwg



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
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DATE:	05/2023	
FILE:	A1000-195A-S-001.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	JC/DBS	
APPROVED BY:	CDH	

STRUCTURAL NOTES

SCALE: NO SCALE

S-001

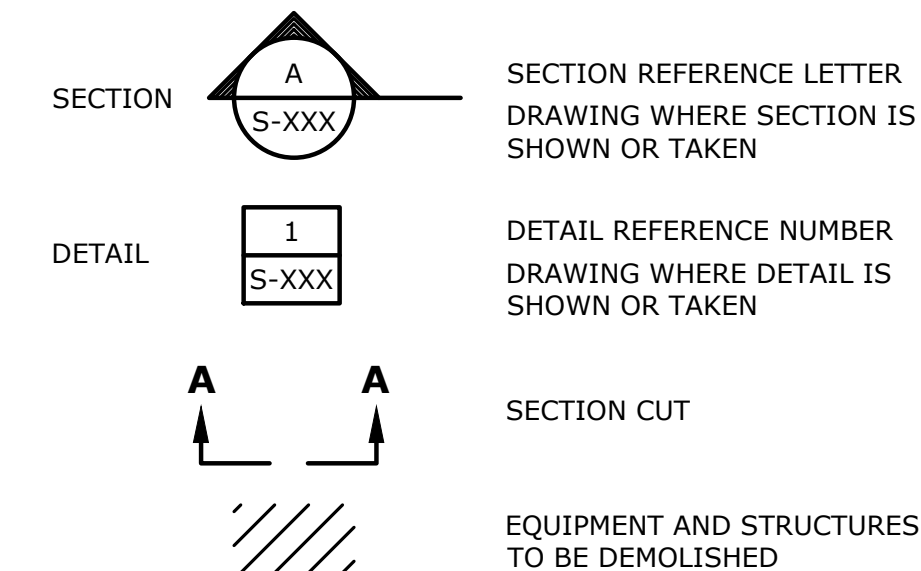
BAR SIZE DESIGNATION		DEVELOPMENT LENGTH (INCHES)	SPLICE LENGTH (INCHES)	
ENGLISH	METRIC	Ld	CLASS B	CLASS B TOP BARS
#3	#10	15	19	25
#4	#13	19	25	33
#5	#16	24	31	40
#6	#19	29	37	48
#7	#22	42	54	70

REBAR SPLICE LENGTH SCHEDULE

NOTES:

- IF CLEAR SPACING BETWEEN THE REBARS IS LESS THAN THREE BAR DIAMETERS, OR IF COVER IS LESS THAN TWO BAR DIAMETERS, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF EPOXY COATED REBAR IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF LIGHTWEIGHT CONCRETE IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 30%.
- THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON $F'_c = 4,000$ PSI AND $F_y = 60,000$ PSI. ADJUST FOR OTHER STRENGTHS USING ACI-318.
- FOR HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW, INCREASE THE DEVELOPMENT LENGTH BY AN ADDITIONAL 30%.
- WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.

GENERAL SYMBOLS



GENERAL

- STRUCTURAL WORK SHALL CONFORM TO STATE BUILDING CODE (IBC 2015), LATEST EDITION, INCLUDING MOST RECENT ADDENDA, AND CONTRACT DOCUMENTS. IN CASE OF CONFLICT, MOST STRINGENT REQUIREMENT SHALL GOVERN.
- CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS RELATED TO THIS PROJECT.
- THE CONTRACTOR SHALL RETAIN THE SERVICES OF AN INDEPENDENT TESTING LABORATORY FOR CONCRETE AND SOILS TESTING. ALL TESTING COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

REINFORCEMENT

- DETAILING, FABRICATION, AND ERECTION OF REINFORCEMENT, UNLESS OTHERWISE NOTED, SHALL CONFORM TO ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)" AND ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315)", LATEST EDITION.
- STEEL REINFORCEMENT UNLESS OTHERWISE SHOWN SHALL CONFORM TO ASTM A615 GRADE 60 MINIMUM (YIELD STRENGTH - 60,000 PSI).
- PROVIDE AND SCHEDULE ON SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION: MINIMUM REQUIREMENTS SHALL BE: HIGH CHAIRS, 4'-0" ON CENTER, #5 SUPPORT BAR FOR HIGH CHAIRS, SLAB BOLSTERS, 3'-6" ON CENTER, ALL WIRE CHAIRS AND BOLSTERS TO BE PLASTIC TIPPED.
- THE CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT SHALL BE 3 INCHES FOR CAST-IN-PLACE CONCRETE CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER AND 2 INCHES IF CAST-IN-PLACE IS NOT CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER, UNLESS OTHERWISE SHOWN.
- WHERE CONTINUOUS BARS ARE CALLED FOR THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS. REINFORCEMENT SHALL BE SPLICED IN ACCORDANCE WITH THE REBAR SPLICE LENGTH SCHEDULE.
- WHERE REINFORCEMENT IS NOT SHOWN ON DRAWINGS, PROVIDE REINFORCEMENT IN ACCORDANCE WITH APPLICABLE TYPICAL DETAILS OR SIMILAR TO THAT SHOWN FOR MOST NEARLY SIMILAR SITUATIONS, AS DETERMINED BY THE ENGINEER. IN NO CASE SHALL REINFORCEMENT BE LESS THAN MINIMUM REINFORCEMENT PERMITTED BY THE APPLICABLE CODES.
- WHERE REINFORCEMENT IS CALLED FOR IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.
- REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 24 HOURS PRIOR TO SCHEDULED CONCRETE PLACEMENT. NOTIFY ENGINEER OF COMPLETION AT LEAST 24 HOURS PRIOR TO SCHEDULED COMPLETION OF REINFORCEMENT PLACEMENT.
- REINFORCEMENT SHALL BE SET BEFORE PLACING CONCRETE. SETTING ANY REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.

CONCRETE

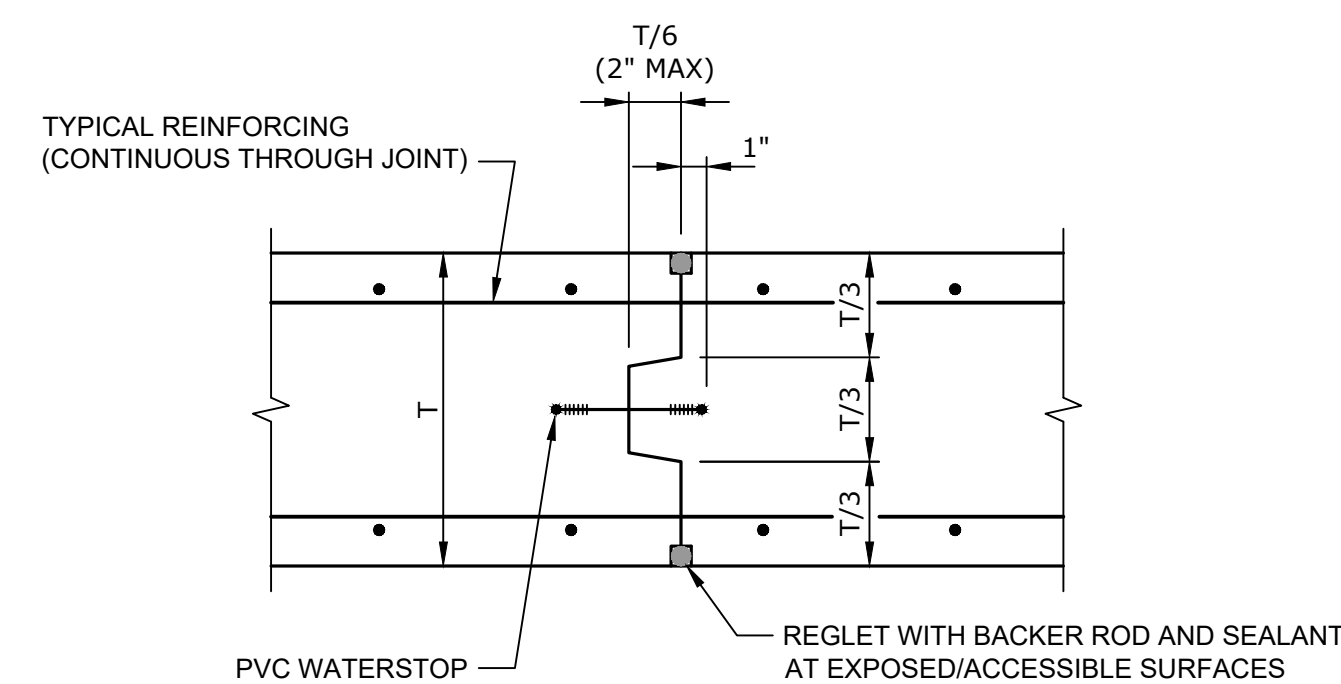
- CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318), AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDING (ACI 301).
- CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED, AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY OR THE ENGINEER.
- CONCRETE SHALL BE NORMAL WEIGHT CONCRETE AND SHALL HAVE A COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS, UNLESS OTHERWISE NOTED AND SHALL BE AIR ENTRAINED (SEE SPECS).
- THE USE OF CONSTRUCTION JOINTS WHERE SHOWN ON THE DRAWINGS IS MANDATORY. OMISSIONS, ADDITIONS OR CHANGES SHALL NOT BE MADE EXCEPT WITH THE SUBMISSION OF A WRITTEN REQUEST TOGETHER WITH DRAWINGS OF THE PROPOSED JOINT LOCATIONS FOR APPROVAL OF THE STRUCTURAL ENGINEER.
- WHERE CONSTRUCTION JOINTS ARE NOT SHOWN, DRAWINGS SHOWING LOCATION OF CONSTRUCTION JOINTS AND CONCRETE PLACING SEQUENCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PREPARATION OF THE REINFORCEMENT SHOP DRAWINGS.
- CONCRETE SLABS SHALL BE CAST SO THAT THE THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS.
- CONCRETE SLABS AND WALLS SHALL BE CAST ALTERNATELY OR IN A CHECKERBOARD FASHION SO THAT ADJACENT SECTIONS ARE PLACED NO SOONER THAN THREE DAYS APART. AT LEAST TWO DAYS MUST ELAPSE AFTER PLACING CONCRETE IN WALLS BEFORE PLACING FLOOR SYSTEM SUPPORTED THEREON.
- CONCRETE SHALL BE PLACED WITHOUT HORIZONTAL CONSTRUCTION JOINTS EXCEPT WHERE SHOWN OR NOTED.
- EXPOSED EDGES OF CONCRETE ELEMENTS SHALL HAVE CHAMFERED CORNERS
- ONLY CRITICAL CONSTRUCTION JOINTS ARE SHOWN. SEE SPECIFICATIONS FOR REQUIRED MAXIMUM SPACING OF CONSTRUCTION JOINTS.

HYDROPHILIC STRIP WATERSTOP

- HYDROPHILIC WATERSTOP SHALL BE HYDROTITE AS SUPPLIED BY SIKA GREENSTREAK OR EQUAL.
- THE WATERSTOP SHALL BE COMPOSED OF CHLOROPRENE RUBBER AND CHLORINEPENE RUBBER MODIFIED TO IMPART HYDROPHILIC PROPERTIES.
- THE WATERSTOP SHALL HAVE A DELAY COATING TO INHIBIT EXPANSION DUE TO MOISTURE PRESENT IN FRESH CONCRETE.
- HYDROPHILIC WATERSTOP SHALL MEET THE PERFORMANCE REQUIREMENTS LISTED IN THE SPECIFICATIONS
- HYDROPHILIC WATERSTOP SHALL BE ADHERED TO CONCRETE SURFACES IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.

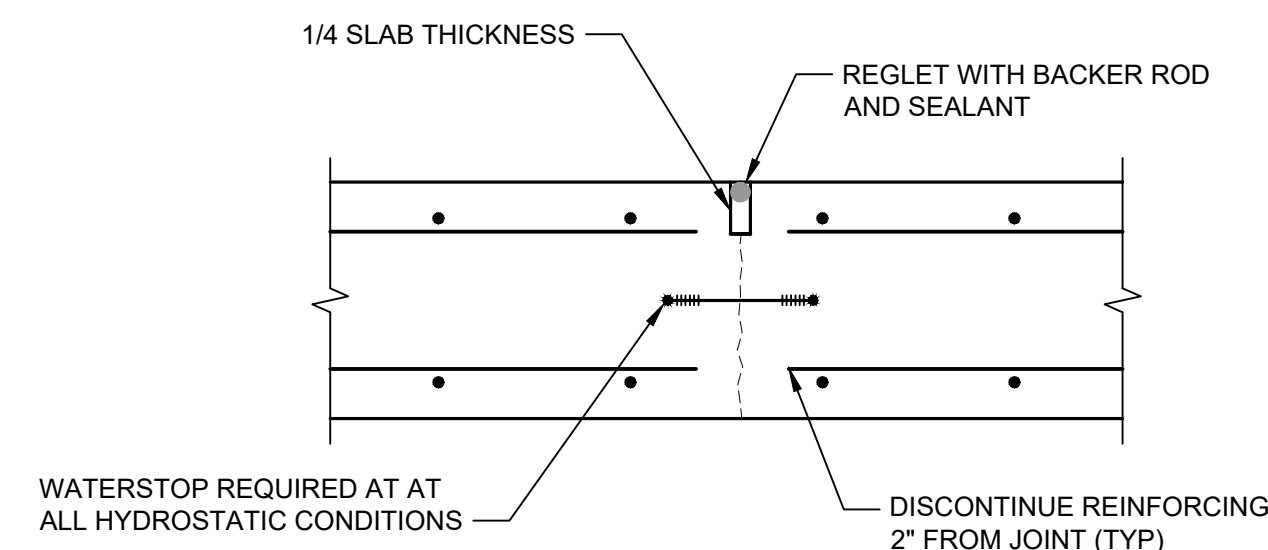
GROUT:

- ALL GROUT SHALL BE NON-SHRINK WITH A COMPRESS STRENGTH NOT LESS THAN 5000 PSI AT 7 DAYS, AND 7500 PSI AT 28 DAYS.
- PROVIDE NOTIFICATION PRIOR TO THE START OF ANY PHASE OF GROUT PLACEMENT WORK SO AS TO PROVIDE THE OPPORTUNITY TO INSPECT THE WORK. SUCH NOTIFICATION SHALL BE MADE AT LEAST 24 HOURS IN ADVANCE OF GROUT PLACEMENTS AND AT LEAST 36 HOURS IN ADVANCE.



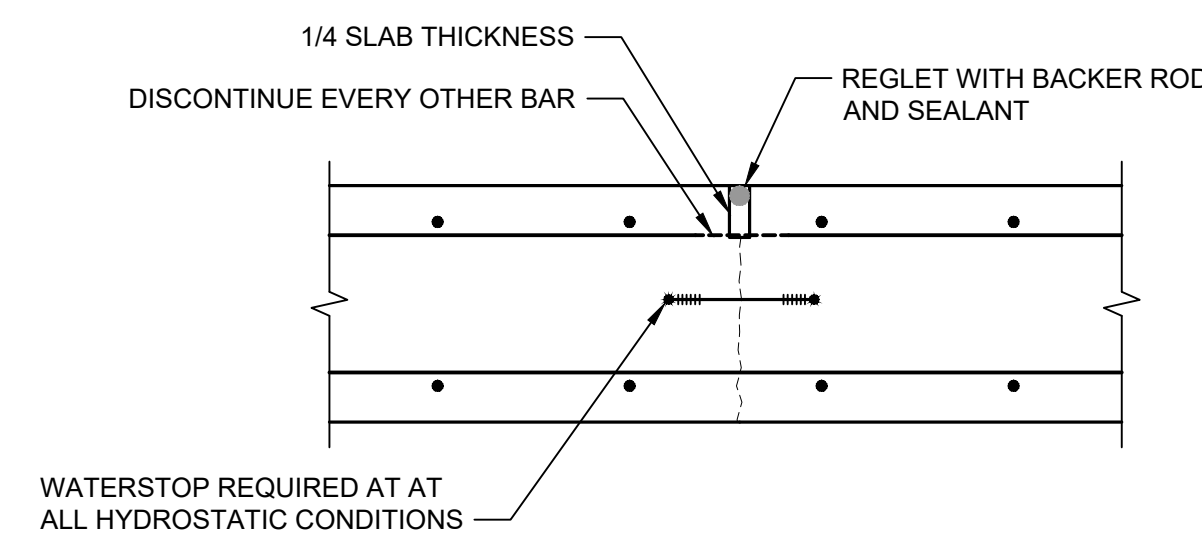
CONSTRUCTION JOINT

DETAIL	1
NO SCALE	S-001



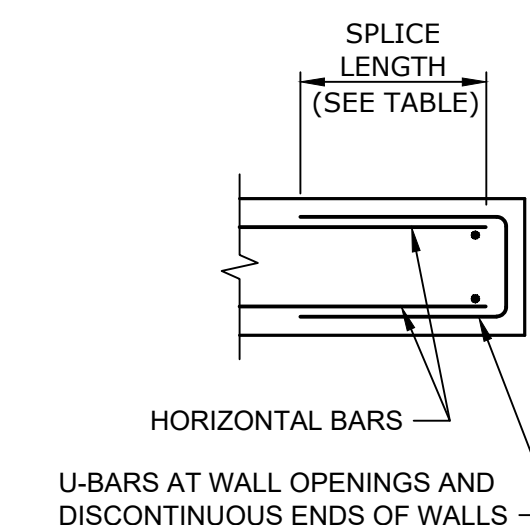
CONCRETE FULL CONTRACTION JOINT

DETAIL	2
NO SCALE	S-001



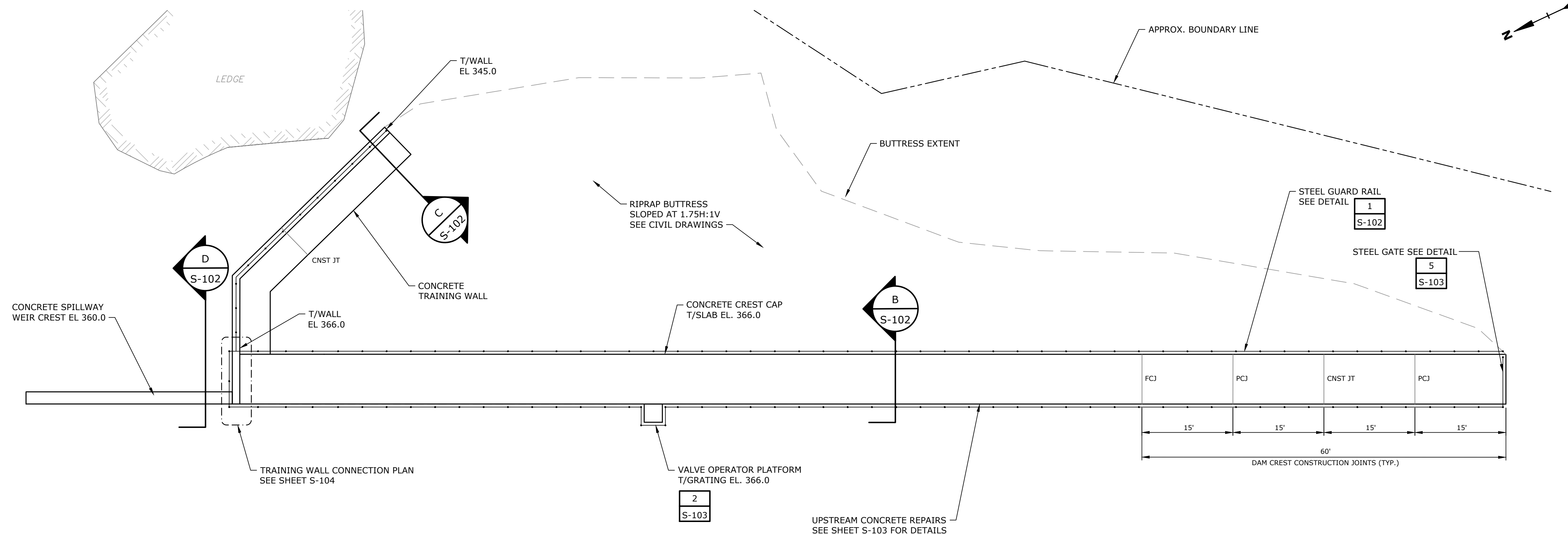
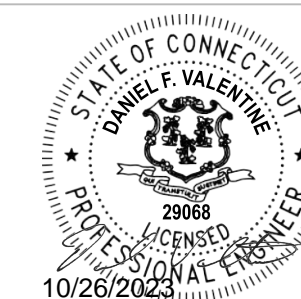
CONCRETE PARTIAL CONTRACTION JOINT

DETAIL	3
NO SCALE	S-001



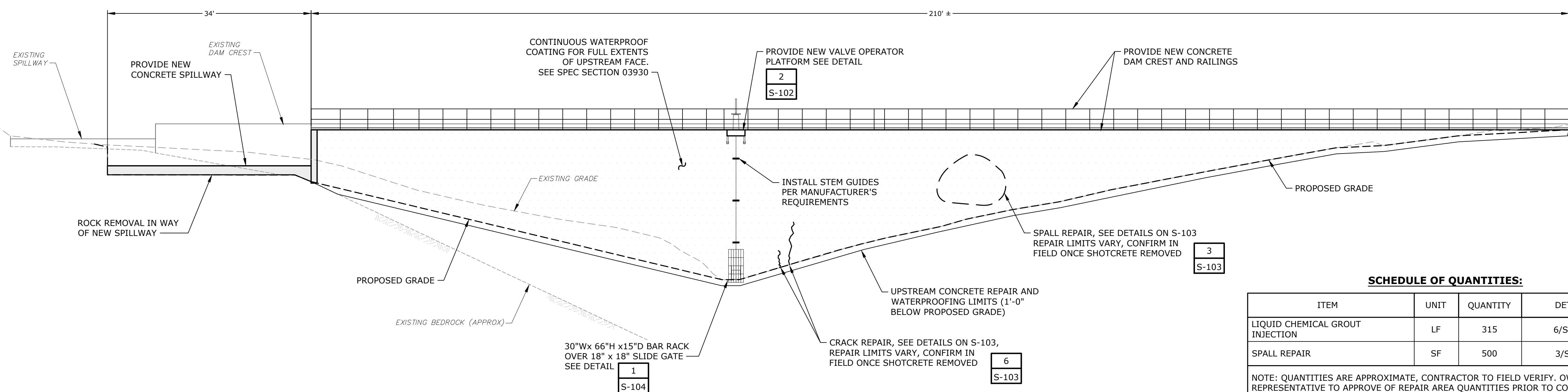
PLAN OF HORIZONTAL REINFORCING AT END OF CONCRETE WALLS

DETAIL	4
NO SCALE	S-001



PLAN
1" = 10'

NOTE:
1. PROVIDE EXPANSION JOINTS AT EXISTING DAM CONSTRUCTION JOINTS.

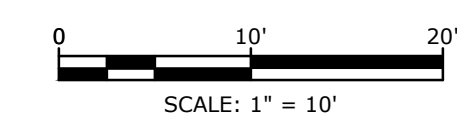


ELEVATION-UPSTREAM FACE
1" = 10'

SCHEDULE OF QUANTITIES:

ITEM	UNIT	QUANTITY	DETAIL
LIQUID CHEMICAL GROUT INJECTION	LF	315	6/S-103
SPALL REPAIR	SF	500	3/S-103

NOTE: QUANTITIES ARE APPROXIMATE, CONTRACTOR TO FIELD VERIFY. OWNER'S REPRESENTATIVE TO APPROVE OF REPAIR AREA QUANTITIES PRIOR TO COMPLETION OF REPAIRS.



Brush Reservoir Dam Improvements

Aquarion Water Company

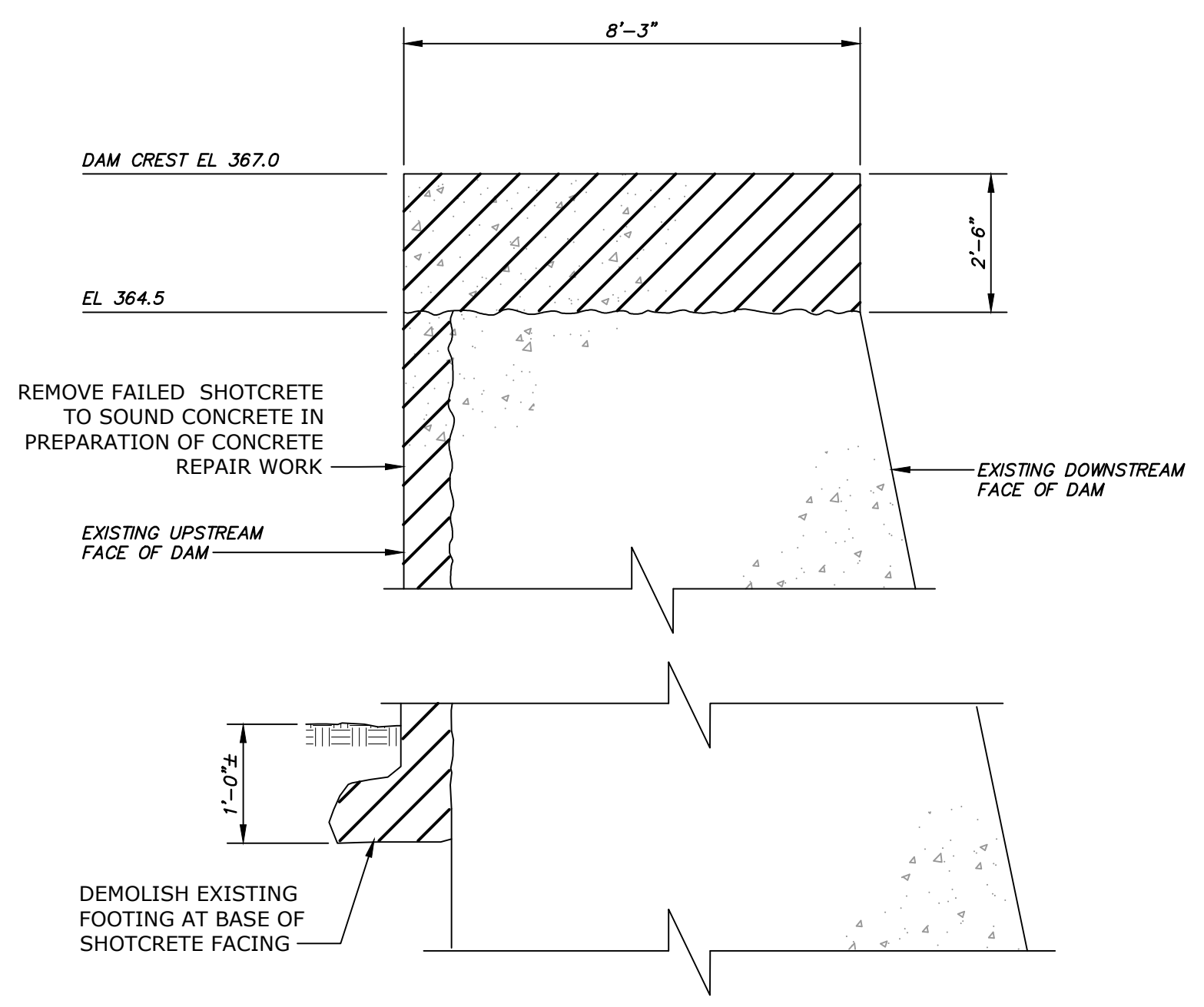
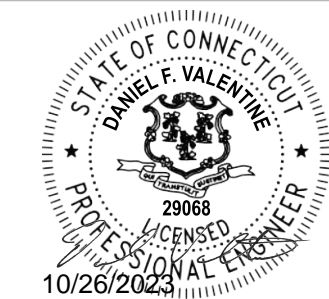
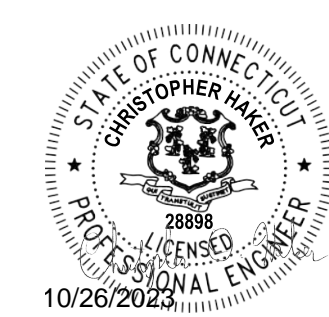
Stamford, Connecticut

MARK	DATE	DESCRIPTION
A	10/23/2023	REV PER CTDEEP COMMENTS

PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-S-101.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: JC/DBS
 APPROVED BY: CDH

STRUCTURAL PLAN AND UPSTREAM ELEVATION

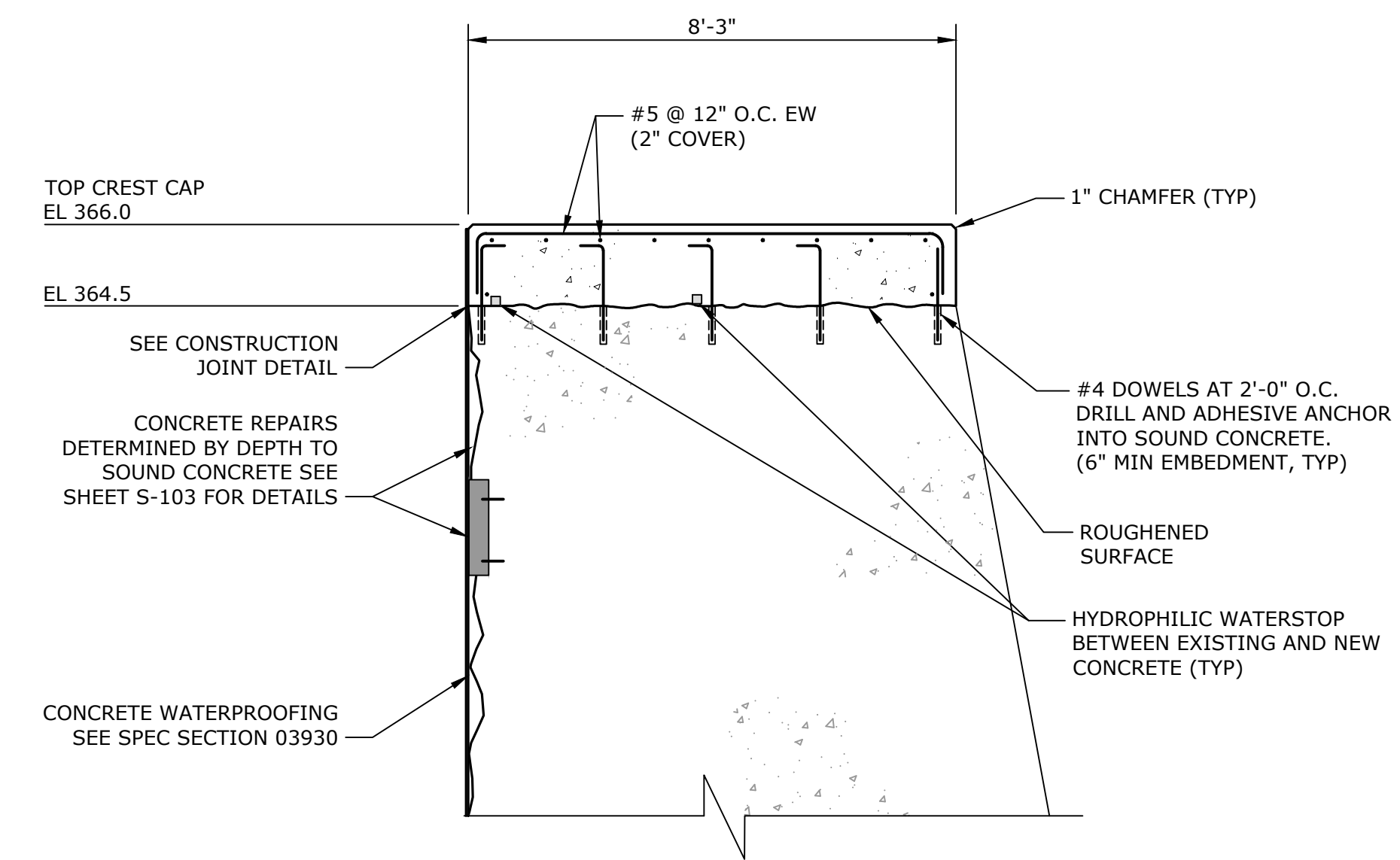
SCALE: AS SHOWN



DAM CREST DEMO SECTION

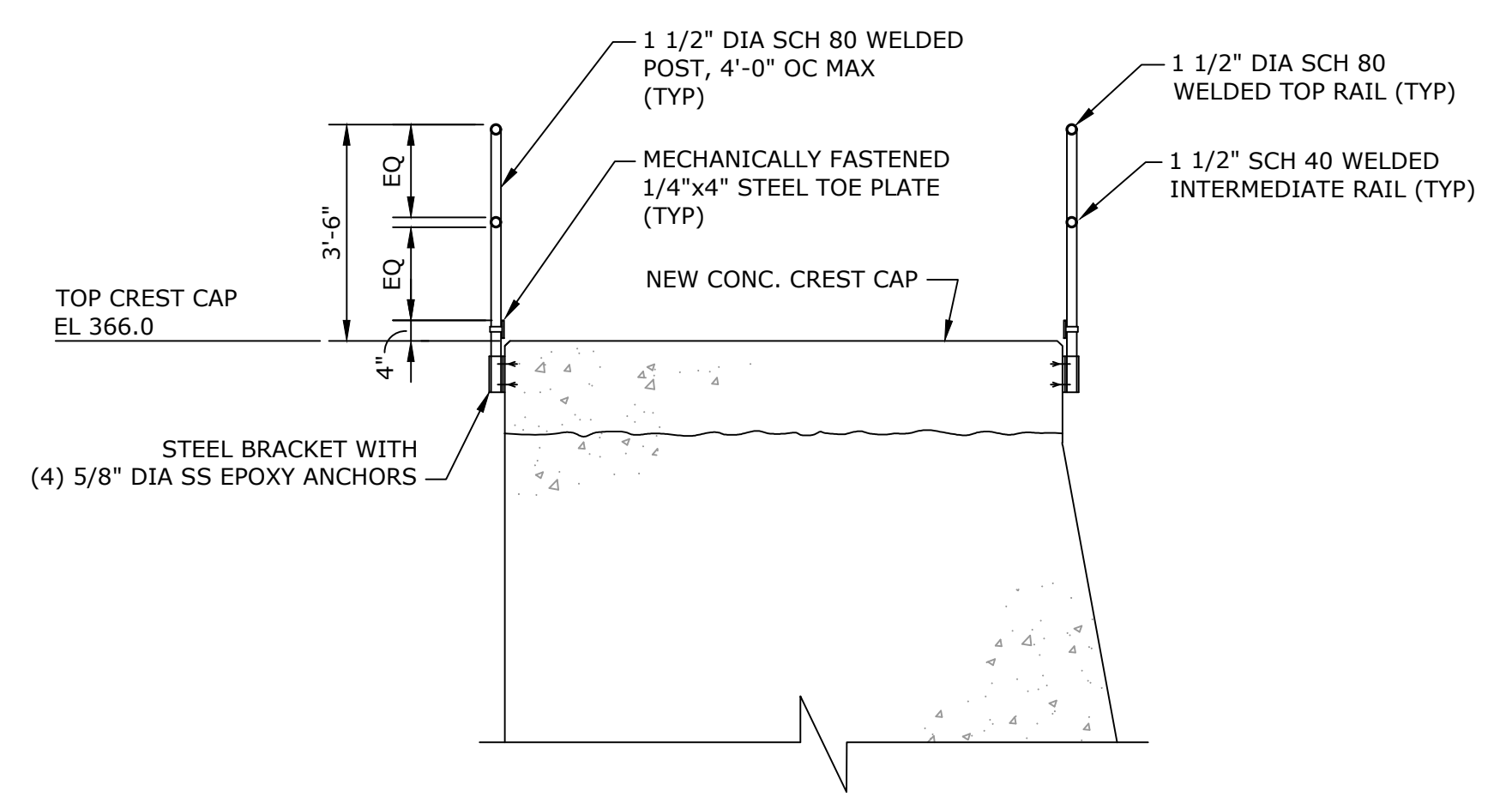
SECTION A
3/8" = 1'-0" D-101

- NOTES:**
1. CONCRETE "FOOTING" DIMENSIONS ARE APPROXIMATE ONLY.
 2. BASED ON A LIMITED SURVEY, IT IS ASSUMED THAT THE "FOOTING" FOLLOWS THE UPSTREAM EXISTING GRADE FOR THE ENTIRE LENGTH OF THE DAM.



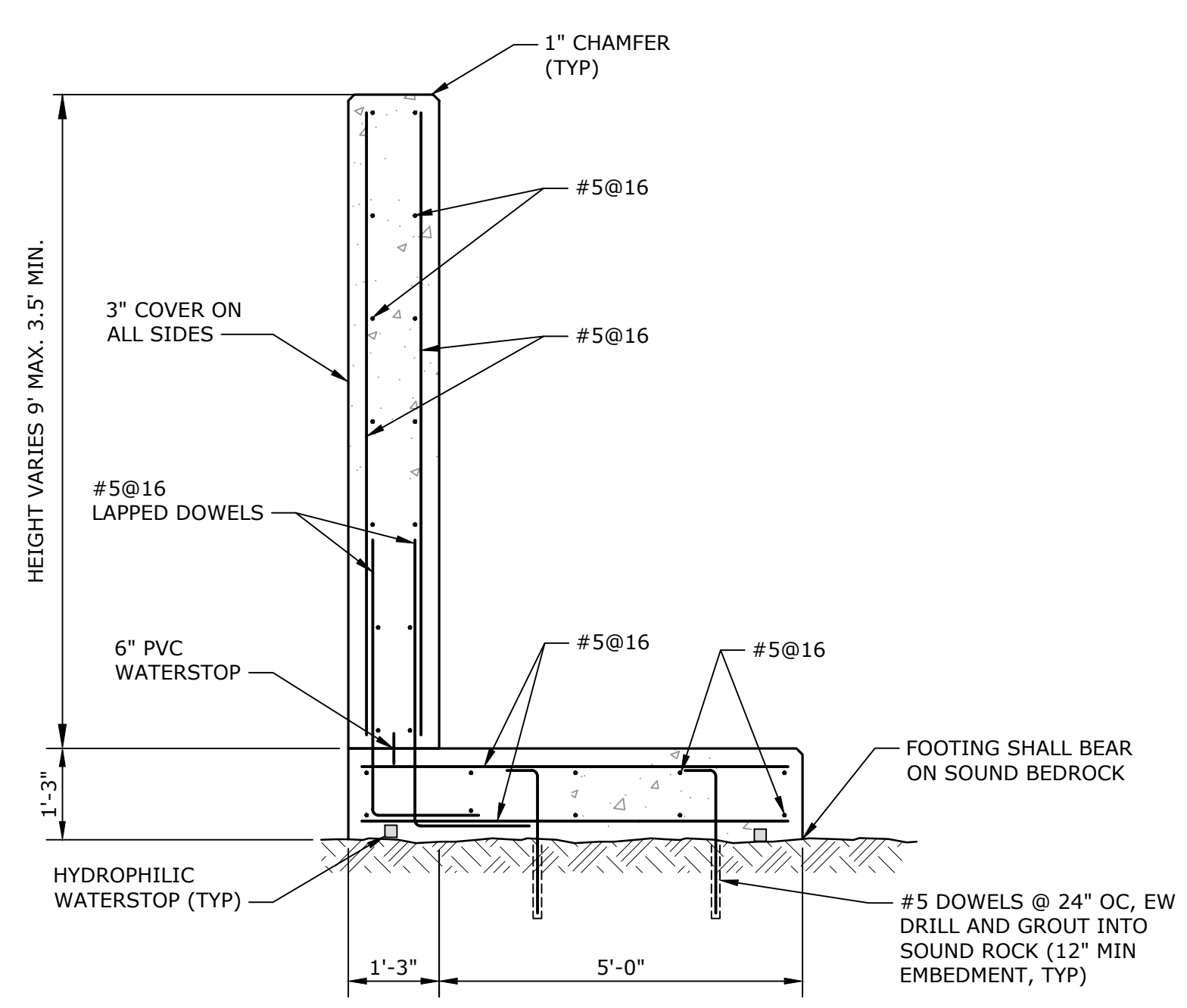
REINFORCED CONCRETE DAM CAP AND UPSTREAM FACING

SECTION B
3/8" = 1'-0" S-101



STEEL GUARDRAILS AT DAM CREST

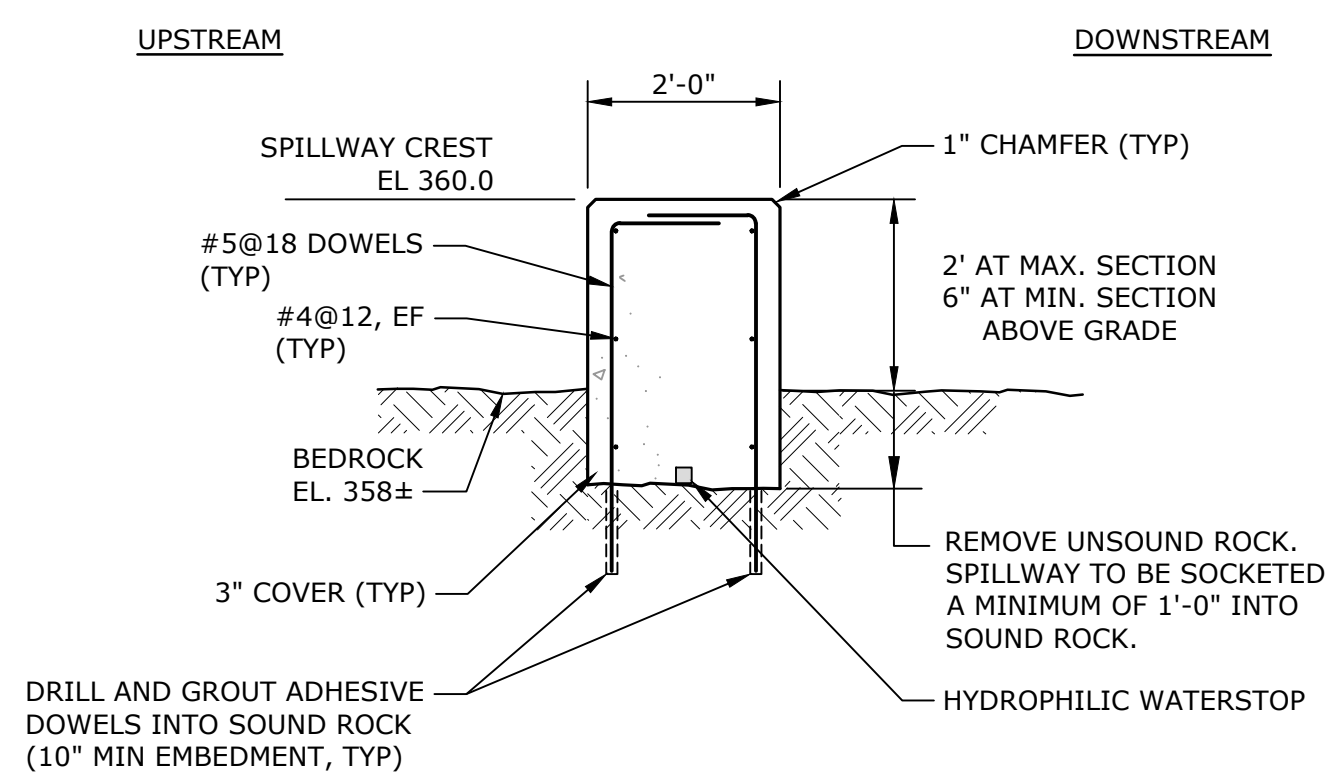
DETAIL
3/8" = 1'-0" 1 S-101



TRAINING WALL

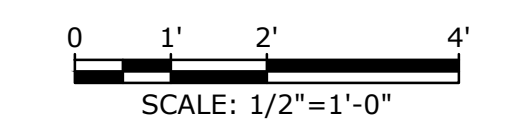
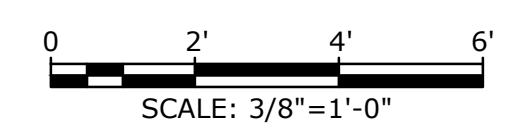
SECTION C
1/2" = 1'-0" S-101

- NOTES:**
1. BEDROCK TO BE LEVEL (±2") ACROSS TRAINING WALL CROSS SECTION.



SPILLWAY

SECTION D
1/2" = 1'-0" S-101



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

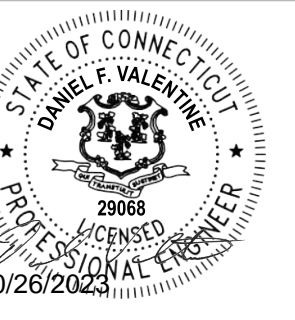
MARK	DATE	DESCRIPTION
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PROJECT NO:	A-1000-195A
DATE:	05/2023
FILE:	A1000-195A-S-102-S-103 S-104.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	JC/DBS
APPROVED BY:	CDH

STRUCTURAL SECTIONS AND DETAILS - 1

SCALE: AS SHOWN

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 Plotted On: Oct 24, 2023 3:38pm
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Brush Reservoir Dam Improvements

Aquarion Water Company

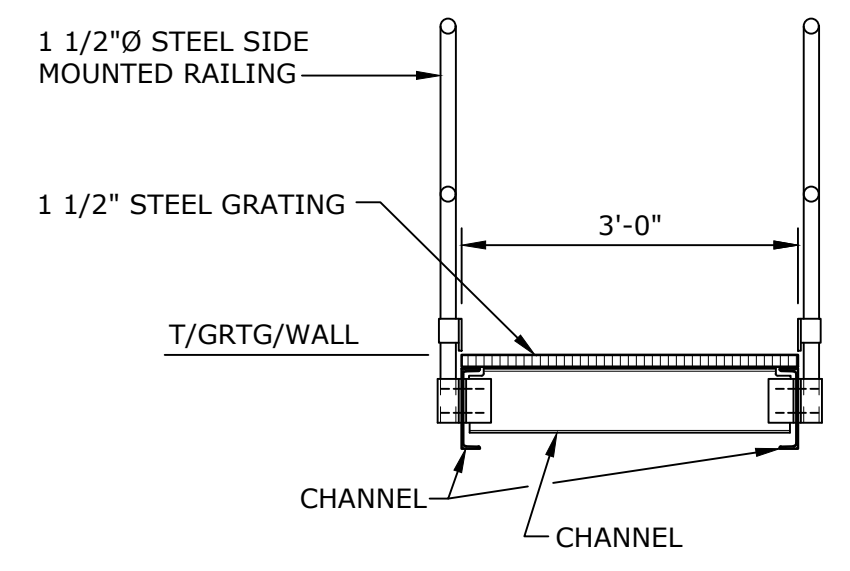
Stamford, Connecticut

MARK	DATE	DESCRIPTION
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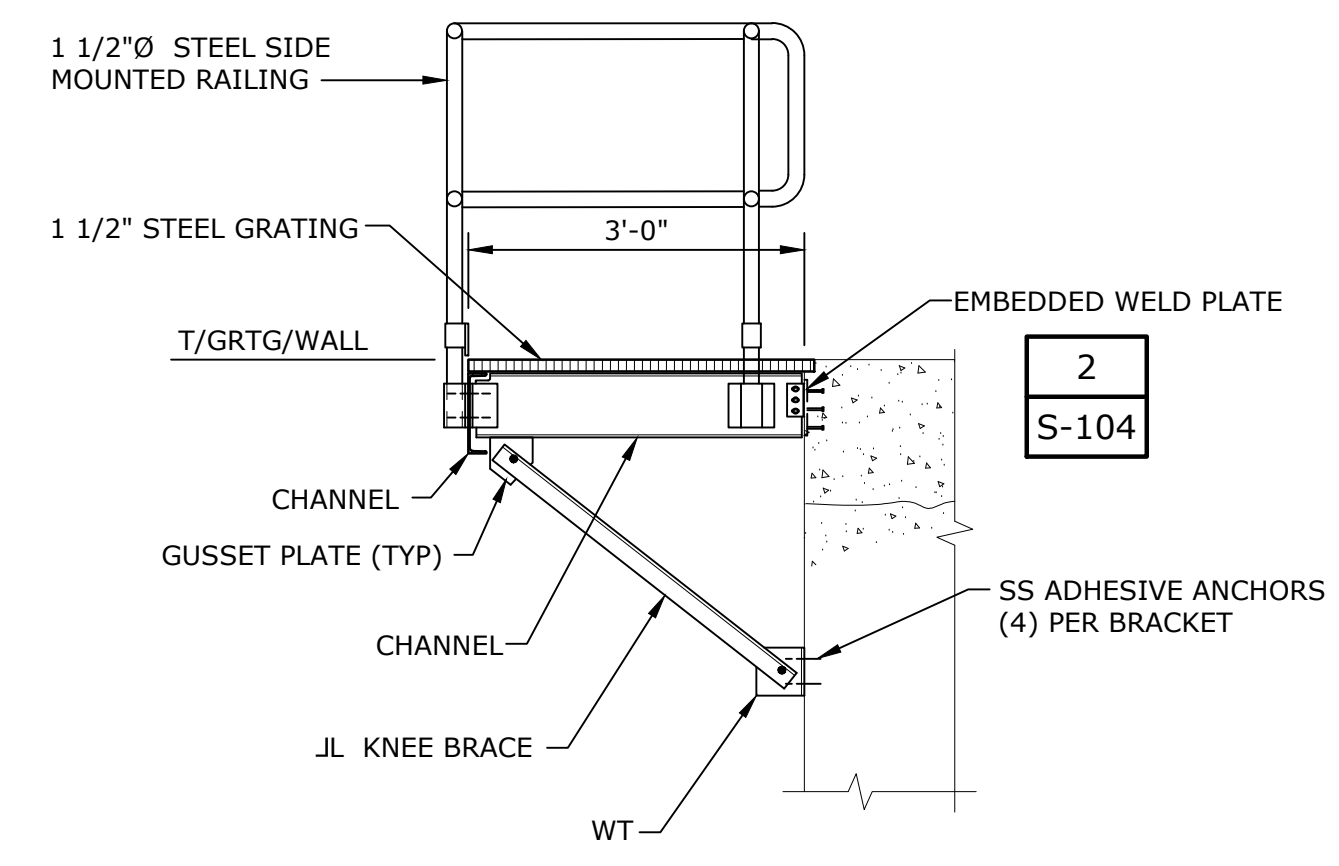
PROJECT NO:	A-1000-195A
DATE:	05/2023
FILE:	A1000-195A-S-102-S-103 S-104.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	JC/DBS
APPROVED BY:	CDH

STRUCTURAL SECTIONS AND DETAILS - 2

SCALE: NO SCALE



FRONT VIEW



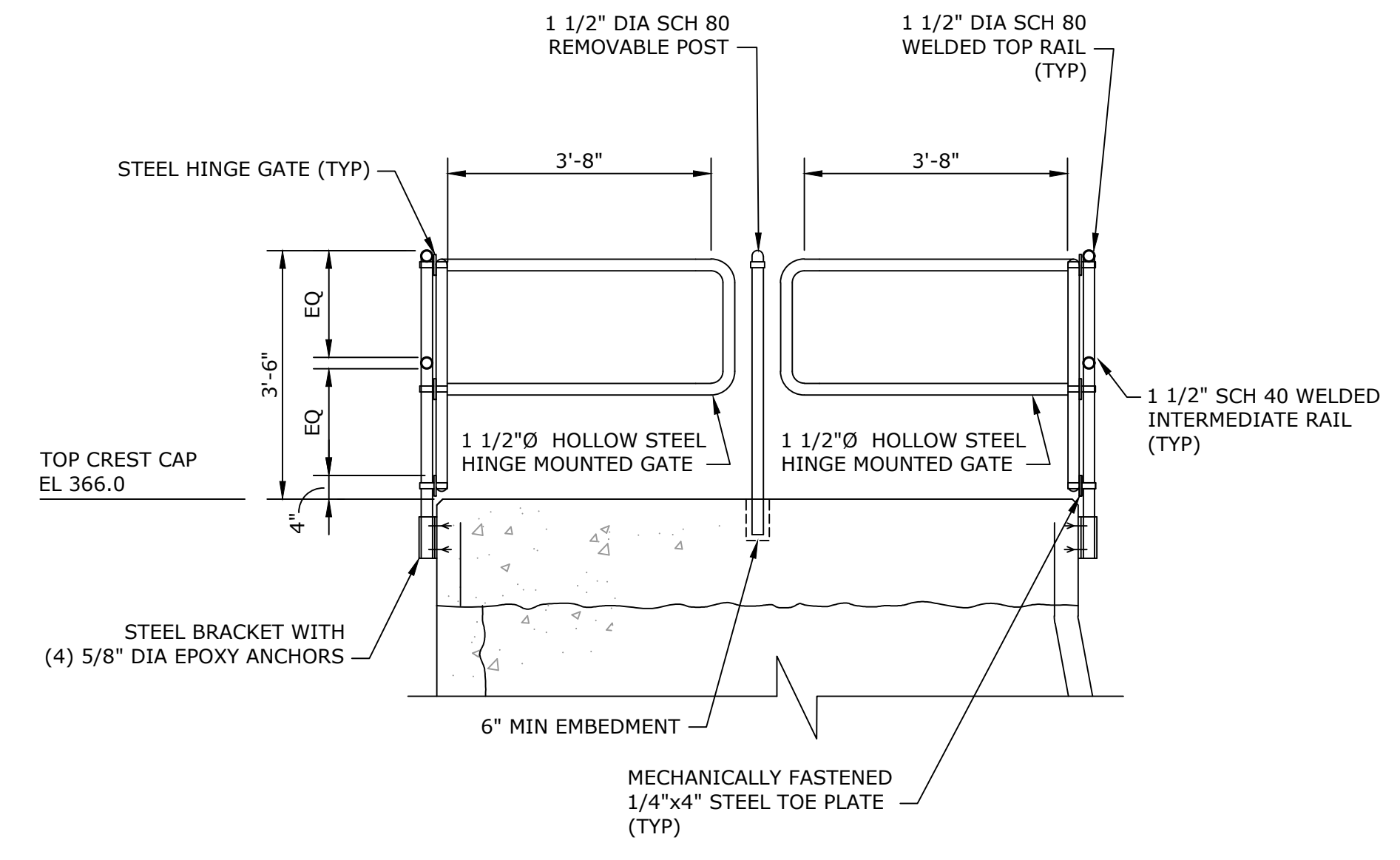
SIDE VIEW

NOTES:

1. FINAL FRAMING/MEMBER SIZES TO BE COMPLETED UPON SELECTION OF OPERATOR LIFT MECHANISM.

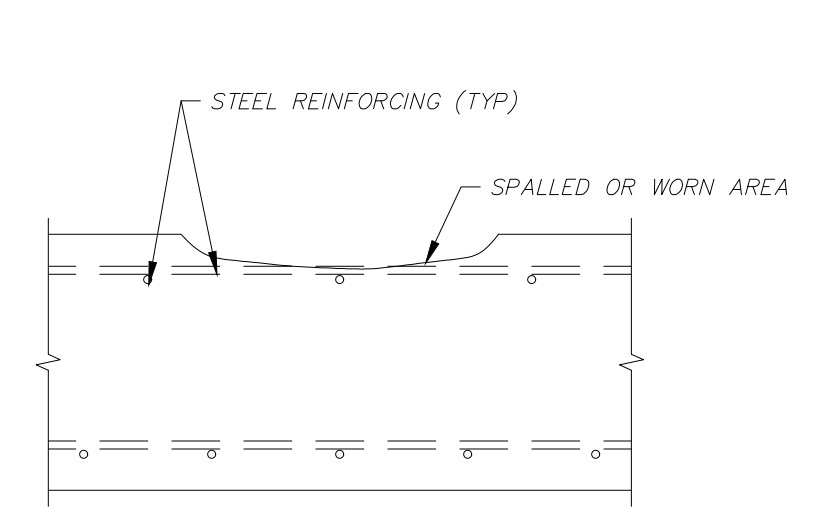
VALVE OPERATOR PLATFORM AT DAM CREST

DETAIL	2
NO SCALE	S-101

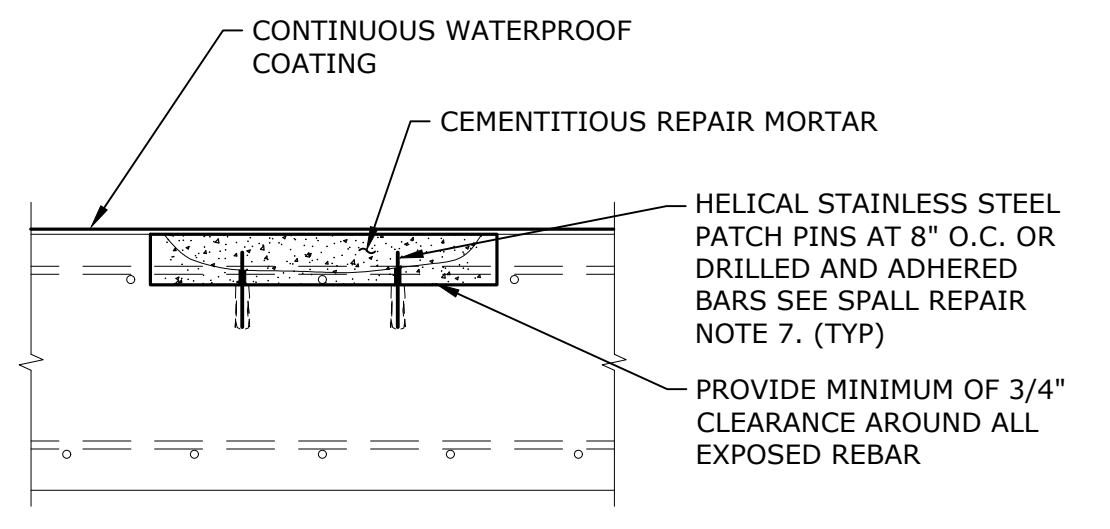


STEEL GATE AT DAM CREST

DETAIL	5
NO SCALE	S-101



EXISTING



PROPOSED

PREPARATION NOTES:

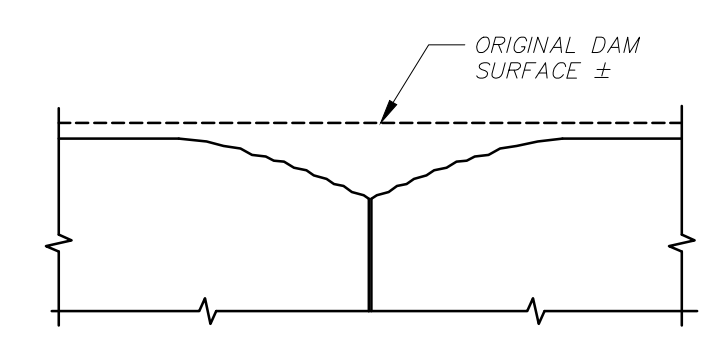
1. REMOVE ALL LOOSE OR UNSOUND CONCRETE.
2. PREPARE EDGES OF REPAIR TO VERTICAL PROFILE.
3. PROVIDE MINIMUM OF 3/4" CLEARANCE AROUND ALL EXPOSED REBAR.
4. CONSULT ENGINEER IF EXPOSED REBAR HAS SECTION LOSS.
5. REPAIR AREA IN CONFORMANCE WITH SPECIFICATION SECTION 03930.

REPAIR NOTES:

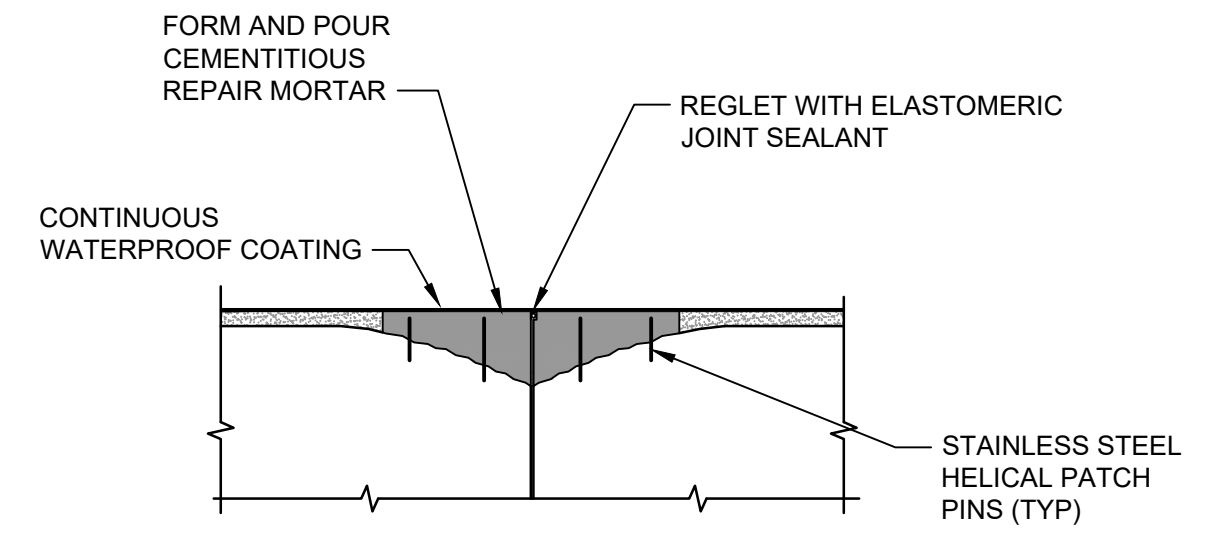
1. SURFACE TO BE SATURATED SURFACE DRY PRIOR TO APPLICATION OF REPAIR MORTAR.
2. SCRUB IN A BRUSH COAT OF THE REPAIR MORTAR INTO THE SUBSTRATE TO FILL ALL PORES AND VOIDS.
3. INSTALL AND MOIST CURE THE REPAIR MORTAR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
4. REPAIR MORTAR SHALL BE A PORTLAND CEMENT BASED PRODUCT WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 7000 PSI.
5. REPAIR MORTAR SHALL BE COMPATIBLE WITH THE PROPOSED WATERPROOF COATING SYSTEM.
6. FOR REPAIRS LESS THAN 4" DEEP, INSTALL 316 STAINLESS STEEL HELICAL ANCHORS AT 8" OC EACH WAY WITH 1/2" MINIMUM COVER.
7. FOR REPAIRS 4" OR DEEPER, DRILL AND ADHESIVE ANCHOR #3 REINF BARS AT 18" OC EACH WAY. PROVIDE A MINIMUM OF 1 1/2" CLEAR COVER OVER BARS WITH 3 1/2" EMBEDMENT INTO SOUND CONCRETE.

SPALL REPAIR

DETAIL	3
NO SCALE	S-101



EXISTING



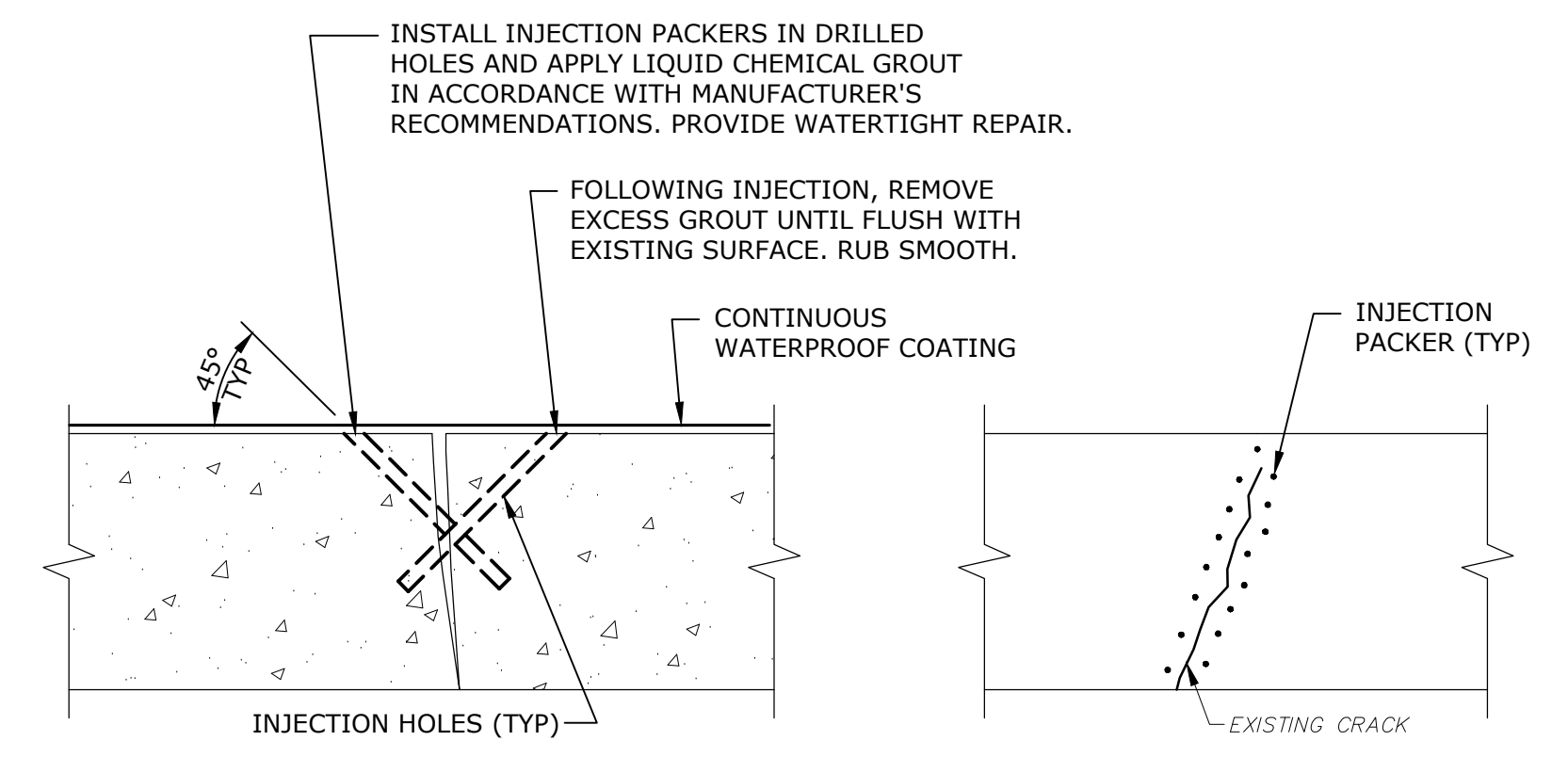
PROPOSED

NOTES:

1. PREPARE SURFACE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. INSTALL STAINLESS STEEL HELICAL PATCH PINS AT 8" OC EACH WAY. PROVIDE MINIMUM OF 1/2" COVER ON ALL SIDES OF PATCH PINS.
3. MIX, APPLY, AND CURE CEMENTITIOUS REPAIR MORTAR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. PERFORM GROUT INJECTION PRIOR TO SPALL REPAIR PER DETAIL 6 EXCEPT AT EXISTING EXPANSION JOINTS.

SPALL REPAIR AT JOINT

DETAIL	4
NO SCALE	S-101



SECTION

ELEVATION

NOTES:

1. ALL LEAKING CRACKS AND JOINTS TO BE FILLED IN ACCORDANCE WITH SPEC SECTION 03930.
2. MAXIMUM HOLE SIZE IS 5/8" DIA. MINIMUM CRACK SIZE IS 1/16".
3. PACKERS TO BE INSTALLED IN DRILLED HOLES.
4. STAGGER PACKERS ON OPPOSITE SIDES OF CRACK.
5. SPACE PACKERS IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. MAXIMUM SPACING OF PACKERS IS 12".
6. INJECT LEAKING CONSTRUCTION JOINTS PER MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS SECTION 03930.

LIQUID CHEMICAL GROUT INJECTION

DETAIL	6
NO SCALE	S-101

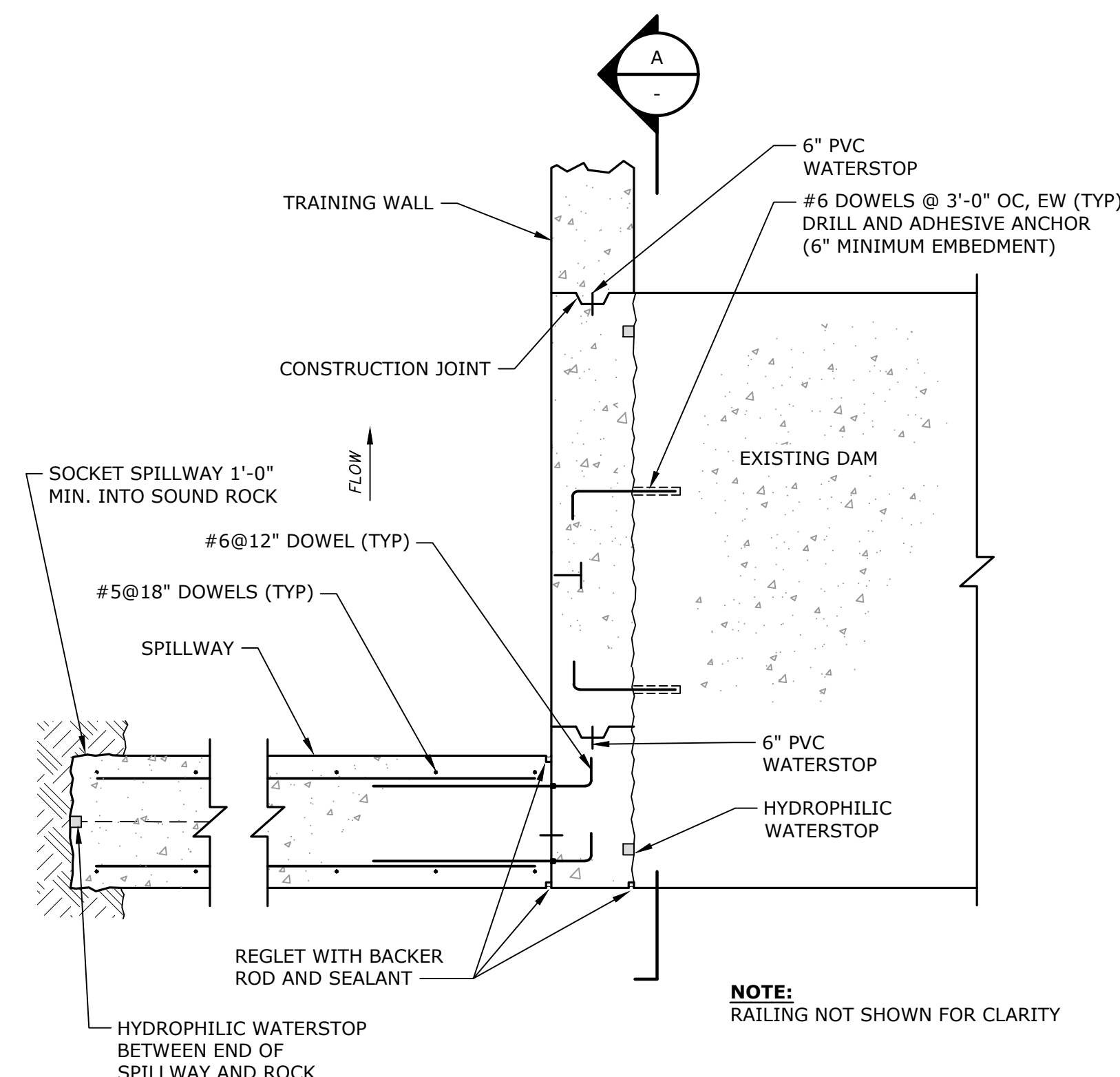
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 By: RShinford
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Brush Reservoir Dam Improvements

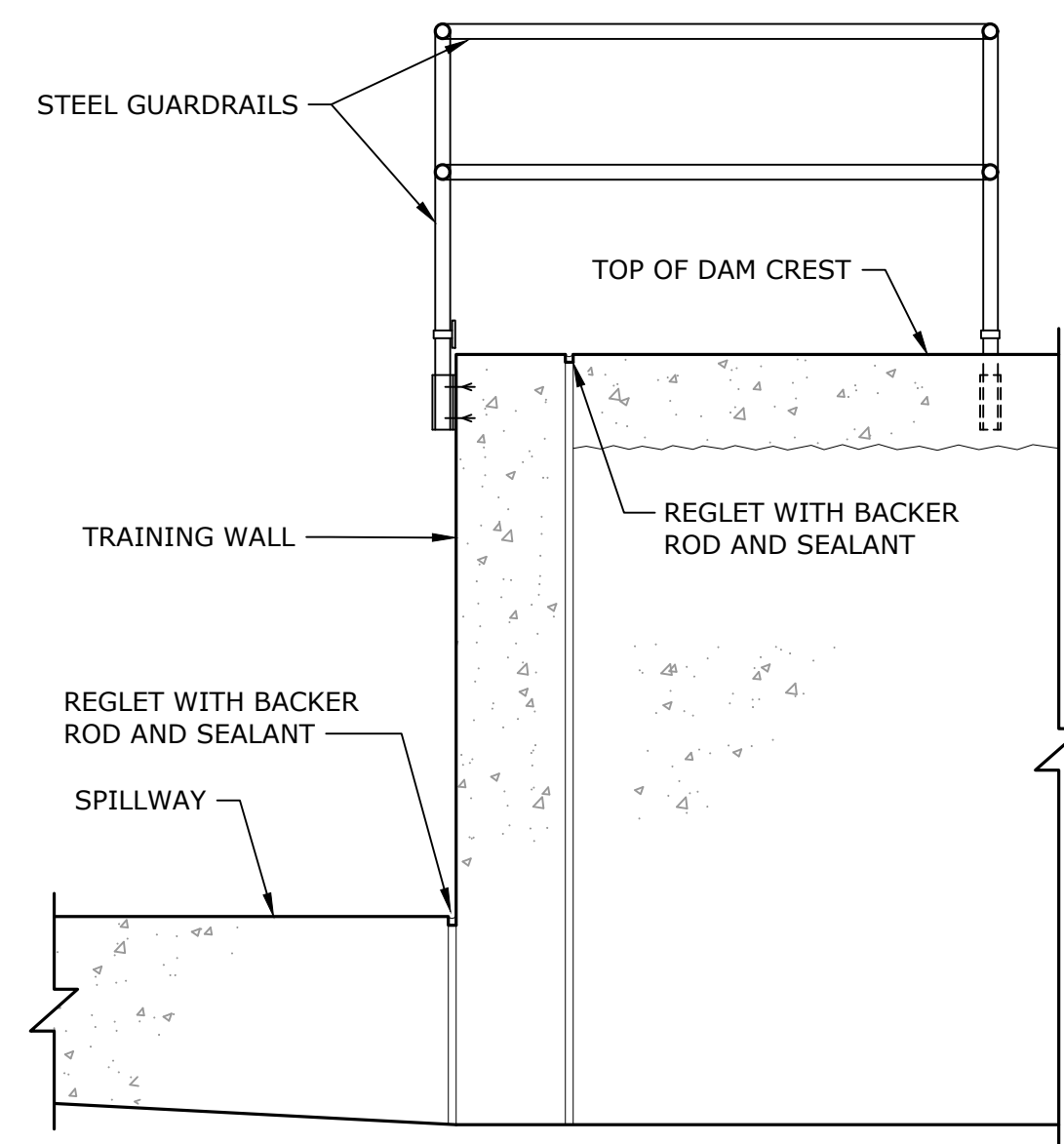
Aquarion Water Company

Stamford, Connecticut



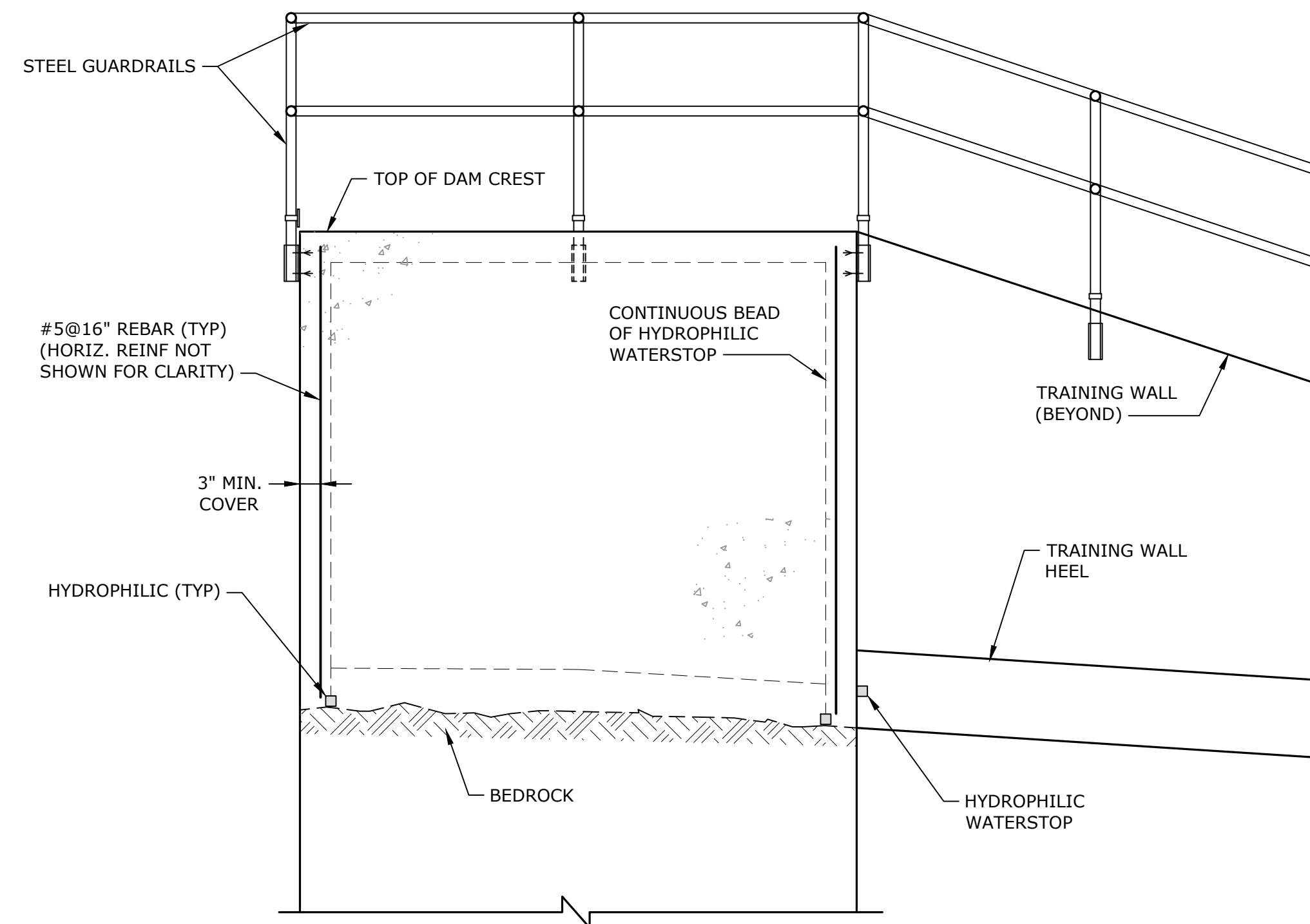
TRAINING WALL CONNECTION AT DAM AND SPILLWAY

PLAN
1/2"=1'-0"

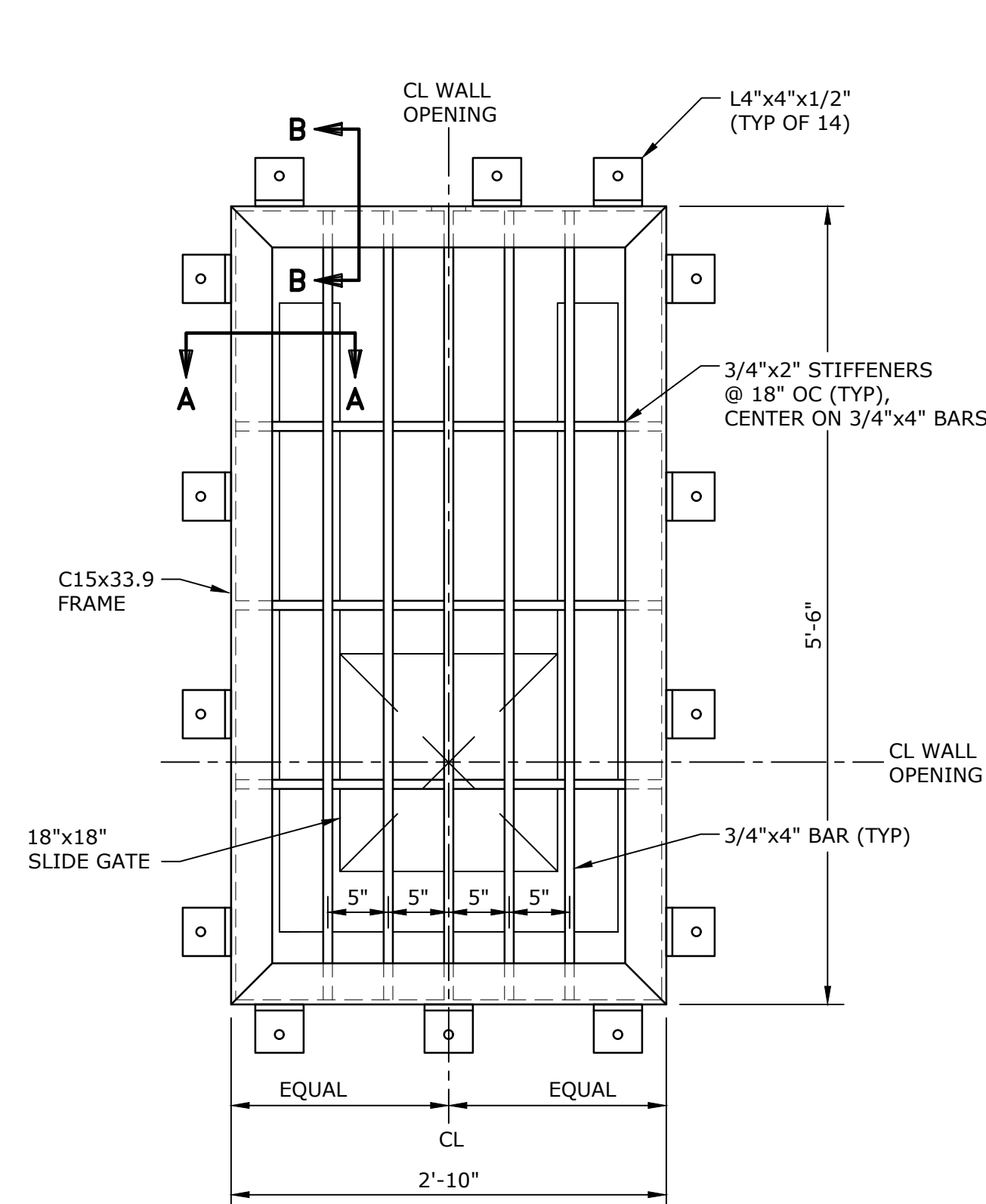


TRAINING WALL AND SPILLWAY JOINTS

ELEVATION
1/2"=1'-0"

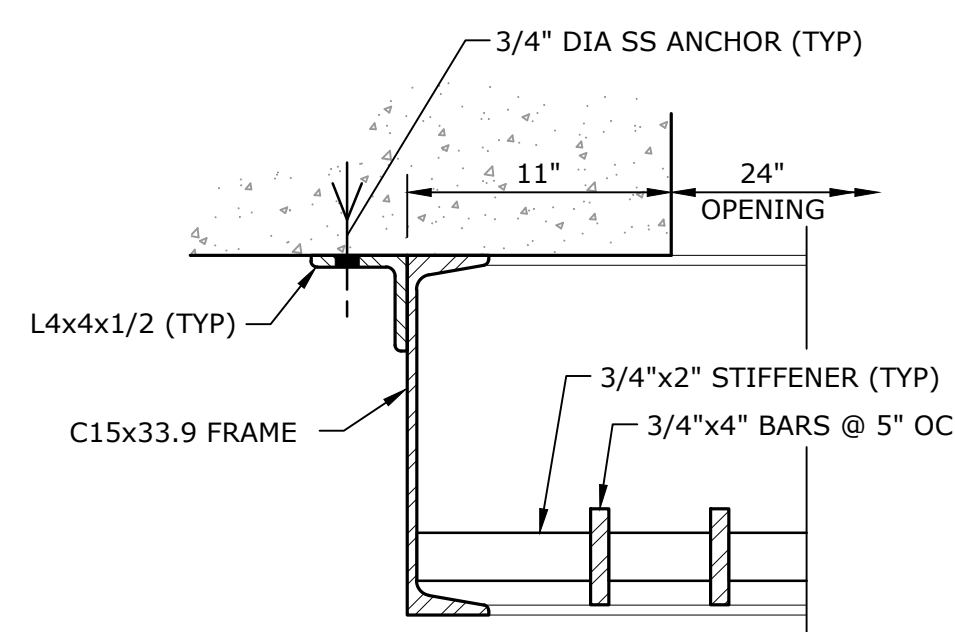


SECTION A-A
1/2"=1'-0"

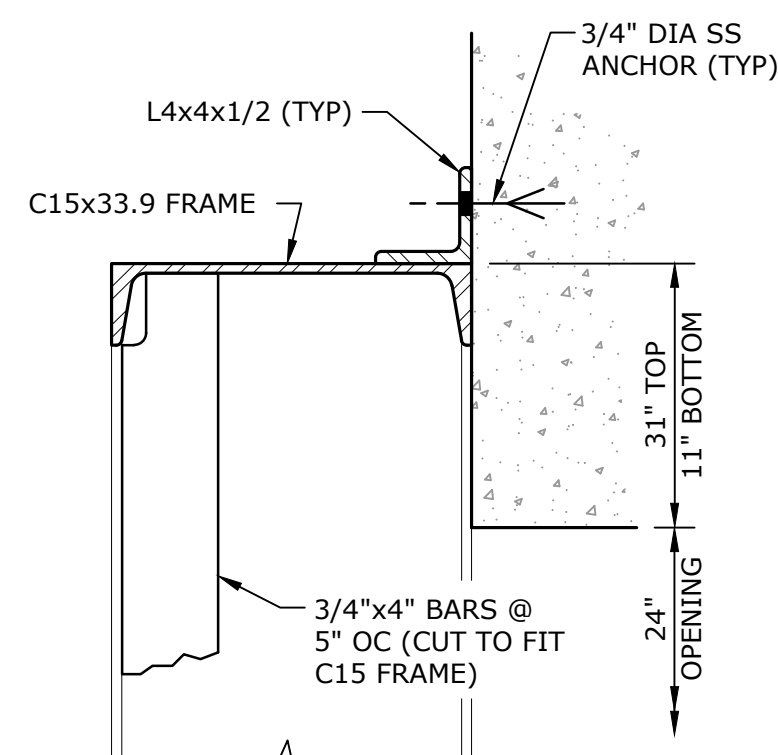


BAR RACK

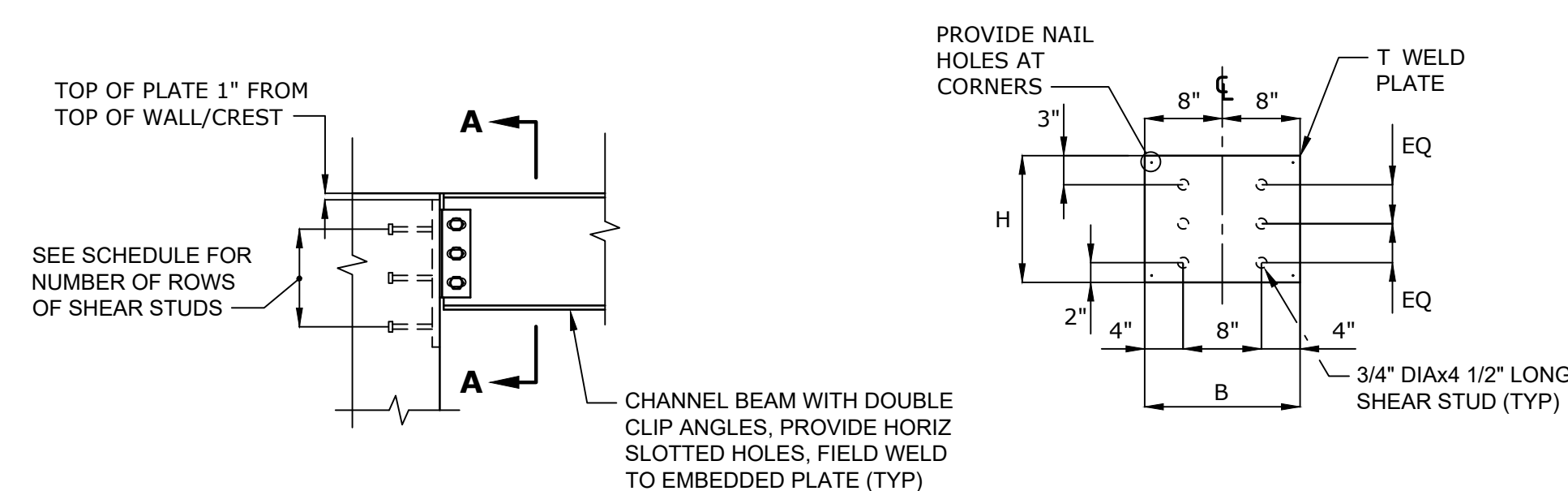
DETAIL 1
NO SCALE S-101



SECTION A-A



SECTION B-B



ELEVATION

SECTION A

EMBEDDED WELD PLATE SCHEDULE		
W SHAPE	NUMBER OF STUD ROWS	MIN. DIMENSION T x B x H
W14 OR SMALLER	3	1/2"x16"x1'-3"

EMBEDDED WELD PLATE

DETAIL 2
NO SCALE S-103



MARK	DATE	REV PER CTDEEP COMMENTS
A	10/23/2023	REV PER CTDEEP COMMENTS

PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-S-102-S-103 S-104.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: JC/DBS
 APPROVED BY: CDH

STRUCTURAL SECTIONS AND DETAILS - 3

SCALE: AS SHOWN

Last Saved: 10/24/2023 10:24:34 AM By: RShenford
 Plotted On: Oct 24, 2023 3:41 PM
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Appendix B

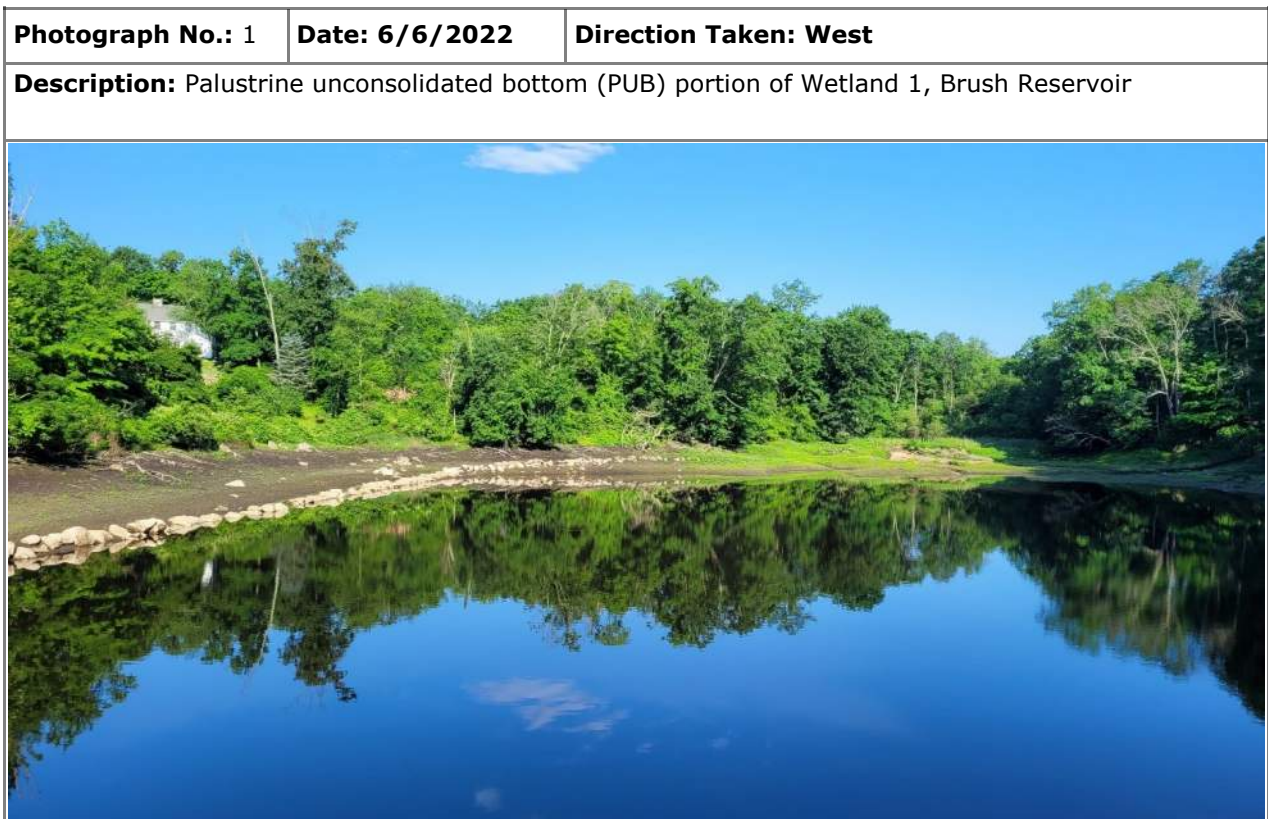
Site Photographs

Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

Photograph No.: 3	Date: 6/6/2022	Direction Taken: East
--------------------------	-----------------------	------------------------------

Description: Wetland 1, Brush Reservoir, view from inlet stream toward the dam.



Photograph No.: 4	Date: 6/6/2022	Direction Taken: Northwest
--------------------------	-----------------------	-----------------------------------

Description: Palustrine emergent (PEM) vegetation surrounded by palustrine forested (PFO) vegetation in northwestern portion of Wetland 1



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

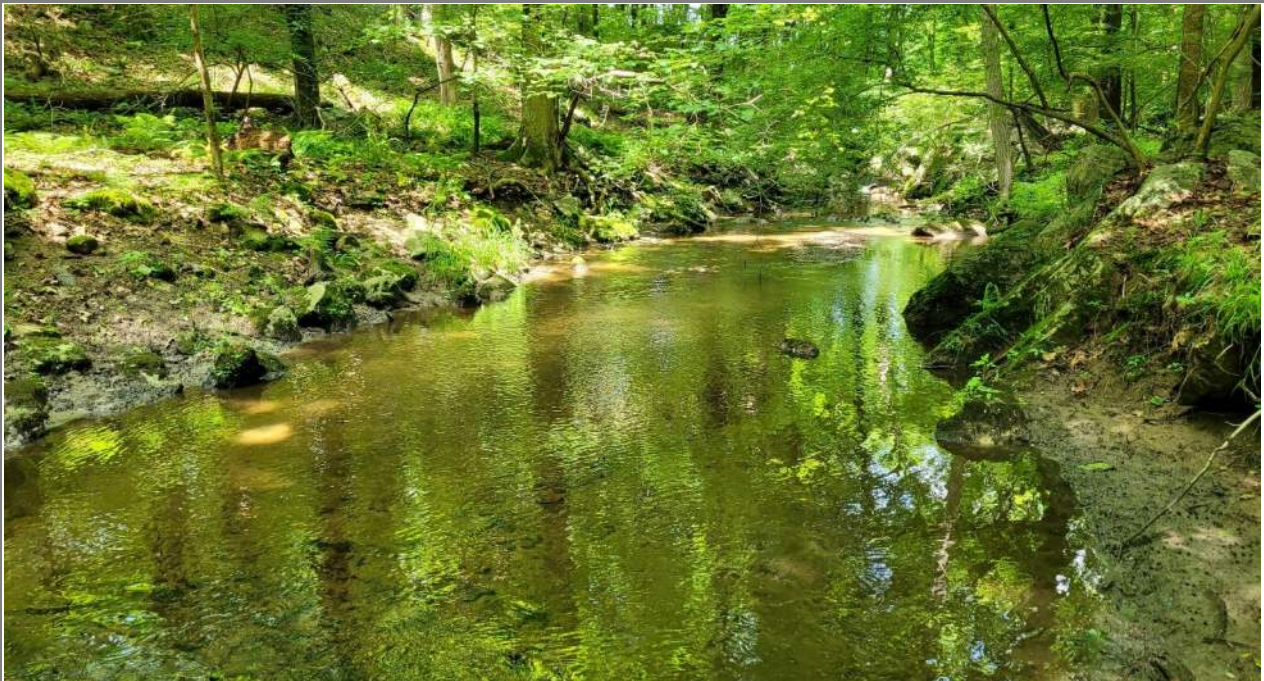
Photograph No.: 5	Date: 6/6/2022	Direction Taken: North
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Description: PFO cover type in the northwestern portion of Wetland 1



Photograph No.: 6	Date: 6/6/2022	Direction Taken: East
--------------------------	-----------------------	------------------------------

Description: Perennial stream (Grays Pond Brook) bordered by Wetland 2



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

Photograph No.: 7	Date: 6/6/2022	Direction Taken: West
--------------------------	-----------------------	------------------------------

Description: Perennial stream (Grays Pond Brook) bordered by PEM cover type in Wetland 2



Photograph No.: 8	Date: 6/6/2022	Direction Taken: North
--------------------------	-----------------------	-------------------------------

Description: PEM cover type bordering perennial stream (Grays Pond Brook) in Wetland 2



Appendix C

Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Brush Reservoir Dam Improvements County: Fairfield Sampling Date: 6/13/2022
 Applicant/Owner: Aquarion Water Company State: CT Sample Point: Wetland 1
 Investigator(s): R. Canavan Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Concave Slope (%): 0 - 3
 Subregion (LRR or MLRA): LRR R 144A Lat: 41.14079 Long: -73.62460 Datum: NAD 83
 Soil Map Unit Name: Ridgebury, Leicester, and Witman Soils, 0 to 8 percent slopes, extremely stony NWI Classification: PFO1E
 Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) _____ (if no, explain in Remarks.)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____ Hydric Soil Present? Yes <u>X</u> No _____ Wetland Hydrology Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ s, optional Wetland Site ID: <u>Wetland 1</u>
Remarks: <p style="text-align: center;">This point was determined to be within a wetland due to the presence of all 3 wetland criteria.</p>	

HYDROLOGY

Wetland hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> _____ Surface Water (A1) _____ Water-Stained Leaves (B9) _____ High Water Table (A2) _____ Aquatic Fauna (B13) <u>X</u> _____ Saturation (A3) _____ Marl Deposits (B15) _____ Water Marks (B1) _____ Hydrogen Sulfide Odor (C1) _____ Sediment Deposits (B2) _____ Oxidized Rhizospheres on Living Roots (C3) _____ Drift Deposits (B3) _____ Presence of Reduced Iron (C4) _____ Algal Mat or Crust (B4) _____ Recent Iron Reduction in Tilled Soils (C6) _____ Iron Deposits (B5) _____ Thin Muck Surface (C7) _____ Inundation Visible on Aerial Imagery (B7) _____ Other (Explain in Remarks) _____ Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> _____ Surface Soil Cracks (B6) <u>X</u> _____ Drainage Patterns (B10) _____ Moss Trim Lines (B16) _____ Dry-Season Water Table (C2) _____ Crayfish Burrows (C8) _____ Saturation Visible on Aerial Imagery (C9) _____ Stunted or Stressed Plants (D1) _____ Geomorphic Position (D2) _____ Shallow Aquitard (D3) _____ Microtopographic Relief (D4) <u>X</u> _____ FAC-Neutral Test (D5)
--	---

Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>0</u> (includes capillary fringe)	Wetland Hydrology Present? Yes <u>X</u> No _____
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

A positive indication of wetland hydrology was observed (at least two secondary indicators).

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: Wetland 1

<u>Tree Stratum</u> (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <i>Acer saccharum</i>	75	Yes	FACU
2. <i>Acer rubrum</i>	50	Yes	FAC
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	125 = Total Cover		

<u>Sapling/Shrub Stratum</u> (Plot size: <u>15 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <i>Berberis thunbergii</i>	10	Yes	FACU
2. <i>Lindera benzoin</i>	10	Yes	FACW
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	20 = Total Cover		

<u>Herb Stratum</u> (Plot size: <u>5 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <i>Symplocarpus foetidus</i>	80	Yes	OBL
2. <i>Microstegium vimineum</i>	10	No	FAC
3. <i>Impatiens capensis</i>	5	No	FACW
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
	95 = Total Cover		

<u>Woody Vine Stratum</u> (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60% (A/B)

Prevalence Index Worksheet:

Total % Cover of:	Multiply by:
OBL species <u>80</u>	x 1 = <u>80</u>
FACW species <u>15</u>	x 2 = <u>30</u>
FAC species <u>60</u>	x 3 = <u>180</u>
FACU species <u>85</u>	x 4 = <u>340</u>
UPL species <u>0</u>	x 5 = <u>0</u>
Column Totals: <u>240</u> (A)	<u>630</u> (B)

Prevalence Index = B/A = 2.63

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

2 - Dominance Test is >50%

3 - Prevalence Index is ≤ 3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH) regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No

Remarks:

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: Wetland 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-8	10YR 3/1	100					Muck	
8-12	2.5Y 3/2	100					Gravelly Sandy Loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soils Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR R, MLRA 149B)
- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F12)
- Very Shallow Dark Surface (F22)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone
 Depth (inches): 12

Hydric Soil Present? Yes No

Remarks:

A positive indication of hydric soil was observed.

WETLAND DETERMINATION DATA FORM - Northcentral and Northeast Region

Project/Site: Brush Reservoir Dam Improvements County: Fairfield Sampling Date: 6/13/2022
 Applicant/Owner: Aquarion Water Company State: CT Sample Point: Upland
 Investigator(s): R. Canavan Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): 0 - 3
 Subregion (LRR or MLRA): LRR R 144A Lat: 41.14071 Long: -73.62449 Datum: NAD 83
 Soil Map Unit Name: Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony NWI Classification: N/A
 Are climatic / hydrologic conditions on the site typical for this time of year? (Yes / No) Yes (if no, explain in Remarks.)
 Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>x</u> No _____ Hydric Soil Present? Yes _____ No <u>x</u> Wetland Hydrology Present? Yes _____ No <u>x</u>	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> If yes, optional Wetland Site ID: _____
Remarks: <p style="text-align: center;">This point was determined not to be within a wetland due to the lack of hydric soils and wetland hydrology.</p>	

HYDROLOGY

Wetland hydrology Indicators: <u>Primary Indicators (minimum of one is required; check all that apply)</u> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<u>Secondary Indicators (minimum of two required)</u> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No <u>X</u>
---	---

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) - Use scientific names of plants.

Sampling Point: Upland

<u>Tree Stratum</u> (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <u><i>Acer saccharum</i></u>	<u>80</u>	<u>Yes</u>	<u>FACU</u>
2. <u><i>Carya ovata</i></u>	<u>30</u>	<u>Yes</u>	<u>FACU</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>110</u> = Total Cover		

<u>Sapling/Shrub Stratum</u> (Plot size: <u>15 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <u><i>Berberis thunbergii</i></u>	<u>40</u>	<u>Yes</u>	<u>FACU</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
	<u>40</u> = Total Cover		

<u>Herb Stratum</u> (Plot size: <u>5 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <u><i>Alliaria petiolata</i></u>	<u>25</u>	<u>Yes</u>	<u>FACU</u>
2. <u><i>Coptis trifolia</i></u>	<u>10</u>	<u>Yes</u>	<u>FACW</u>
3. <u><i>Symplocarpus foetidus</i></u>	<u>5</u>	<u>No</u>	<u>OBL</u>
4. <u><i>Dennstaedtia punctilobula</i></u>	<u>5</u>	<u>No</u>	<u>UPL</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
	<u>45</u> = Total Cover		

<u>Woody Vine Stratum</u> (Plot size: <u>30 ft.</u>)	Absolute % cover	Dominant Species?	Indicator Status
1. <u><i>None Observed</i></u>	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
	<u>0</u> = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 20% (A/B)

Prevalence Index Worksheet:

Total % Cover of:	Multiply by:
OBL species <u>5</u>	x 1 = <u>5</u>
FACW species <u>10</u>	x 2 = <u>20</u>
FAC species <u>0</u>	x 3 = <u>0</u>
FACU species <u>175</u>	x 4 = <u>700</u>
UPL species <u>5</u>	x 5 = <u>25</u>
Column Totals: <u>195</u> (A)	<u>750</u> (B)

Prevalence Index = B/A = 3.85

Hydrophytic Vegetation Indicators:

 1 - Rapid Test for Hydrophytic Vegetation

 2 - Dominance Test is >50%

 3 - Prevalence Index is ≤ 3.0¹

 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)

 Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree - Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH) regardless of height.

Sapling/Shrub - Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine - All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes No X

Remarks:

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

A positive indication of hydrophytic vegetation was observed (Prevalence Index is ≤ 3.00).

SOIL

Sampling Point: Upland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	10YR 3/2	100					fine Sandy Loam	
2-4	10YR 3/3	100					fine Sandy Loam	
4-12	10YR 3/4	100					fine Sandy Loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

<p>Hydric Soils Indicators:</p> <p><input type="checkbox"/> Histosol (A1)</p> <p><input type="checkbox"/> Histic Epipedon (A2)</p> <p><input type="checkbox"/> Black Histic (A3)</p> <p><input type="checkbox"/> Hydrogen Sulfide (A4)</p> <p><input type="checkbox"/> Stratified Layers (A5)</p> <p><input type="checkbox"/> Depleted Below Dark Surface (A11)</p> <p><input type="checkbox"/> Thick Dark Surface (A12)</p> <p><input type="checkbox"/> Sandy Mucky Mineral (S1)</p> <p><input type="checkbox"/> Sandy Gleyed Matrix (S4)</p> <p><input type="checkbox"/> Sandy Redox (S5)</p> <p><input type="checkbox"/> Stripped Matrix (S6)</p> <p><input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)</p>	<p><input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R, MLRA 149B)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)</p> <p><input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)</p> <p><input type="checkbox"/> Loamy Gleyed Matrix (F2)</p> <p><input type="checkbox"/> Depleted Matrix (F3)</p> <p><input type="checkbox"/> Redox Dark Surface (F6)</p> <p><input type="checkbox"/> Depleted Dark Surface (F7)</p> <p><input type="checkbox"/> Redox Depressions (F8)</p>	<p>Indicators for Problematic Hydric Soils³:</p> <p><input type="checkbox"/> 2 cm Muck (A10) (LRR K, L, MLRA 149B)</p> <p><input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)</p> <p><input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)</p> <p><input type="checkbox"/> Dark Surface (S7) (LRR K, L)</p> <p><input type="checkbox"/> Polyvalue Below Surface (S8) (LRR K, L)</p> <p><input type="checkbox"/> Thin Dark Surface (S9) (LRR K, L)</p> <p><input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)</p> <p><input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149B)</p> <p><input type="checkbox"/> Mesic Spodic (TA6) (MLRA 144A, 145, 149B)</p> <p><input type="checkbox"/> Red Parent Material (F12)</p> <p><input type="checkbox"/> Very Shallow Dark Surface (F22)</p> <p><input type="checkbox"/> Other (Explain in Remarks)</p>
--	---	---

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<p>Restrictive Layer (if observed):</p> <p>Type: <u>Stone</u></p> <p>Depth (inches): <u>12</u></p>	<p>Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>
---	---

Remarks:

No positive indication of hydric soils was observed.

Appendix D

Fisheries Consultation

U.S. Fish and Wildlife Service Project Review Request



**Connecticut Department of
Energy & Environmental Protection
Bureau of Natural Resources
Inland Fisheries Division**

Request for Determination of Need for Fishway for Dam Safety Permit

Section 26-136 of the Connecticut General Statutes requires that the DEEP determine if a fishway is necessary at any dam for which there will be work done that requires a DEEP Dam Safety Permit. This form is used to initiate this review. It is recommended that you submit the form prior to submitting the Dam Safety permit application to allow the review process to be more efficient.

Send the completed form to DEEP Inland Fisheries Division, P.O. Box 719, Old Lyme, CT 06371 or scan to PDF and email to: deep.inland.fisheries@ct.gov. Include additional pages as required. **Please include a map showing the location of the dam and if available, attach one or two photos of the dam.**

Once received, the bottom of page 2 will be completed by the Inland Fisheries Division. A copy will be sent to the dam owner(s), their agent, and the DEEP Dam Safety Program. If the approved form indicates that a fishway or other protective measures are necessary, the dam owner should contact the Inland Fisheries Division at 860-434-6043 or deep.inland.fisheries@ct.gov to discuss the details of these determinations.

If the owner prepares an application for a Dam Safety Permit, a copy of the signed form must be included with the application materials. If not included, the application may take longer to process and review.

Contact the Inland Fisheries Division at 860-434-6043 or deep.inland.fisheries@ct.gov with questions.

Part I: Dam Information

- | | |
|---|----------------------------|
| 1. Dam Name: Brush Reservoir Dam | DEEP Dam ID#: 13504 |
|---|----------------------------|
- (Provide name of dam on file with DEEP Dam Safety Program. If unsure of name or ID, contact Dam Safety at 860-424-3706)*
- Alternate Dam or Pond Name: **Brush Reservoir Dam, Brush Dam, Gray's Pond Dam**
- Town: **Stamford** Name of stream: **Grays Pond Brook**
- Describe dam (e.g. earthen, concrete, etc.): **Concrete and masonry dam**
-
- Type of spillway (e.g. concrete weir, drop inlet, etc.): **Broad crested concrete weir**
- Total length of dam including spillway: **260 feet** Length of Spillway: **25 feet**
- Height of Dam: **27 feet** Height of Spillway: **24.5 feet**
(Measured from downstream bed to top of dam) (Measured from downstream stream bed to top spillway)
-
2. What is the purpose of the dam and impoundment? (check all that apply)
- | | | |
|---|---|--|
| <input type="checkbox"/> Agricultural | <input type="checkbox"/> Hydropower | <input type="checkbox"/> Recreation |
| <input type="checkbox"/> Conservation | <input checked="" type="checkbox"/> Public water supply | <input type="checkbox"/> Aesthetic |
| <input type="checkbox"/> Fire protection | <input type="checkbox"/> Non-public water supply | <input type="checkbox"/> No identified use |
| <input type="checkbox"/> Detention sediment basin | <input type="checkbox"/> Flood control | |
-
3. What is the reason you are proposing working on the dam?
- | |
|--|
| <input type="checkbox"/> DEEP Dam Repair order; if so, indicate order #: |
| <input type="checkbox"/> Maintenance or Engineering Request from DEEP Dam Safety.
(include copy of the correspondence from DEEP Dam Safety Program) |
| <input checked="" type="checkbox"/> Initiated by owner for safety, conservation, or other reasons. |

Part I: Dam Information (continued)

4. Describe the proposed changes to the dam: e.g. raise the elevation of the crest of dam; widen the spillway, etc.
Repairs to Brush Reservoir Dam will improve the condition, stability, and hydraulic capacity for the 100-year spillway design flood. Repairs include modifications to the existing spillway to widen and deepen it, replacement of unsound concrete on the dam crest in approximately the same configuration, addition of an upstream face seepage cutoff through the concrete dam, addition of a rip rap buttress on the downstream face of the concrete dam to improve stability, and other ancillary improvements to the dam to bring it to good condition. As part of the project the normal pool elevation will be lowered and wetland buffer plantings are proposed in the area between the existing normal pool elevation and proposed normal pool elevation.

5. Is a drawdown necessary to conduct this work? Yes No
 How far down? **23.5, 4.5 feet** For how long? **temporarily, permanently**

6. Provide additional information relevant to the protection, enhancement or restoration of fish population at this location:
Due to a concern of potential dam failure, under emergency consultation with DEEP Dam Safety, the water level has been drawn down by 23.5 feet for the past year. The low-level outlet is fully open and controls the water level in the impoundment. The dam is proposed to remain in this condition until the dam improvement project is complete.

Part II: Owner/Agent Information

1. Dam Owner Name: **Aquarion Water Company, Dennis Fields**
 Mailing Address: **600 Lindley Street**
 City/Town: **Bridgeport** State: **CT** Zip Code: **06606**
 Business Phone: **203-362-3057** ext.:
 E-mail: **dfields@aquarionwater.com**
 Check here if additional names of owners need to be included, and label and attach them to this sheet.


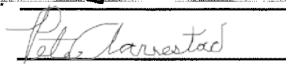
2. Agent Name (optional): **Daniel Valentine, Tighe & Bond**
 (An agent could be a consultant, dam operator, or owner representative)
 Mailing Address: **213 Court Street, Suite 1100**
 City/Town: **Middletown** State: **CT** Zip Code: **06457**
 Business Phone: **(860) 704-4772** ext.:
 E-mail: **dfvalentine@tighebond.com**

===== For CT DEEP Use Only =====

Date Received: 4/5/23 by Tim W. Idman

Fish Passage Determination:
 No Fishway Necessary. Comments: Above diadromous fish range
 Fishway Desirable but not Necessary at this time. Comments: _____
 Fishway Necessary. Comments: _____

Describe Other Fish Protection Measures Necessary: _____

Reviewed by:  Title: Fisheries Biologist Date: 4/25/23
Approved by:  Title: Director Date: 5/3/2023

A1000-195
September 28, 2023

From: Matthew Regan
213 Court Street, Suite 1100
Middletown, CT 06457
mregan@tighebond.com
716-949-9131

To: U.S. Fish and Wildlife Service
New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301

Re: **Brush Reservoir Dam Improvements, Fairfield County, Connecticut,
Project Code: 2023-0059646**

Dear To Whom It May Concern:

We have reviewed the referenced project using the New England Field Office's online step-by-step project review process and have followed all guidance and instructions in completing the review. We completed our review on September 18, 2023, and are submitting our project package in accordance with the instructions for further review.

This is a request for review pursuant to section 7 of the Endangered Species Act for the U.S. Army Corps of Engineers to issue regional general permit 2 for Aquarion's proposed Brush Reservoir Dam Improvements project. The project is located at East Middle Patent Road, Stamford, Connecticut. The project location is shown on the Site Location Map (Figure 1) and Orthophotograph Aerial Map (Figure 2) and site plans (Attachment A). The action area is identified on the IPaC Official Species List (Attachment B) and the site plans (Attachment A). The project would begin March 14, 2023, and would take approximately 26 weeks to complete.

The action area includes Brush Reservoir Dam. The dam serves to impound water, also known as Grays Pond, a former water supply reservoir. Grays Pond is located northwest of the Brush Reservoir Dam and is classified as an excavated palustrine unconsolidated bottom wetland with a permanently flooded water regime (PUBHx) by the U.S. Fish & Wildlife Service (USFWS) National Wetland Inventory (NWI). There is a wetland classified by the USFWS NWI as a palustrine forested broad leaved deciduous wetland with a seasonally flooded/saturated water regime (PFO1E) immediately upstream of Grays Pond with sections of palustrine emergent wetland. The pond serves to store a relatively small volume of water in the watershed that contributes to the Greenwich Reservoir System through Bargh or Rockwood Reservoirs. The dam's spillway discharges to Grays Pond Brook downstream of the dam, which conveys flow to Bargh Reservoir. Grays Pond Brook is classified as a riverine upper perennial unconsolidated bottom wetland with a permanently flooded water regime (R3UBH). The upland adjacent to Grays Pond consisted of maintained lawn and forested upland dominated by sugar maple (*Acer saccharum*) and shagbark hickory (*Carya ovata*), with a mix of invasive species, including Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), and Japanese barberry (*Berberis thunbergii*). Photographs of the site are included in Attachment C.

Our proposed work consists of the following improvements at Brush Reservoir Dam:



- Drawdown of the reservoir by approximately 23.5 feet to access submerged areas of the dam for repairs.
- Permanent lowering of the spillway elevation from 364.5 ft to 360 ft.
- Modifications to the existing spillway to widen and deepen it.
- Replacement of unsound concrete in approximately the same configuration.
- Addition of an upstream face seepage cutoff through the concrete dam.
- Addition of a rip rap buttress on the downstream face of the concrete dam to improve stability.
- Extend the low-level outlet pipe downstream past the proposed riprap buttress.
- Replacement of the upstream low-level outlet control valve.
- Lowering the normal pool elevation.
- Planting water tolerant plantings in the formerly inundated area.

The details of the dam improvements and site plan are included in Attachment B.

The Northern Long-Eared Bat Rangewide Determination Key and the Northeast Endangered Species Determination Key were completed using IPaC. The project received a determination of “may affect” for northern long-eared bat (*Myotis septentrionalis*) and bog turtle (*Glyptemys muhlenbergii*) (see Attachment A).

The enclosed project package provides information about the species and critical habitat considered in our review, and the species conclusions table included in the package identifies our determinations for the resources that may be affected by the project. We request you concur with our determinations of “may affect, not likely to adversely affect” for northern long-eared bat and bog turtle as shown in the species determination table (Attachment D).

Northern long-eared bat (*Myotis septentrionalis*) – According to the Connecticut Natural Diversity Database (NDDDB), the project is not within the proximity of a recorded occurrence of rare wildlife species. Suitable summer roosting habitat for northern long-eared bat occurs within the vicinity of Brush Reservoir Dam. Trees with exfoliating bark such as shagbark hickory occur in the vicinity of Brush Reservoir Dam. The proposed dam improvements may affect northern long-eared bats primarily in the form of habitat destruction from tree-clearing. The project only requires the removal of six trees which are within 25 feet of the dam and will be removed for dam safety. Aquarion would complete all tree-clearing in the inactive season between October 31 and April 14 to avoid adverse impacts to northern long-eared bat.

Bog Turtle (*Glyptemys muhlenbergii*) - According to the Connecticut Natural Diversity Database (NDDDB), the project is not within the proximity of a recorded occurrence of rare wildlife species. According to the USFWS, Fairfield County has historic records of bog turtles dating back 30 years or more. Bog turtles prefer shallow wetlands with open canopies and deep muck soils. There were areas of open canopy wetlands with muck soils upstream of Grays Pond observed during a wetland delineation. The dam improvements may affect bog turtles by changing hydrology in the area. Lowering the pool elevation and planting along the newly exposed soils will result in permanent habitat conversion from open water to scrub shrub/emergent wetland habitat. Aquarion will implement conservation measures to avoid adverse effects to bog turtles. Exclusionary fencing or other exclusionary methods will ensure that no bog turtles will get into the limit of disturbance. A recognized qualified bog turtle phase 2 surveyor for the Hudson River/Housatonic recovery unit will inspect the exclusionary silt fence to ensure no bog turtles are within the project area. An education and encounter plan will be developed to help everyone who is on site how to identify bog turtles and what

to do if a bog turtle is encountered. Only a qualified bog turtle phase 2 surveyor will be able to remove a bog turtle from the limits of disturbance.

For additional information, please contact Matthew Regan at the address listed above, by phone at 716-949-9131, or email at mregan@tighebond.com.

Very truly yours,

TIGHE & BOND, INC.



Matthew Regan
Project Environmental Scientist

Attachment A – Figures and Project Drawings

Figure 1 – Site Location Map

Figure 2 – Aerial Imagery

Site Plans

Attachment B – IPaC Official Species List and Determination Key Results

IPaC Official Species List

Northern Long-Eared Bat Rangewide Determination Key Result

Northeast Species Determination Key Result

Attachment C – Site Photographs

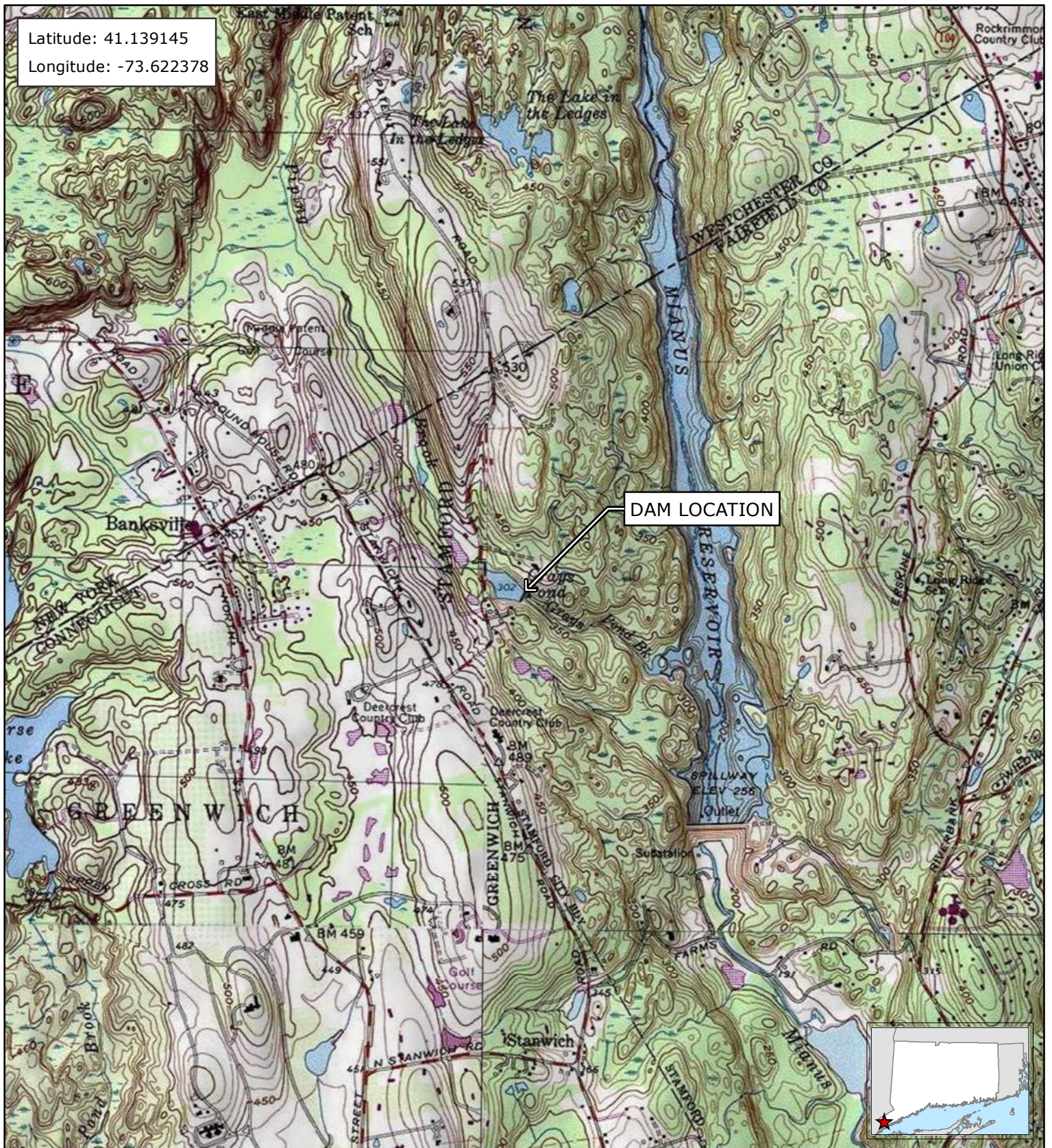
Attachment D – Species Determination Table

Attachment A

Figures

Project Drawings

Latitude: 41.139145
Longitude: -73.622378

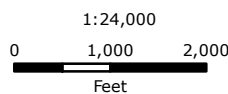


**FIGURE 1
SITE LOCATION MAP**

Brush Dam - CT13504
Aquarion Water Company
Stamford, Connecticut



Based on USGS Topographic Map for
Pound Ridge, NY [Site Quad]
Stamford, CT,
Glenville, NY,
Mount Kisco, NY.
Contour Interval Equals 10ft..
Circles indicate 500-foot and half-mile radii



March 2023



SUBJECT PROPERTY

EAST MIDDLEPATENT RD

CHERRY HILL RD



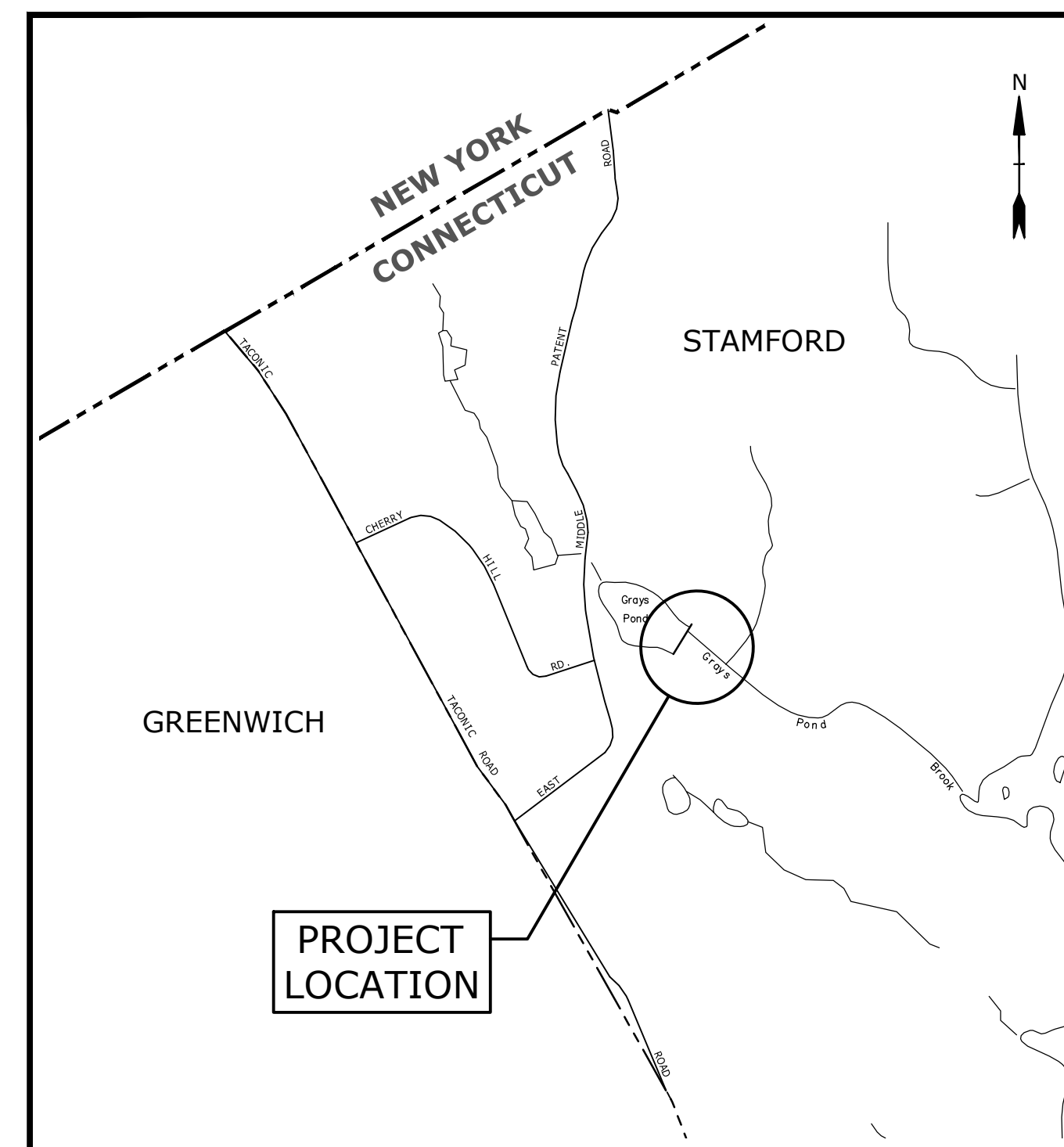
FIGURE 2
AERIAL IMAGERY
Brush Dam - CT13504
Aqurion Water Company
Stamford, Connecticut



BRUSH RESERVOIR DAM IMPROVEMENTS STAMFORD, CONNECTICUT

MAY 2023

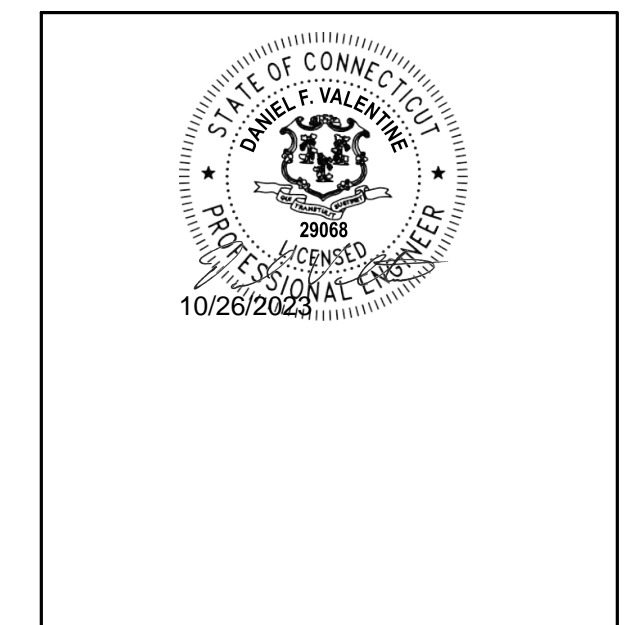
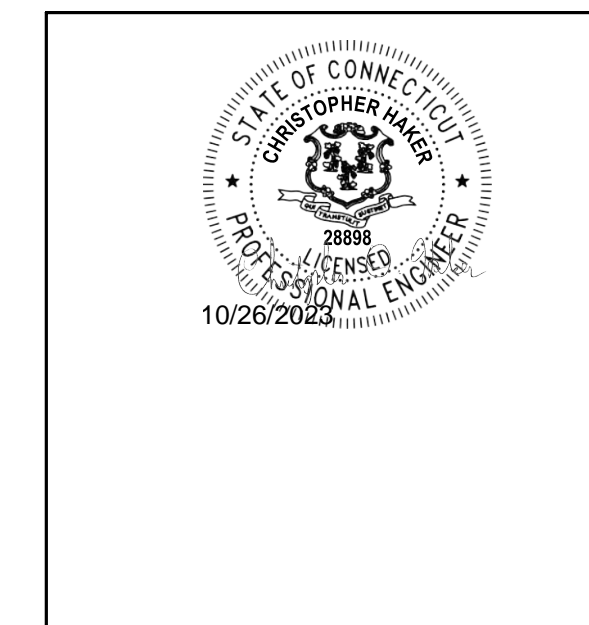
LIST OF DRAWINGS		
SHEET NO.	DRAWING NO.	DRAWING TITLE
GENERAL		
1	G-001	COVER SHEET AND LIST OF DRAWINGS
2	G-002	LEGEND AND ABBREVIATIONS
3	G-003	GENERAL NOTES
4	G-004	EXISTING CONDITIONS SITE PLAN
DEMOLITION		
5	D-101	SITE DEMOLITION AND EROSION CONTROL
CIVIL		
6	C-101	SITE PLAN
7	C-102	LANDSCAPE PLAN
8	C-201	DAM AND TRAINING WALL PROFILES
9	C-301	DAM SECTION
10	C-401	SITE DETAILS
STRUCTURAL		
11	S-001	STRUCTURAL NOTES
12	S-101	STRUCTURAL PLAN AND UPSTREAM ELEVATION
13	S-102	STRUCTURAL SECTIONS AND DETAILS - 1
14	S-103	STRUCTURAL SECTIONS AND DETAILS - 2
15	S-104	STRUCTURAL SECTIONS AND DETAILS - 3



LOCATION MAP
SCALE: 1" = 1000'

PREPARED BY:

Tighe & Bond



PREPARED FOR:

AQUARION WATER COMPANY

COMPLETE SET 15 SHEETS

GENERAL NOTES:

- 1. THE EXISTING TOPOGRAPHY WAS TAKEN FROM "TOPOGRAPHIC SURVEY OF BRUSH DAM AT GRAY'S POND" PREPARED BY D'ANDREA SURVEYING AND ENGINEERING, P.C. DATED MAY 26, 2022. THE HORIZONTAL DATUM REFERENCES THE CONNECTICUT COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83). THE VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAD88).
- 2. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT. TOPOGRAPHY BEYOND LIMITS OF THE "TOPOGRAPHIC SURVEY OF BRUSH DAM AT GRAY'S POND" SURVEY WAS IMPORTED FROM THE CONNECTICUT ENVIRONMENTAL CONDITIONS ONLINE (CT ECO) LIDAR.
- 3. WETLAND RESOURCE AREAS WERE DELINEATED BY TIGHE & BOND ON JUNE 6, 2022.
- 4. BOLD TEXT AND LINES INDICATE PROPOSED WORK. LIGHT TEXT AND LINES INDICATE APPROXIMATE EXISTING CONDITIONS
- 5. THE TERM "DEMOLISH" USED ON THE DRAWINGS MEANS TO REMOVE AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
- 6. THE TERM "ABANDON" USED ON THE DRAWINGS MEANS TO LEAVE IN PLACE AND TAKE APPROPRIATE MEASURES TO DECOMMISSION AS SPECIFIED OR NOTED ON THE DRAWINGS.
- 7. TIGHE & BOND ASSUMES NO RESPONSIBILITY FOR ANY ISSUES, LEGAL OR OTHERWISE, RESULTING FROM CHANGES MADE TO THESE DRAWINGS WITHOUT WRITTEN AUTHORIZATION FROM TIGHE & BOND.
- 8. THE CONTRACTOR IS RESPONSIBLE FOR SITE SAFETY, COORDINATION WITH THE OWNER, COORDINATION WITH ALL SUBCONTRACTORS, COORDINATION WITH OTHER CONTRACTORS WORKING WITHIN THE LIMITS OF THE WORK, AND THE MEANS AND METHODS OF CONSTRUCTING THE PROPOSED WORK.
- 9. REMOVE AND DISPOSE OF ALL CONSTRUCTION-RELATED WASTE MATERIALS AND DEBRIS IN STRICT ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL LAWS.
- 10. ANY EXISTING WORK OR PROPERTY DAMAGED OR DISRUPTED BY CONSTRUCTION/DEMOLITION ACTIVITIES SHALL BE REPLACED OR REPAIRED TO MATCH EXISTING CONDITIONS BY CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- 11. ALL PROPOSED WORK MAY BE ADJUSTED IN THE FIELD BY THE OWNER'S PROJECT REPRESENTATIVE TO MEET EXISTING CONDITIONS.
- 12. A RESERVOIR DRAWDOWN WILL BE PERFORMED BY THE OWNER. REFER TO SECTION 01310 REGARDING THE ANTICIPATED DRAWDOWN.
- 13. THIS PROJECT IS BEING PERFORMED AT AN ACTIVE DRINKING WATER SUPPLY RESERVOIR. CONSTRUCTION MUST FOLLOW A SPECIFIC SEQUENCE AND CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT RESERVOIR WATER QUALITY AND ALLOW OWNER TO MAINTAIN CONTINUOUS OPERATIONS DURING CONSTRUCTION.

EROSION AND SEDIMENTATION CONTROL NOTES:

- 1. TEMPORARY SEDIMENT AND EROSION CONTROL BY THE CONTRACTOR SHALL BE PERFORMED IN ACCORDANCE WITH CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, PROJECT SPECIFICATIONS, AND PERMIT REQUIREMENTS.
- 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES NECESSARY TO EXECUTE AND COMPLETE THE WORK OF THE CONTRACT, IN COMPLIANCE WITH THE TERMS AND CONDITIONS CONTAINED IN THE CONTRACT AND PROJECT PERMITS. CONTROLS SHOWN ON THE CONTRACT DRAWINGS AND MENTIONED IN THE TECHNICAL SPECIFICATIONS SHALL BE CONSIDERED MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL EMPLOY WHATEVER SUPPLEMENTARY MEASURES NECESSARY TO PROTECT WETLANDS, WATERS, AND ADJACENT AREAS FROM DISTURBANCE OR DISCHARGE OF SEDIMENTS.
- 3. EROSION CONTROL BARRIERS ARE TO BE PLACED TO TRAP SEDIMENT TRANSPORTED BY RUNOFF BEFORE IT REACHES THE DRAINAGE FEATURES, WATERBODIES, OR WETLANDS, IN ADDITION TO AREAS WHERE HIGH RUNOFF VELOCITIES OR HIGH SEDIMENT LOADS ARE EXPECTED. THE BARRIERS ARE REPLACED AS DETERMINED BY PERIODIC FIELD INSPECTIONS OR AT THE DIRECTION OF THE ENGINEER.
- 4. TEMPORARY COFFERDAMS MAY BE INSTALLED BY THE CONTRACTOR TO ACCOMMODATE PORTIONS OF CONSTRUCTION AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH APPLICABLE PERMITS AND REGULATIONS.
- 5. EROSION AND SEDIMENTATION CONTROLS BARRIERS SHALL BE INSTALLED PER DETAILS PROVIDED ON SHEET C-401.
- 6. EROSION CONTROL BARRIERS SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING ACTIVITIES. LOCATION OF EROSION CONTROL BARRIERS TO BE ADJUSTED UPON COMPLETION OF CLEARING AND GRUBBING BUT PRIOR TO COMMENCEMENT OF GRADING ACTIVITIES.
- 7. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE MAINTAINED IN GOOD CONDITION AND IN PROPER WORKING ORDER. NECESSARY REPAIRS SHALL BE MADE IMMEDIATELY.
- 8. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE PROPERLY DISPOSED OFF-SITE UPON COMPLETION OF WORK, SITE STABILIZATION AND/OR AUTHORIZATION FROM THE OWNER.
- 9. WHEN NECESSARY, OR AS INDICATED IN THE SPECIFICATIONS ON GRASS COVERED SLOPES 3 HORIZONTAL TO 1 VERTICAL (3H:1V) OR STEEPER, TEMPORARY SLOPE PROTECTION SHALL BE PROVIDED BY INSTALLING EROSION CONTROL BLANKETS. IF ADDITIONAL STABILIZATION IS NEEDED, THE CONTRACTOR SHALL INSTALL EROSION CONTROL BARRIERS AT THE TOE OF THE SLOPE.
- 10. IN THE EVENT THAT DISTURBED AREAS AT THE SITE ARE TO BE LEFT UN-WORKED FOR MORE THAN 14 DAYS, THE AREAS SHALL BE MULCHED WITH STRAW AT A RATE OF 100 LBS. PER 1,000 S.F. TO HELP CONTROL EROSION. TWO INCHES OF WOOD CHIP MULCH MAY ALSO BE USED AS TEMPORARY COVER.
- 11. IN THE EVENT THAT DISTURBED AREAS AT THE SITE ARE TO BE LEFT UN-WORKED FOR MORE THAN ONE MONTH, THE AREAS SHALL BE TOPSOILED AND SEEDED PER THE SPECIFICATIONS AND AT NO ADDITIONAL COST TO THE OWNER.
- 12. COFFERDAMS SHALL BE INSTALLED IN PHASES AS INDICATED ON THE CONTRACT DRAWINGS. ALL COFFERDAMS SHALL CONSIST OF NON-ERODIBLE MATERIAL.

CONSTRUCTION IN WETLANDS:

- 1. DURING PREPARATION OF WETLAND AREAS AFTER COMPLETION OF CLEARING AND GRUBBING, WETLAND BLOCKS AND/OR ORGANIC TOPSOIL THAT IS FREE OF INVASIVE PLANT SPECIES SHALL BE REMOVED AND SEGREGATED ON SITE FOR REUSE IN THE IN-SITU WETLAND RESTORATION. IF ADDITIONAL TOPSOIL IS REQUIRED, SUCH SHALL CONSIST OF A MIXTURE OF EQUAL VOLUMES OF CLEAN, WEED AND SEED FREE ORGANIC AND MINERAL MATERIALS. WELL-DECOMPOSED CLEAN LEAF COMPOST IS THE PREFERRED SOIL AMENDMENT TO ACHIEVE THE ORGANIC STANDARD. SUPPLEMENTAL TOPSOIL IN WETLAND REPLACEMENT AREAS SHALL HAVE A MINIMUM ORGANIC CARBON CONTENT OF 4-12% (7 TO 21 PERCENT ORGANIC MATTER) ON A DRY WEIGHT BASIS.
- 2. UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED WETLAND AREAS SHALL BE RESTORED IN ACCORDANCE WITH SECTION 02922 WITH A WETLAND SEED MIX CONTAINING ONLY PLANT SPECIES NATIVE TO NEW ENGLAND WHICH SHALL NOT CONTAIN ANY SPECIES LISTED IN THE "INVASIVE AND OTHER UNACCEPTABLE PLANT SPECIES" APPENDIX K IN THE "NEW ENGLAND DISTRICT COMPENSATORY MITIGATION STANDARD OPERATING PROCEDURES" FOUND AT: <https://www.nae.usace.army.mil/Portals/74/docs/regulatory/Mitigation/Compensatory-Mitigation-SOP-2020.pdf?ver=EWhCrK70ZfmPr-8x0K5jg%3D%3D>

BEST MANAGEMENT PRACTICES:

INSPECTION AND MAINTENANCE

- SEDIMENT AND EROSION CONTROLS AND BMPS SHALL BE INSTALLED PRIOR TO COMMENCING CONSTRUCTION AT THE SITE. NO WORK WHICH SHALL DISTURB THE SITE OR CREATE THE POTENTIAL FOR SEDIMENT RELEASE SHALL COMMENCE UNTIL THE SEDIMENT AND EROSION CONTROLS HAVE BEEN INSPECTED AND APPROVED BY THE ENGINEER. ALL CONTROLS AND BMPS WERE SUBJECT TO INSPECTION BY THE OWNER, THEIR REPRESENTATIVE, AND REGULATORY AGENCIES AT ANYTIME THEREAFTER.
- PERIODIC INSPECTION, MAINTENANCE, AND CLEANING OF TEMPORARY EROSION OF SEDIMENT CONTROL MEASURES AND BEST MANAGEMENT PRACTICES (BMPS) WERE REQUIRED. ALL CONTROLS AND BMPS SHALL BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF RAINFALL EVENTS OF 0.5 INCHES OR GREATER. ROUTINE INSPECTION AND MAINTENANCE WILL REDUCE THE CHANCE OF POLLUTING STORMWATER BY FINDING AND CORRECTING PROBLEMS BEFORE THE NEXT RAIN EVENT. THE FOCUS OF THE INSPECTION WILL BE TO DETERMINE: 1) WHETHER OR NOT THE MEASURE WAS INSTALLED / PERFORMED CORRECTLY; 2) WHETHER OR NOT THERE HAS BEEN ANY DAMAGE TO THE MEASURE SINCE IT WAS INSTALLED OR PERFORMED; AND 3) WHAT SHOULD BE DONE TO CORRECT ANY PROBLEMS WITH THE MEASURE. EACH MEASURE IS TO BE OBSERVED TO DETERMINE IF IT IS STILL EFFECTIVE. IN SOME CASES, SPECIFIC MEASUREMENTS MAY BE TAKEN TO DETERMINE IF MAINTENANCE OF THE MEASURES IS REQUIRED.

SITE MANAGER

- PRIOR TO CONSTRUCTION, A SITE MANAGER WILL BE DESIGNATED BY THE CONTRACTOR TO BE RESPONSIBLE FOR INSTALLATION, MONITORING, INSPECTION, AND CORRECTION OF EROSION AND SEDIMENT CONTROL MEASURES.

CONSTRUCTION SITE ENTRANCE

- TO REDUCE THE TRACKING OF SEDIMENT FROM THE CONSTRUCTION SITE ONTO OTHER AREAS OF THE PROPERTY AND/OR PUBLIC ROADS, AS WELL AS THE PRODUCTION OF AIRBORNE DUST, A STABILIZED CONSTRUCTION ENTRANCE IS TO BE ESTABLISHED AND AT ANY ADDITIONAL AUTHORIZED PERMANENT CONSTRUCTION STAGING AREA.
- THE ENTRANCE IS TO CONSIST OF A 6-INCH THICK PAD OF CRUSHED STONE UNDERLAIN WITH FILTER FABRIC OR A BITUMINOUS CONCRETE APRON. IT IS TO BE REMOVED AND THE AREA RESTORED FOLLOWING CONSTRUCTION.

SITE CLEARING

- DURING SITE CLEARING, EXISTING VEGETATION WITHIN THE OVERALL LIMITS OF CLEARING AND GRUBBING SHALL BE CLEARED AND REMOVED, EXCEPT AS OTHERWISE DIRECTED. THIS INCLUDES ALL VEGETATION ON THE DAM EMBANKMENT AND WITHIN 25 FEET OF THE PROPOSED DAM EMBANKMENT EXTENTS.
- PRIOR TO ANY SITE CLEARING ACTIVITIES, SEDIMENT CONTROL BARRIERS SHALL BE PLACED ALONG THE OUTER LIMIT OF DISTURBANCE.
- CLEARING IS TO BE LIMITED TO THOSE AREAS OF PROPOSED WORK. DISTURBED AREAS ARE TO BE KEPT TO A MINIMUM. NO TREE WITH A BREAST HEIGHT DIAMETER OF GREATER THAN 6 INCHES SHALL BE CLEARED FROM AREAS OUTSIDE THE LIMITS OF CLEARING AND GRUBBING WITHOUT PRIOR APPROVAL FROM THE OWNER.

EROSION CONTROL BARRIERS

- COMPOST WATTLE BARRIERS ARE TO BE PLACED TO TRAP SEDIMENT TRANSPORTED BY RUNOFF BEFORE IT REACHES THE DRAINAGE FEATURES, WATERBODIES, OR WETLANDS, IN ADDITION TO AREAS WHERE HIGH RUNOFF VELOCITIES OR HIGH SEDIMENT LOADS ARE EXPECTED. THE COMPOST WATTLES SHALL BE REPLACED AS DETERMINED BY PERIODIC FIELD INSPECTIONS.

DUST CONTROL

- STANDARD DUST CONTROL MEASURES, INCLUDING SPRAYING AND MISTING SHALL BE USED AS NECESSARY. CALCIUM CHLORIDE SHALL NOT BE ALLOWED ON THIS PROJECT.

STAGING AREAS

- THE CONTRACTOR SHALL COORDINATE LAYDOWN STAGING AREAS IN WHICH TO STORE EQUIPMENT AND MATERIALS WITH THE OWNER.
- STAGING AREAS SHALL BE SURROUNDED WITH COMPOST WATTLE EROSION BARRIERS ON THE DOWN HILL SIDE.
- DURING AND AFTER CONSTRUCTION, ALL PAVED ROAD AND DRIVEWAY SURFACES SHALL BE SCRAPED AND BROOMED FREE OF EXCAVATED MATERIALS ON A DAILY BASIS, UNLESS APPROVED BY THE OWNER.

STOCKPILED MATERIALS

- STOCKPILES OF SOIL CREATED DURING CONSTRUCTION ACTIVITIES ARE TO BE SURROUNDED WITH EROSION CONTROL BARRIER AROUND THE PERIMETER OF THE STOCKPILE. STOCKPILES OF ERODIBLE MATERIAL ARE TO BE COVERED PRIOR TO INCLEMENT WEATHER WITH A MINIMUM OF 20 MIL POLYETHYLENE SHEETING. STOCKPILES LEFT UNDISTURBED LONGER THAN 14 DAYS SHALL BE SEEDED OR COVERED.

EQUIPMENT FUELING

- EQUIPMENT FUELING AND OTHER ACTIVITIES INVOLVING PETROLEUM, OIL, OR OTHER POTENTIALLY HAZARDOUS SUBSTANCES ARE TO BE PERFORMED AT PRE-APPROVED, DESIGNATED AREAS WITH APPROPRIATE SPILL PREVENTION AND CONTROL MEASURES. PORTABLE SECONDARY CONTAINMENT IS TO BE USED, AND SORBENT MATERIALS ARE TO BE PLACED AROUND THE PERIMETER OF THE FUELING AREA.

CONSTRUCTION DEWATERING

- CONSTRUCTION DEWATERING SHALL BE REQUIRED DURING PORTIONS OF CONSTRUCTION WHICH REQUIRED EXCAVATION OR OTHER ACTIVITIES WHERE GROUNDWATER INTERFERED WITH THE WORK. CONSTRUCTION DEWATERING DISCHARGE TO A SURFACE WATER BODY SHALL BE PRE-TREATED FOR SEDIMENT REMOVAL BY PASSING THROUGH AN APPROPRIATELY SIZED FILTER SOCK, SILT BAG, FRACTIONATION / SEDIMENTATION TANK, OR SEDIMENT TRAP PRIOR TO DISCHARGE, AS NECESSARY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING DEWATERING TECHNIQUES AND MAINTAINING DEWATERING PROCEDURES THROUGHOUT THE DURATION OF THE PROJECT.

OUTLET PROTECTION

- APPROPRIATE OUTLET PROTECTION, CONSISTING OF RIPRAP CHANNEL LINING, A LEVEL SPREADER, OR OTHER SUCH MEASURE SHALL BE PROVIDED AT THE OUTLET OF ANY DEWATERING CONDUIT OR STORMWATER CULVERT OR CHANNEL OUTFALL TO REDUCE VELOCITIES AND ENHANCE SEDIMENTATION PRIOR TO DISCHARGE.

SURFACE WATER CONTROL

- FLOW THROUGH A PORTION OF SPILLWAY AND/OR THE PROPOSED OUTLET STRUCTURE AT ALL TIMES, THE IMPOUNDMENT MAY BE DRAWN DOWN TO ACCOMMODATE THE WORK. THE CONTRACTOR SHALL SUBMIT A WATER CONTROL PLAN THAT ADDRESSED EMERGENCY MEASURES TO IMPLEMENT IN THE EVENT A STORM OCCURS DURING CONSTRUCTION.
- DRAWDOWN LIMITATIONS INCLUDE:
 - MAXIMUM DRAWDOWN (ELEVATION 341' MIN.)
 - LIMITED OUTFLOW TO ___ CFS WHILE REDUCING WATER LEVEL.
 - MAINTAINED OUTFLOW AT ___ CFS MINIMUM DURING REFILL.

TURBIDITY MONITORING AND CONTROL

- IF TURBIDITY LEVELS ARE UNACCEPTABLE AS JUDGED BY THE OWNER, ENGINEER, OR REGULATORY AGENCY, ADDITIONAL MEASURES SHALL BE IMPLEMENTED AT NO EXPENSE TO THE OWNER.

DRAW-DOWN DISCHARGE PROTECTION

- CONTRACTOR SHALL VISUALLY MONITOR DISCHARGE ON A REGULAR BASIS DURING DRAW-DOWN LOOKING FOR DISCOLORED WATER LEAVING THE PROJECT SITE. IF DISCOLORED WATER LEAVING THE PROJECT SITE LASTS LONGER THAN TWO HOURS, THE CONTRACTOR SHALL PERFORM INCIDENT MONITORING AT THEIR OWN EXPENSE IN ACCORDANCE WITH THE APPLICABLE PERMIT REQUIREMENTS, INCLUDING BUT NOT LIMITED TO:
 - RECORD TURBIDITY LEVELS WITH A TURBIDITY METER THREE TIMES PER DAY BETWEEN SUNRISE AND SUNSET, AT AN INTERVAL OF FOUR TO SIX HOURS, UNTIL THE TURBIDITY PLUME IS NO LONGER OBSERVED.

LIMITS OF WORK

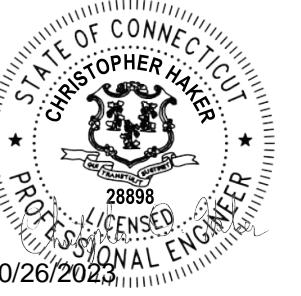
- THE CONTRACTOR SHALL LINE THE UPGRADIENT BOUNDARY OF WORK AREAS WITH ORANGE SAFETY FENCING BEFORE THE START OF SITE CLEARING ACTIVITIES.

TEMPORARY STABILIZATION

- WHEN NECESSARY, TEMPORARY SLOPE PROTECTION SHALL BE PROVIDED BY INSTALLING SEDIMENT TRAP BARRIERS AT THE TOE OF FILLS OR CUT SLOPES. IF ADDITIONAL STABILIZATION IS NEEDED, THEN THE CONTRACTOR SHALL INSTALL MULCH LOGS, AND MATTING, SUCH AS STRAW, JUTE, WOOD FIBER, OR BIODEGRADABLE MESH. A TACKIFIER SHALL BE USED ON LOOSE MATERIALS USED FOR TEMPORARY EROSION CONTROL.
- IN THE EVENT THAT DISTURBED AREAS AT THE SITE ARE LEFT UN-WORKED FOR MORE THAN TWO WEEKS, THE AREAS SHALL BE MULCHED WITH STRAW AT A RATE OF 100 LBS. PER 1,000 S.F. TO HELP CONTROL EROSION. 100% BIODEGRADABLE EROSION CONTROL BLANKETS OR TWO INCHES OF WOOD CHIP MULCH SHALL BE USED AS TEMPORARY COVER.
- IN THE EVENT THAT DISTURBED AREAS AT THE SITE ARE LEFT UN-WORKED FOR MORE THAN ONE MONTH, THE AREAS SHALL BE TOPSOILED AND SEEDED PER THE SPECIFICATIONS AND AT NO ADDITIONAL COST TO THE OWNER.
- THE SURFACE OF ALL EXCAVATIONS AND FILLS SHALL BE IN A FIRM AND STABLE CONDITION AT THE END OF EACH DAY. ROLL OR OTHERWISE TREAT THE SURFACE AS NEEDED.

SITE RESTORATION

- STABILIZATION OF DISTURBED AREAS OR NEW SOIL FILLS SHALL BE IMPLEMENTED WITHIN 14 DAYS AFTER GRADING OR CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. APPROPRIATE VEGETATIVE SOIL STABILIZATION IS TO BE USED TO MINIMIZE EROSION. TEMPORARY AND PERMANENT VEGETATIVE COVER IS TO BE ESTABLISHED IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS, USING HYDRO-SEEDING, BROADCASTING, OR OTHER APPROVED TECHNIQUES.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORATION OF PREVIOUSLY VEGETATED UPLAND AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. RESTORATION OF UPLAND AREAS AS SHOWN ON THE DRAWINGS OR WHERE NO OTHER RESTORATION IS SHOWN OR SPECIFIED SHALL CONSIST OF REPLACEMENT OF TOPSOIL OR PLACEMENT OF IMPORTED LOAM AS NEEDED SUCH THAT A MINIMUM OF 4 INCHES OF SUITABLE VEGETATIVE SUPPORT MATERIAL IS PRESENT AND APPROPRIATELY, LIMED, FERTILIZED, GRADED, AND SCARIFIED.
- RESTORED AREAS SHALL BE ROLLED AND THEN APPROPRIATELY MULCHED WITH STRAW, WOOD CHIPS OR OTHER APPROVED WEED-FREE MATERIAL. EROSION CONTROL BLANKET IS ALSO ACCEPTABLE FOR POST-RESTORATION STABILIZATION. ON FLAT SURFACES AND ON SLOPES FLATTER THAN 3H:1V, MULCH OR EROSION CONTROL BLANKET SHALL BE USED AFTER PERMANENT SEEDING TO PROTECT SOIL FROM THE IMPACT OF FALLING RAIN AND TO INCREASE THE CAPACITY OF THE SOIL TO ABSORB WATER. FOR STEEPER SLOPES, EROSION CONTROL BLANKET SHALL BE USED.
- FINAL STABILIZATION SHALL BE CONSIDERED COMPLETE WHEN ALL SOIL-DISTURBING ACTIVITIES HAVE BEEN COMPLETED AND A UNIFORM, PERENNIAL VEGETATIVE COVER WITH A DENSITY OF EIGHTY PERCENT HAS BEEN ESTABLISHED OR EQUIVALENT STABILIZATION MEASURES (SUCH AS THE USE OF MULCHES OR EROSION CONTROL BLANKET) HAVE BEEN EMPLOYED ON ALL UNPAVED AREAS AND AREAS NOT COVERED BY RIPRAP OR PROCESSED GRAVEL.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF ALL VEGETATED SURFACES, INCLUDING WATERING, FERTILIZING, AND RE-SEEDING UNTIL ESTABLISHMENT CONDITIONS ARE MET AND UNTIL THE END OF THE CONTRACTUAL MAINTENANCE PERIOD.
- WOOD CHIP MULCH AND LIME AND FERTILIZATION IS NOT ACCEPTABLE IN RESTORED WETLAND AREAS.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

A	10/23/2023	REV PER CTDEEP COMMENTS
MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195A	
DATE:	05/2023	
FILE:	A1000-195A-G-002-003.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

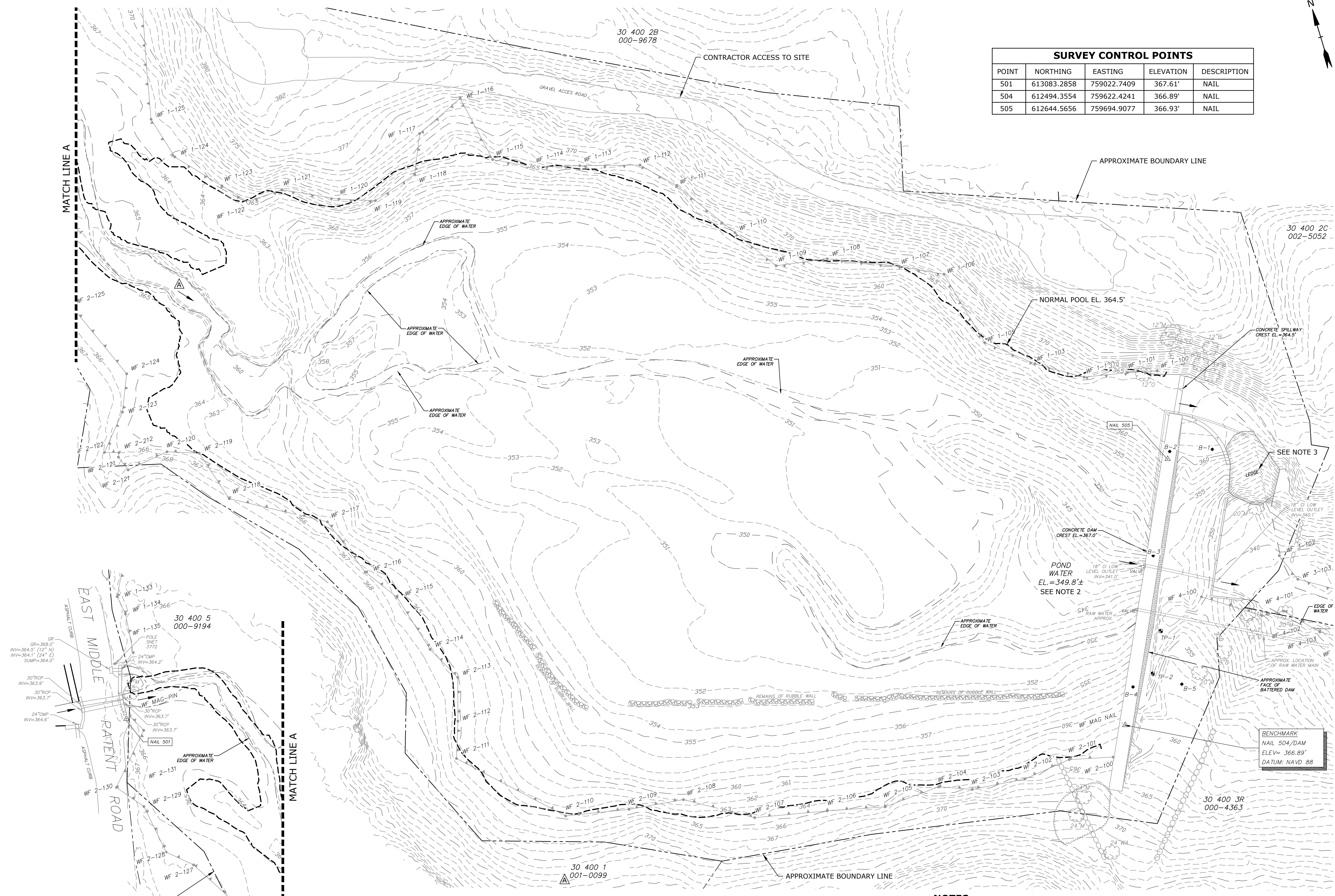
GENERAL NOTES

SCALE: NO SCALE

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Plotted On: Oct 24, 2023 2:20pm
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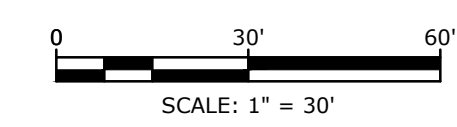


SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	613083.2858	759022.7409	367.61'	NAIL
504	612494.3554	759622.4241	366.89'	NAIL
505	612644.5656	759694.9077	366.93'	NAIL



NOTES

- BOUNDARY LINE SURVEYED BY OTHERS. THIS DRAWING MAKES NO CLAIM TO THE ACCURACY OF THE BOUNDARY SHOWN. BOUNDARY LINES ARE APPROXIMATE AND ARE SHOWN FOR SCHEMATIC PURPOSES ONLY.
- CONTOURS SHOWN BELOW THE POND WATER LINE ON THE DAY OF THE TOPOGRAPHIC SURVEY ON 5-8-22 ARE APPROXIMATE IN NATURE BASED ON AVAILABLE DATA AND SHOULD BE FIELD VERIFIED.
- CONTOURS SHOWN ON THE LEDGE ARE INTERPOLATED BASED ON ELEVATIONS AT THE BORDER AND SHOULD BE FIELD VERIFIED.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	REV PER CTDEEP COMMENTS
A	10/23/2023	REV PER CTDEEP COMMENTS

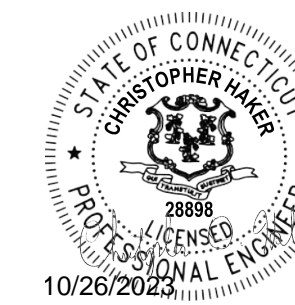
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DATE:	05/2023
FILE:	A1000-195A-G-004.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	RS/DFV
APPROVED BY:	CDH

EXISTING CONDITIONS SITE PLAN

SCALE: 1" = 30'

G-004

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 User: rsinclair
 Plotter: HP DesignJet T1100e
 Plot Style: acad.ctb
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 Sheet: 1 of 1
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NOTE:
SEE SPEC SECTION 02200 SITE PREPARATION FOR CLEARING AND GRUBBING DETAILS.

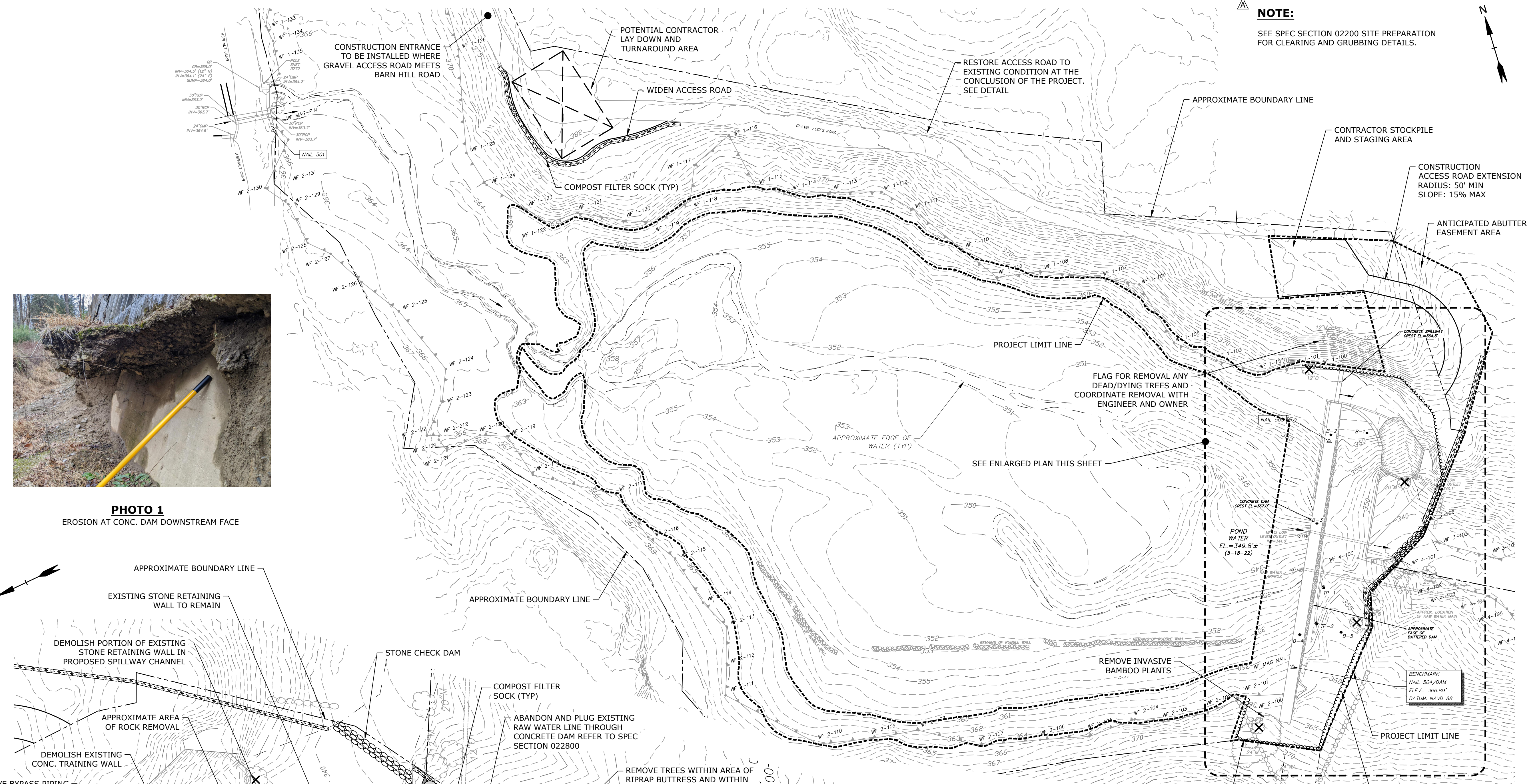
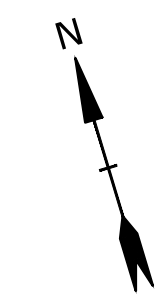
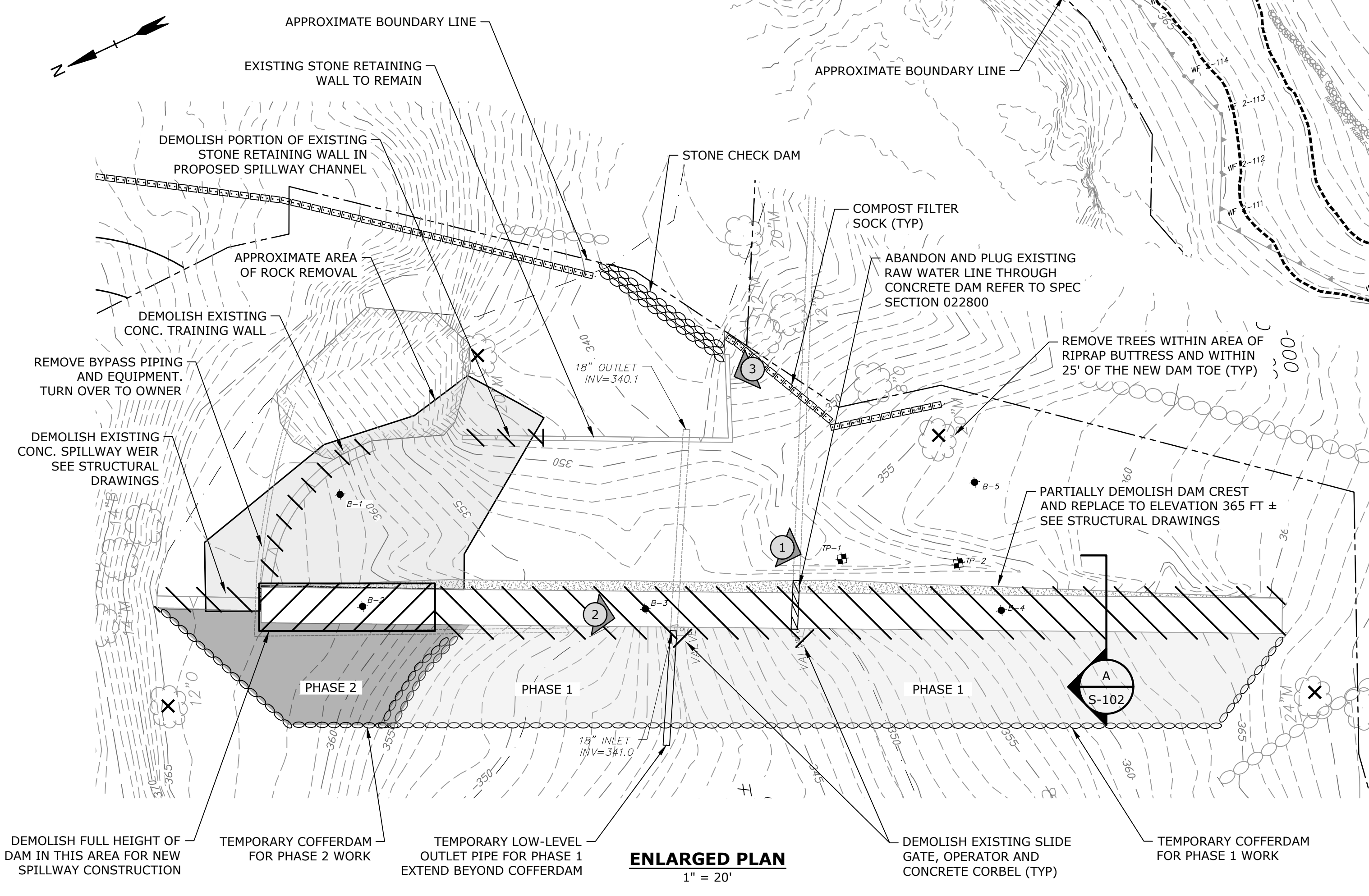


PHOTO 1
EROSION AT CONC. DAM DOWNSTREAM FACE



PLAN
1" = 40'

CLEAR AND GRUB TREES, STUMPS, AND BRUSH WITHIN 25' OF DAM. BACKFILL VOIDS WITH COMPACTED GRAVEL BORROW (TYP)

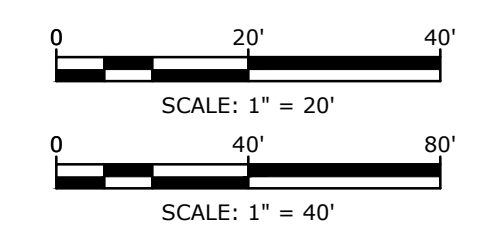
CLEAR AND GRUB TREES, STUMPS, AND BRUSH WITHIN AREA OF RIPRAP BUTTRESS AND WITHIN 25' OF THE NEW DAM TOE (TYP)



PHOTO 2
LOW-LEVEL OUTLET GATE OPERATOR



PHOTO 3
LOW-LEVEL OUTLET PIPE



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

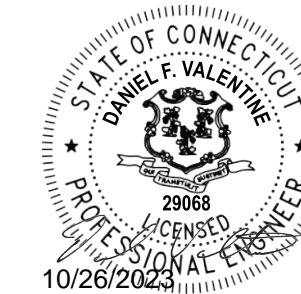
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A	10/23/2023	REV PER CTDEEP COMMENTS	

PROJECT NO: A-1000-195A
DATE: 05/2023
FILE: A1000-195A-D-101.dwg
DRAWN BY: MJC
DESIGNED/CHECKED BY: RS/DFV
APPROVED BY: CDH

SITE DEMOLITION AND EROSION CONTROL

SCALE: AS SHOWN

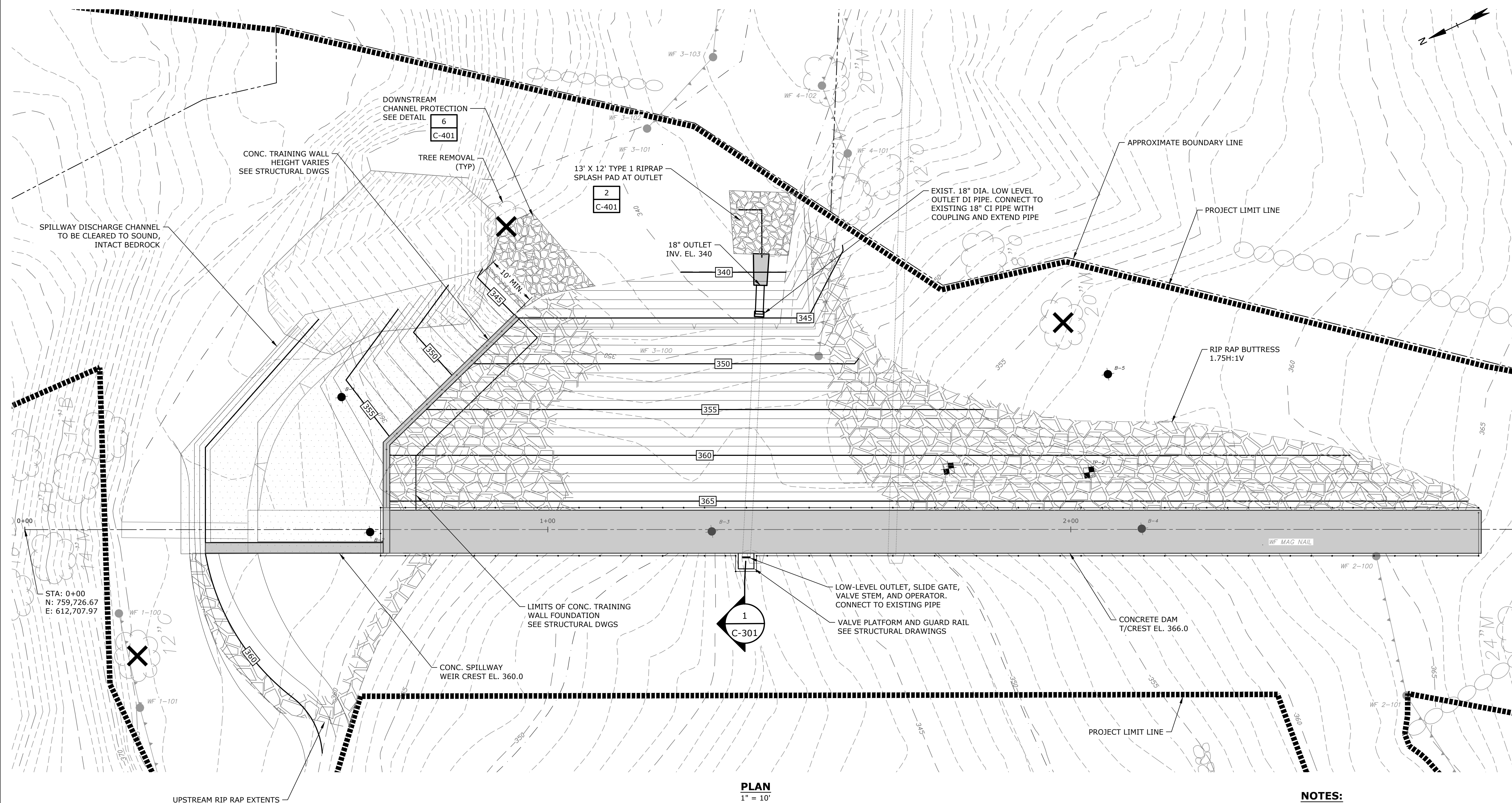
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Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut



STA: 0+00
N: 759,726.67
E: 612,707.97

PLAN
1" = 10'

- NOTES:**
- SEE SHEET C-201 FOR PROFILE VIEWS.
 - RESTORE DOWNSTREAM CHANNEL DISTURBED BY CONSTRUCTION PER DETAIL.
 - EROSION AND SEDIMENTATION CONTROLS NOT SHOWN FOR CLARITY.

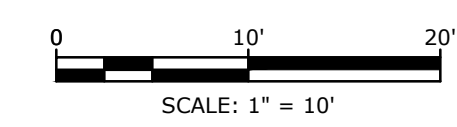
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DATE: 05/2023
FILE: A1000-195A-C-101.dwg
DRAWN BY: MJC
DESIGNED/CHECKED BY: RS/DFV
APPROVED BY: CDH

SITE PLAN

SCALE: 1" = 10'

C-101



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Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

A-1000-195A

05/2023

A1000-195-G-BORD.dwg

MJP

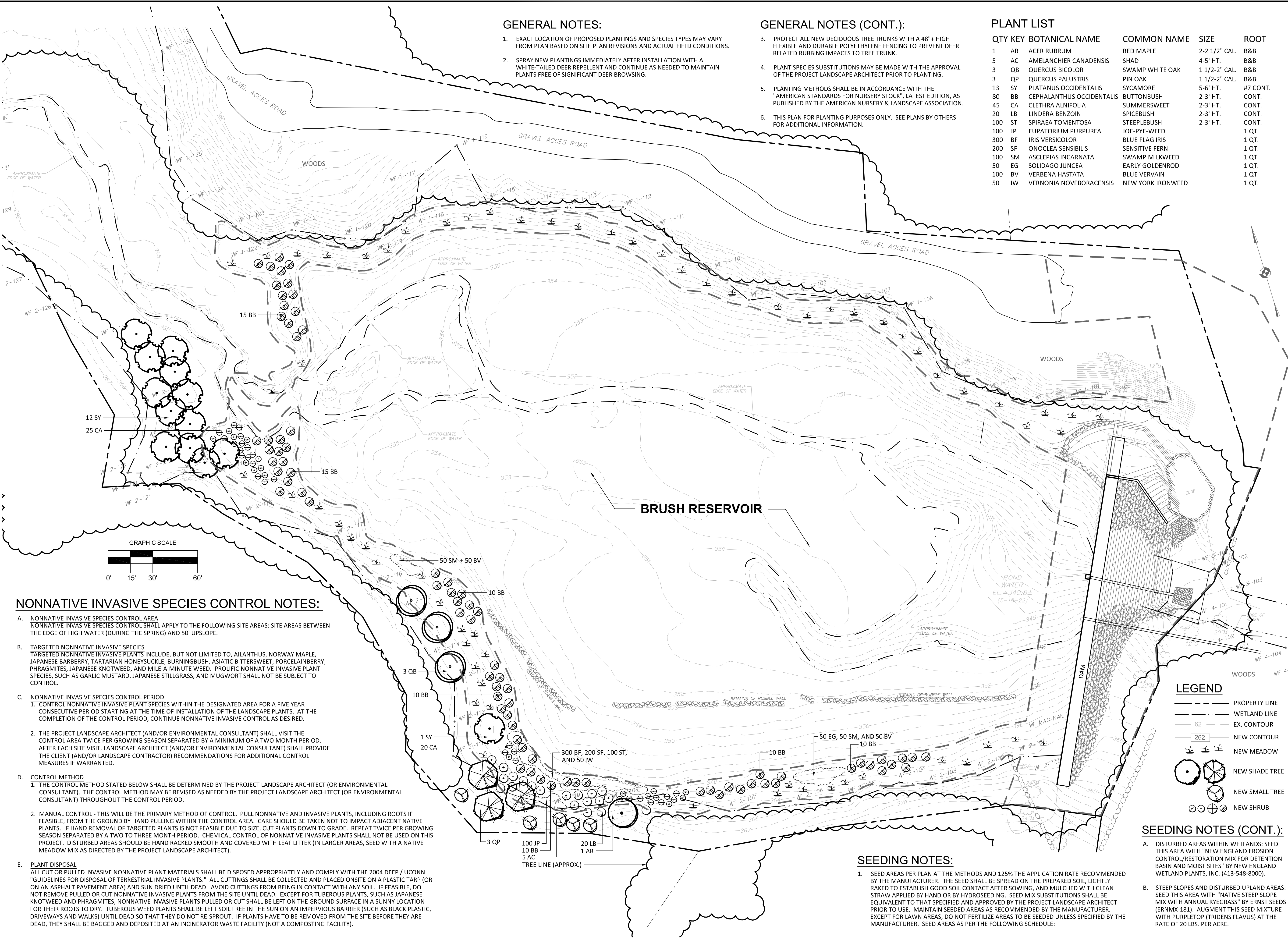
MJP

MJP

LANDSCAPE PLAN

SCALE: 1"=30'

C-102



GENERAL NOTES:

1. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM PLAN BASED ON SITE PLAN REVISIONS AND ACTUAL FIELD CONDITIONS.
2. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING.

GENERAL NOTES (CONT.):

3. PROTECT ALL NEW DECIDUOUS TREE TRUNKS WITH A 48" x HIGH FLEXIBLE AND DURABLE POLYETHYLENE FENCING TO PREVENT DEER RELATED RUBBING IMPACTS TO TREE TRUNK.
4. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING.
5. PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
6. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT
1	AR	ACER RUBRUM	RED MAPLE	2-2 1/2" CAL.	B&B
5	AC	AMELANCHIER CANADENSIS	SHAD	4-5' HT.	B&B
3	QB	QUERCUS BICOLOR	SWAMP WHITE OAK	1 1/2-2" CAL.	B&B
3	QP	QUERCUS PALUSTRIS	PIN OAK	1 1/2-2" CAL.	B&B
13	SY	PLATANUS OCCIDENTALIS	SYCAMORE	5-6' HT.	#7 CONT.
80	BB	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	2-3' HT.	CONT.
45	CA	CLETHRA ALNIFOLIA	SUMMERSWEET	2-3' HT.	CONT.
20	LB	LINDERA BENZOIN	SPICEBUSH	2-3' HT.	CONT.
100	ST	SPIRAEA TOMENTOSA	STEEPLEBUSH	2-3' HT.	CONT.
100	JP	EUPATORIUM PURPUREA	JOE-PYE-WEED		1 QT.
300	BF	IRIS VERSICOLOR	BLUE FLAG IRIS		1 QT.
200	SF	ONOCLEA SENSIBILIS	SENSITIVE FERN		1 QT.
100	SM	ASCLEPIAS INCARNATA	SWAMP MILKWEED		1 QT.
50	EG	SOLIDAGO JUNCEA	EARLY GOLDENROD		1 QT.
100	BV	VERBENA HASTATA	BLUE VERVAIN		1 QT.
50	IW	VERNONIA NOVEBORACENSIS	NEW YORK IRONWEED		1 QT.

NONNATIVE INVASIVE SPECIES CONTROL NOTES:

- NONNATIVE INVASIVE SPECIES CONTROL AREA**
NONNATIVE INVASIVE SPECIES CONTROL SHALL APPLY TO THE FOLLOWING SITE AREAS: SITE AREAS BETWEEN THE EDGE OF HIGH WATER (DURING THE SPRING) AND 50' UPSLOPE.
- TARGETED NONNATIVE INVASIVE SPECIES**
TARGETED NONNATIVE INVASIVE PLANTS INCLUDE, BUT NOT LIMITED TO, AILANTHUS, NORWAY MAPLE, JAPANESE BARBERRY, TARTARIAN HONEYSUCKLE, BURNINGBUSH, ASIATIC BITTERSWEET, PORCELAINBERRY, PHRAGMITES, JAPANESE KNOTWEED, AND MILE-A-MINUTE WEED. PROLIFIC NONNATIVE INVASIVE PLANT SPECIES, SUCH AS GARLIC MUSTARD, JAPANESE STILLGRASS, AND MUGWORT SHALL NOT BE SUBJECT TO CONTROL.
- NONNATIVE INVASIVE SPECIES CONTROL PERIOD**
 1. CONTROL NONNATIVE INVASIVE PLANT SPECIES WITHIN THE DESIGNATED AREA FOR A FIVE YEAR CONSECUTIVE PERIOD STARTING AT THE TIME OF INSTALLATION OF THE LANDSCAPE PLANTS. AT THE COMPLETION OF THE CONTROL PERIOD, CONTINUE NONNATIVE INVASIVE CONTROL AS DESIRED.
 2. THE PROJECT LANDSCAPE ARCHITECT (AND/OR ENVIRONMENTAL CONSULTANT) SHALL VISIT THE CONTROL AREA TWICE PER GROWING SEASON SEPARATED BY A MINIMUM OF A TWO MONTH PERIOD. AFTER EACH SITE VISIT, LANDSCAPE ARCHITECT (AND/OR ENVIRONMENTAL CONSULTANT) SHALL PROVIDE THE CLIENT (AND/OR LANDSCAPE CONTRACTOR) RECOMMENDATIONS FOR ADDITIONAL CONTROL MEASURES IF WARRANTED.
- CONTROL METHOD**
 1. THE CONTROL METHOD STATED BELOW SHALL BE DETERMINED BY THE PROJECT LANDSCAPE ARCHITECT (OR ENVIRONMENTAL CONSULTANT). THE CONTROL METHOD MAY BE REVISED AS NEEDED BY THE PROJECT LANDSCAPE ARCHITECT (OR ENVIRONMENTAL CONSULTANT) THROUGHOUT THE CONTROL PERIOD.
 2. MANUAL CONTROL - THIS WILL BE THE PRIMARY METHOD OF CONTROL. PULL NONNATIVE AND INVASIVE PLANTS, INCLUDING ROOTS IF FEASIBLE, FROM THE GROUND BY HAND PULLING WITHIN THE CONTROL AREA. CARE SHOULD BE TAKEN NOT TO IMPACT ADJACENT NATIVE PLANTS. IF HAND REMOVAL OF TARGETED PLANTS IS NOT FEASIBLE DUE TO SIZE, CUT PLANTS DOWN TO GRADE. REPEAT TWICE PER GROWING SEASON SEPARATED BY A TWO TO THREE MONTH PERIOD. CHEMICAL CONTROL OF NONNATIVE INVASIVE PLANTS SHALL NOT BE USED ON THIS PROJECT. DISTURBED AREAS SHOULD BE HAND RACKED SMOOTH AND COVERED WITH LEAF LITTER (IN LARGER AREAS, SEED WITH A NATIVE MEADOW MIX AS DIRECTED BY THE PROJECT LANDSCAPE ARCHITECT).
- PLANT DISPOSAL**
ALL CUT OR PULLED INVASIVE NONNATIVE PLANT MATERIALS SHALL BE DISPOSED APPROPRIATELY AND COMPLY WITH THE 2004 DEEP / UCONN "GUIDELINES FOR DISPOSAL OF TERRESTRIAL INVASIVE PLANTS." ALL CUTTINGS SHALL BE COLLECTED AND PLACED ONSITE ON A PLASTIC TARP (OR ON AN ASPHALT PAVEMENT AREA) AND SUN DRIED UNTIL DEAD. AVOID CUTTINGS FROM BEING IN CONTACT WITH ANY SOIL. IF FEASIBLE, DO NOT REMOVE PULLED OR CUT NONNATIVE INVASIVE PLANTS FROM THE SITE UNTIL DEAD. EXCEPT FOR TUBEROUS PLANTS, SUCH AS JAPANESE KNOTWEED AND PHRAGMITES, NONNATIVE INVASIVE PLANTS PULLED OR CUT SHALL BE LEFT ON THE GROUND SURFACE IN A SUNNY LOCATION FOR THEIR ROOTS TO DRY. TUBEROUS WEED PLANTS SHALL BE LEFT SOIL FREE IN THE SUN ON AN IMPERVIOUS BARRIER (SUCH AS BLACK PLASTIC, DRIVEWAYS AND WALKS) UNTIL DEAD SO THAT THEY DO NOT RE-SPROUT. IF PLANTS HAVE TO BE REMOVED FROM THE SITE BEFORE THEY ARE DEAD, THEY SHALL BE BAGGED AND DEPOSITED AT AN INCINERATOR WASTE FACILITY (NOT A COMPOSTING FACILITY).

SEEDING NOTES:

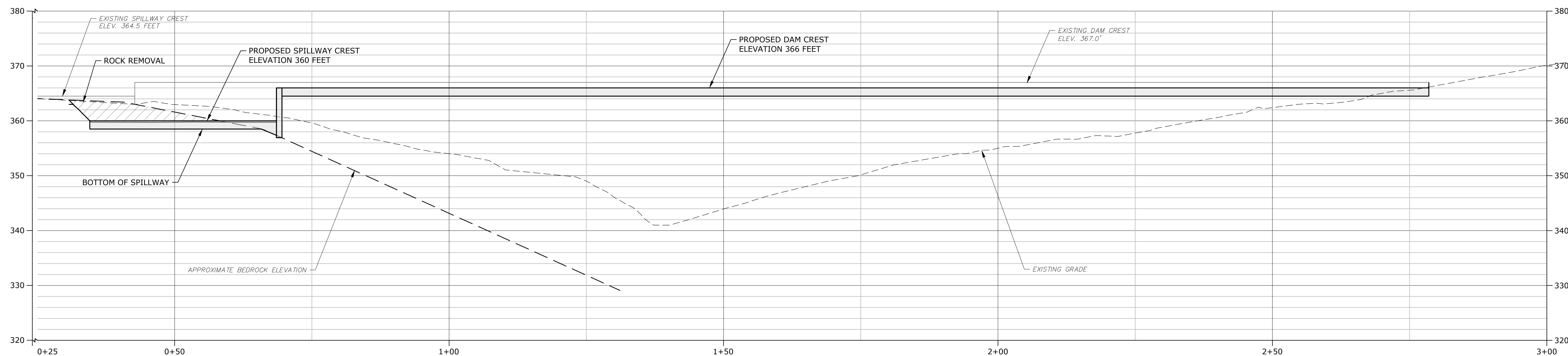
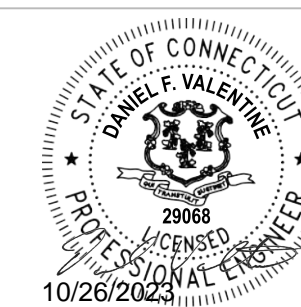
1. SEED AREAS PER PLAN AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE MANUFACTURER. THE SEED SHALL BE SPREAD ON THE PREPARED SOIL, LIGHTLY RAKED TO ESTABLISH GOOD SOIL CONTACT AFTER SOWING, AND MULCHED WITH CLEAN STRAW APPLIED BY HAND OR BY HYDROSEEDING. SEED MIX SUBSTITUTIONS SHALL BE EQUIVALENT TO THAT SPECIFIED AND APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE. MAINTAIN SEEDED AREAS AS RECOMMENDED BY THE MANUFACTURER. EXCEPT FOR LAWN AREAS, DO NOT FERTILIZE AREAS TO BE SEEDED UNLESS SPECIFIED BY THE MANUFACTURER. SEED AREAS AS PER THE FOLLOWING SCHEDULE:

LEGEND

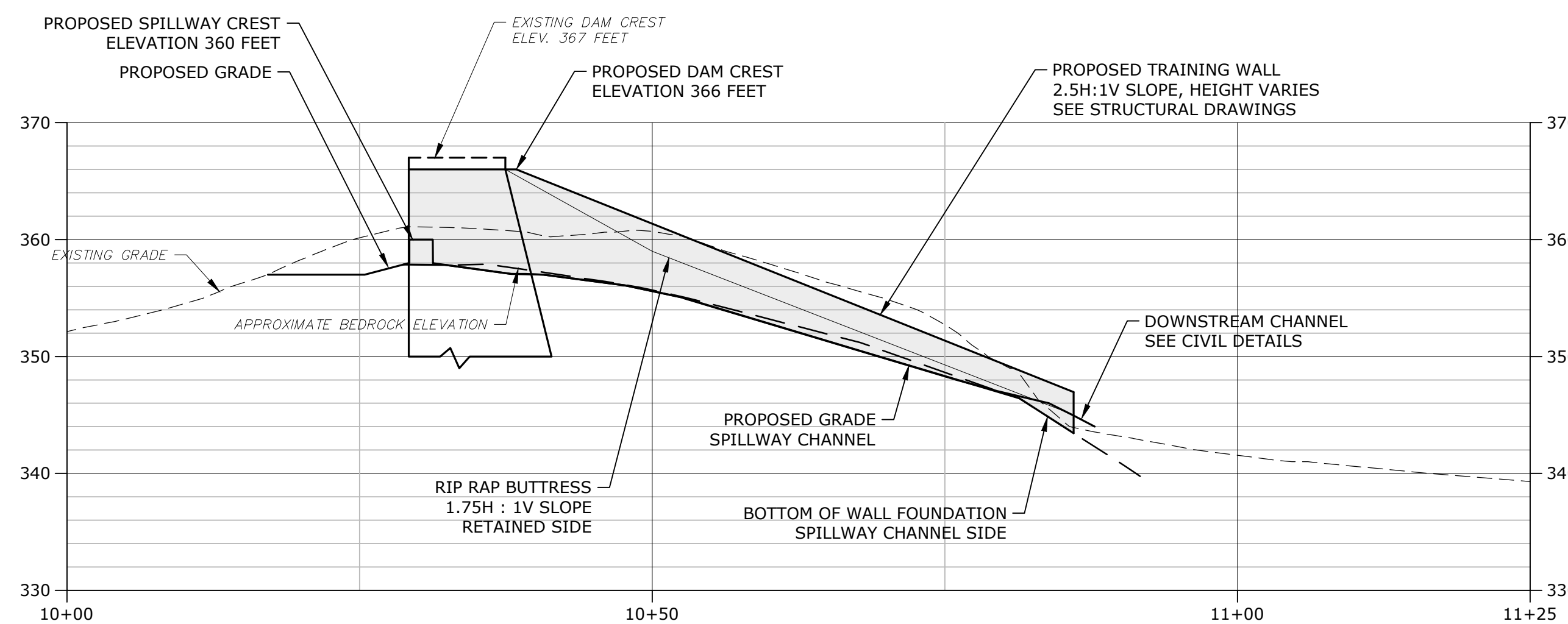
- PROPERTY LINE
- WETLAND LINE
- EX. CONTOUR
- 62
- NEW CONTOUR
- NEW MEADOW
- NEW SHADE TREE
- NEW SMALL TREE
- NEW SHRUB

SEEDING NOTES (CONT.):

- A. DISTURBED AREAS WITHIN WETLANDS: SEED THIS AREA WITH "NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DETENTION BASIN AND MOIST SITES" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000).
- B. STEEP SLOPES AND DISTURBED UPLAND AREAS: SEED THIS AREA WITH "NATIVE STEEP SLOPE MIX WITH ANNUAL RYEGRASS" BY ERNST SEEDS (ERNMX-181). AUGMENT THIS SEED MIXTURE WITH PURPLETOP (TRIDENS FLAVUS) AT THE RATE OF 20 LBS. PER ACRE.



UPSTREAM FACE OF DAM PROFILE
1" = 10'



TRAINING WALL PROFILE
1" = 10'

NOTES

- SEE STRUCTURAL SHEETS FOR ADDITIONAL DETAIL ON DAM FACE AND CREST, SPILLWAY SECTION, AND TRAINING WALL.

Brush Reservoir Dam Improvements

Aquarion Water Company

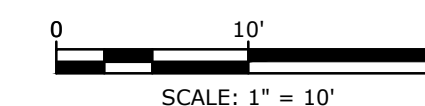
Stamford, Connecticut

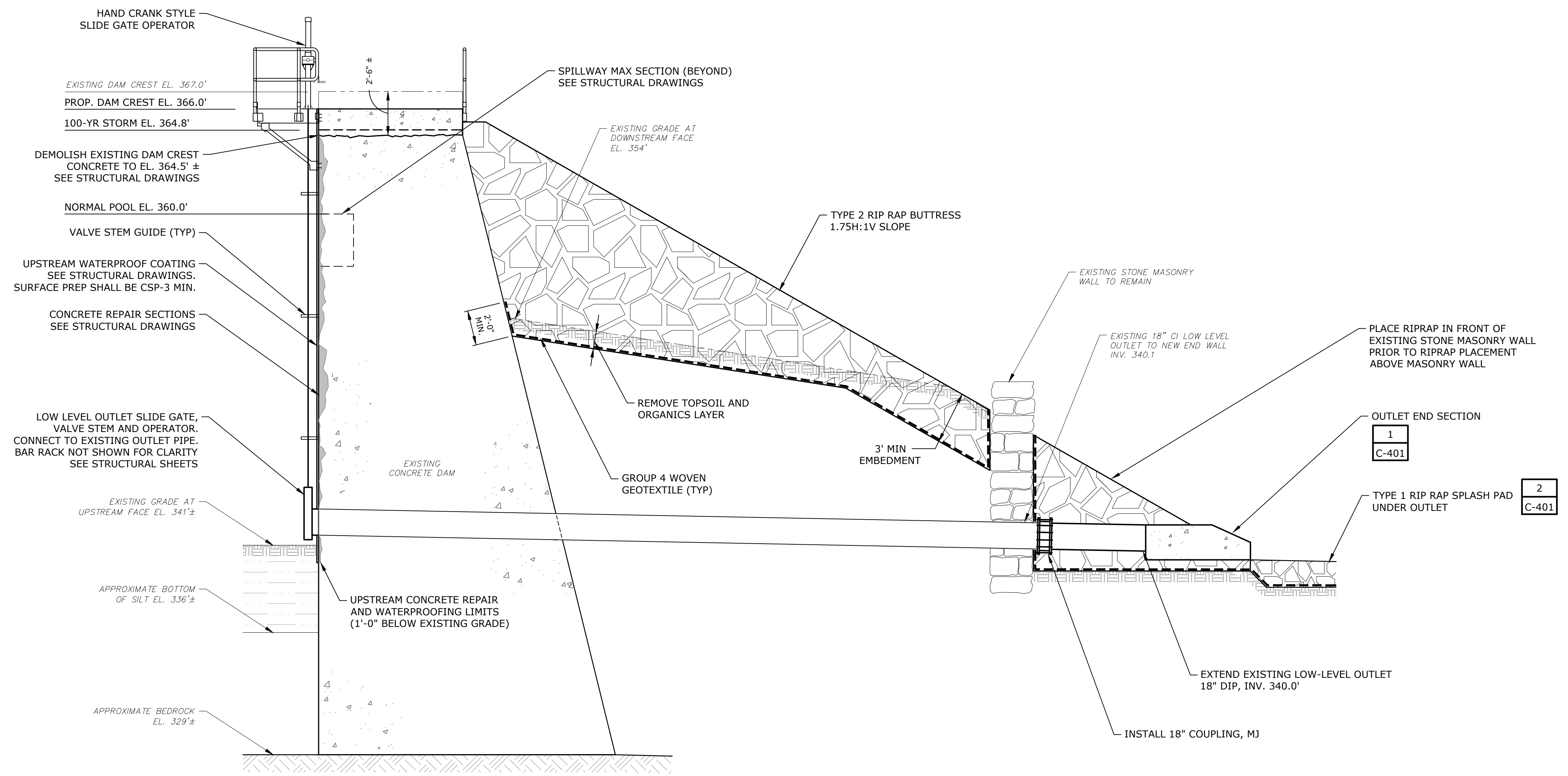
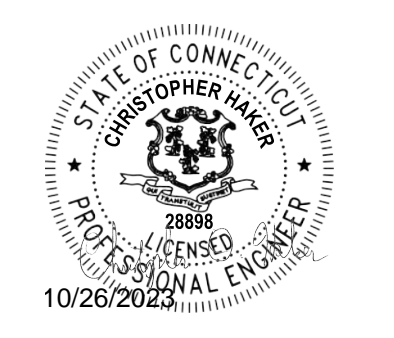
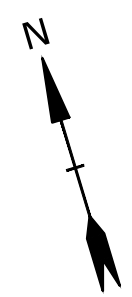
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DATE: 05/2023		
FILE: A1000-195A-C-201.dwg		
DRAWN BY: MJC		
DESIGNED/CHECKED BY: RS/DFV		
APPROVED BY: CDH		

DAM PROFILES

SCALE: 1" = 10'

C-201

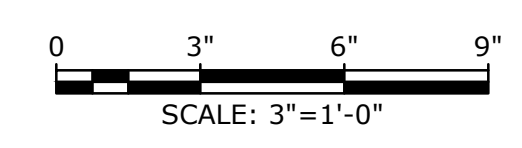




PROPOSED DAM MAX SECTION
3" = 1'-0"

NOTES

1. PROTECT EXISTING MASONRY STONE WALL DURING CONSTRUCTION. MASONRY STONE WALL TO BE LEFT IN PLACE. ANY STONES MOVED DURING CONSTRUCTION ACTIVITIES SHALL BE REPLACED.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

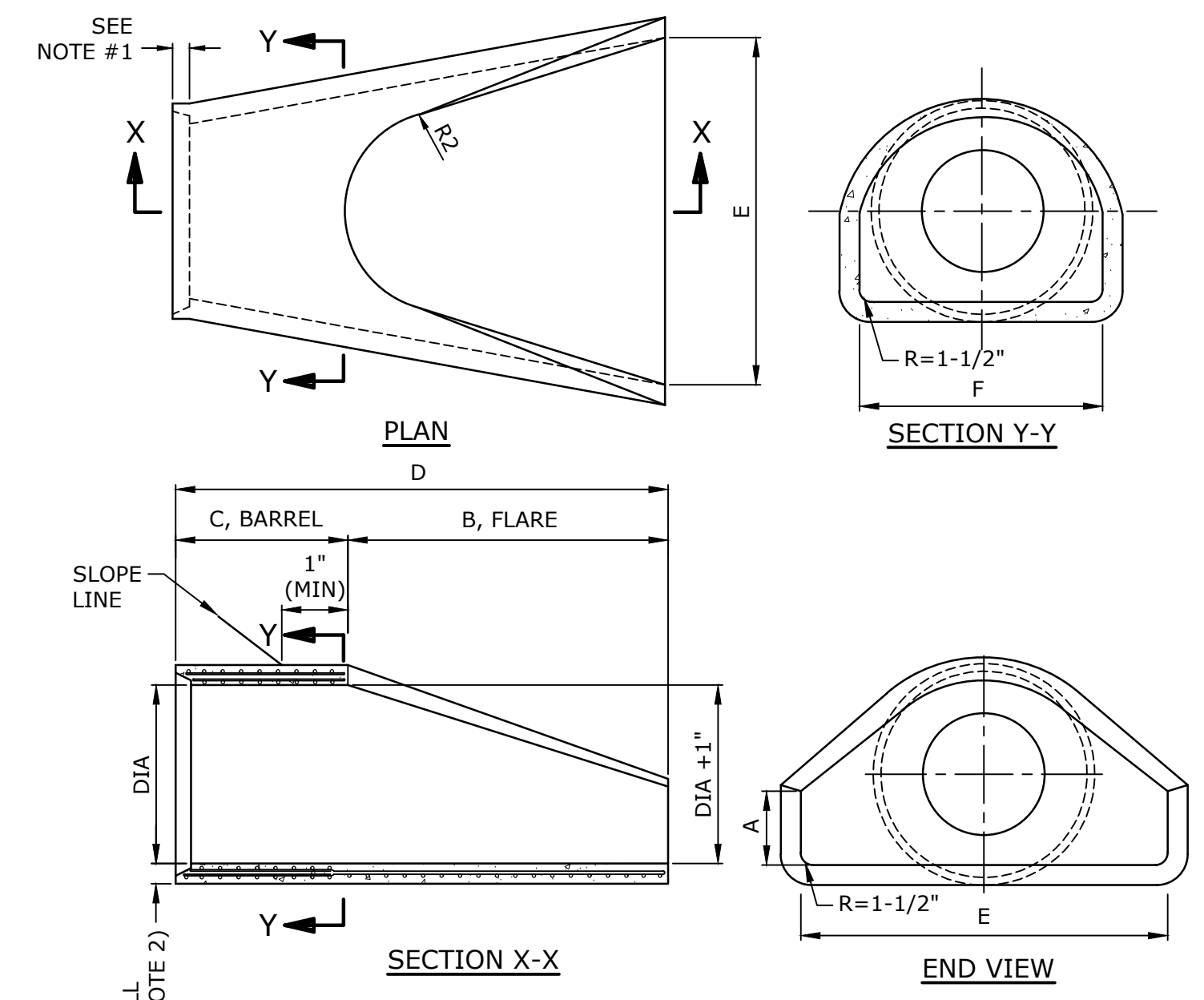
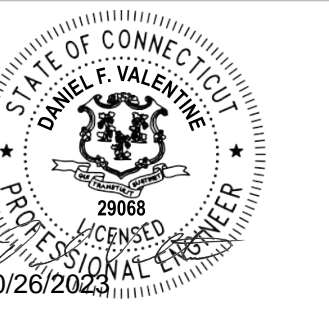
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DATE:	05/2023
FILE:	A1000-195A-C-301.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	RS/DFV
APPROVED BY:	CDH

DAM SECTIONS

SCALE: AS SHOWN

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Plotted On: Oct 24, 2023 2:28pm
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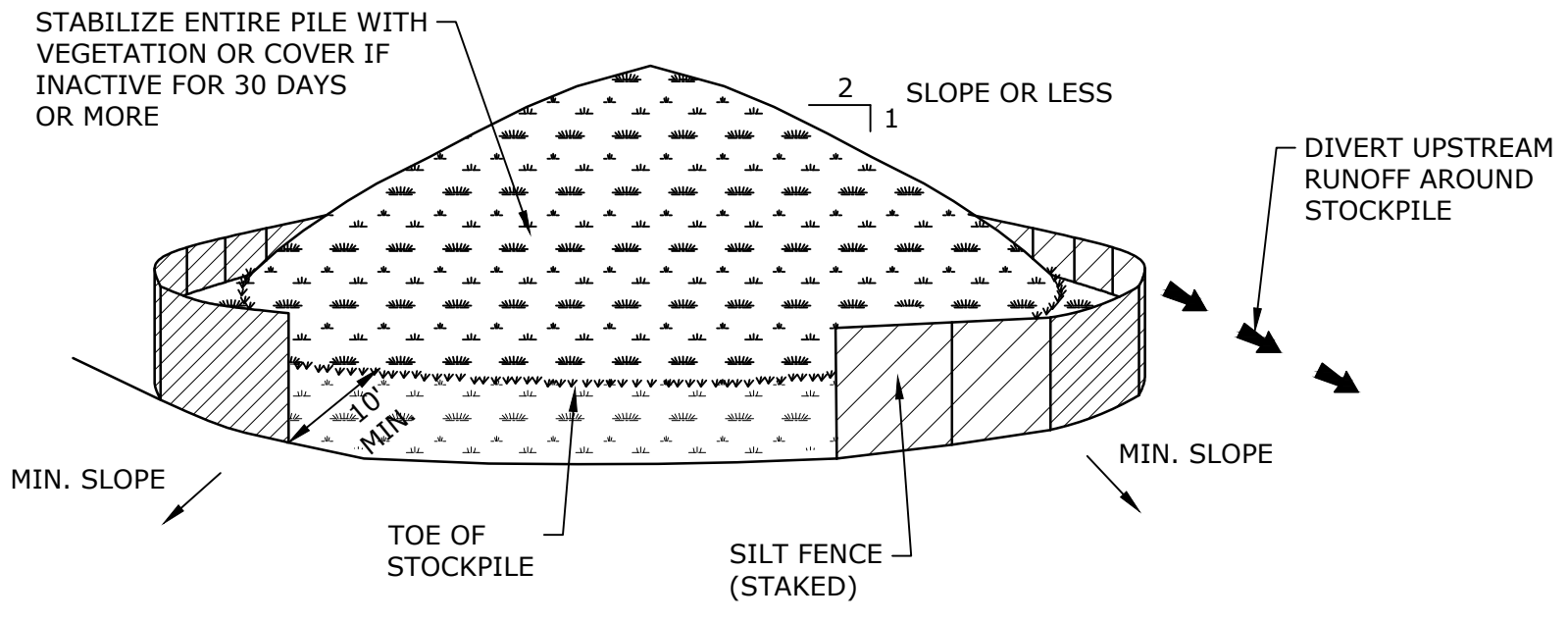


- NOTES:**
- JOINTS SHALL BE TONGUE AND GROOVE OR BELL AND SPIGOT AS REQUIRED TO CONFORM TO PIPE INSTALLED.
 - WALL THICKNESS SHALL CONFORM TO PIPE THICKNESS.

DIMENSIONS FOR REINFORCED CONCRETE CULVERT END									FLARE REINFORCEMENT ONE LAYER ONLY IN CENTER OF WALL	
DIA.	A	B	C	D	E	F	R ₁	R ₂	MIN. AREA OF LONGITUDINALS SQ. IN PER FT.	MIN. AREA OF TRANSVERSE STEEL SQ. IN PER FT.
30"	1'-0"	4'-6"	1'-7.75"	6'-1.75"	5'-0"	3'-1"	1'-6.5"	1'-3"	0.084	0.084

REINFORCED CONCRETE CULVERT END

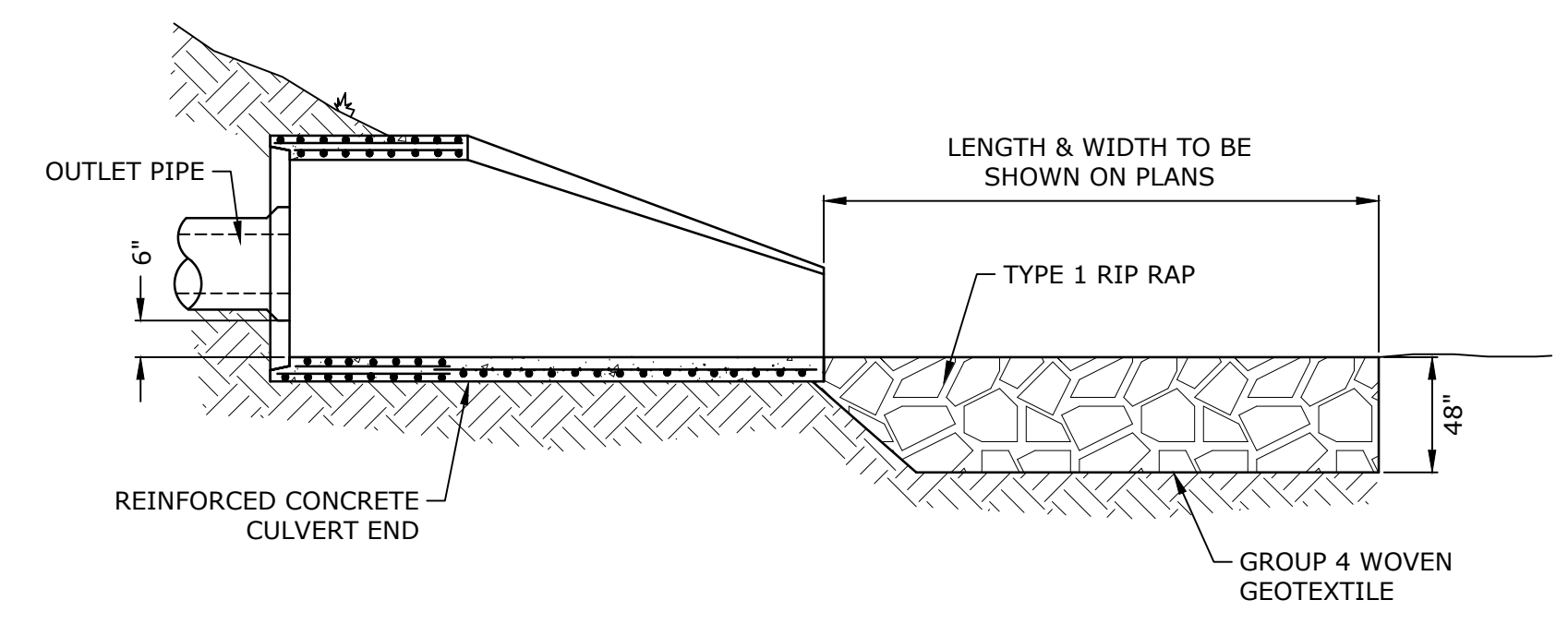
DETAIL	1
NO SCALE	C-301



- INSTALLATION NOTES:**
- AREA CHOSEN FOR STOCKPILING OPERATIONS SHALL BE DRY AND STABLE.
 - MAXIMUM SLOPE OF STOCKPILE SHALL BE 2H:1V.
 - UPON COMPLETION OF SOIL STOCKPILING, EACH PILE SHALL BE SURROUNDED WITH EITHER SILT FENCING OR HAYBALES, THEN STABILIZED WITH VEGETATION OR COVERED.

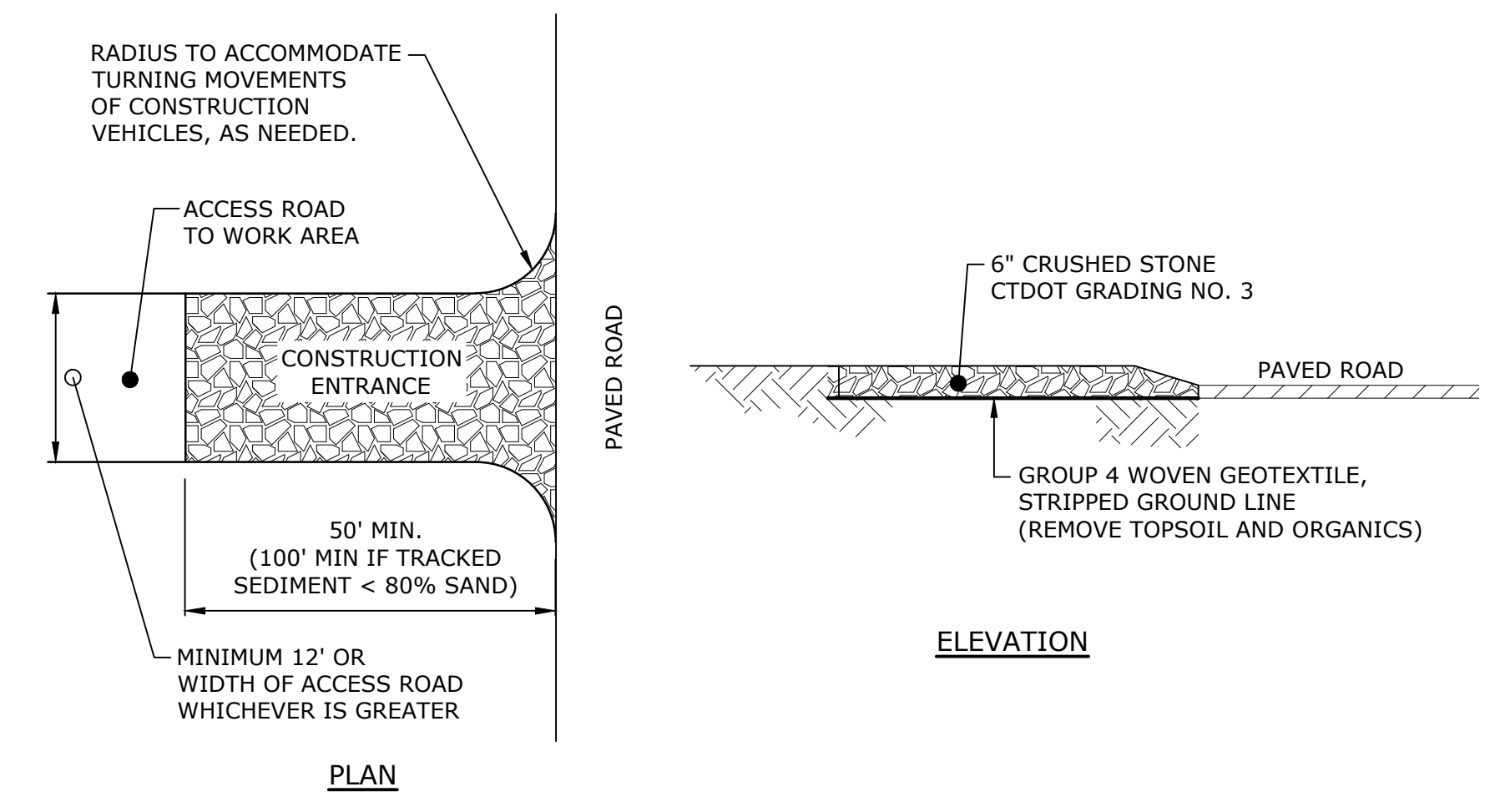
SOIL STOCKPILING

DETAIL	4
NO SCALE	-



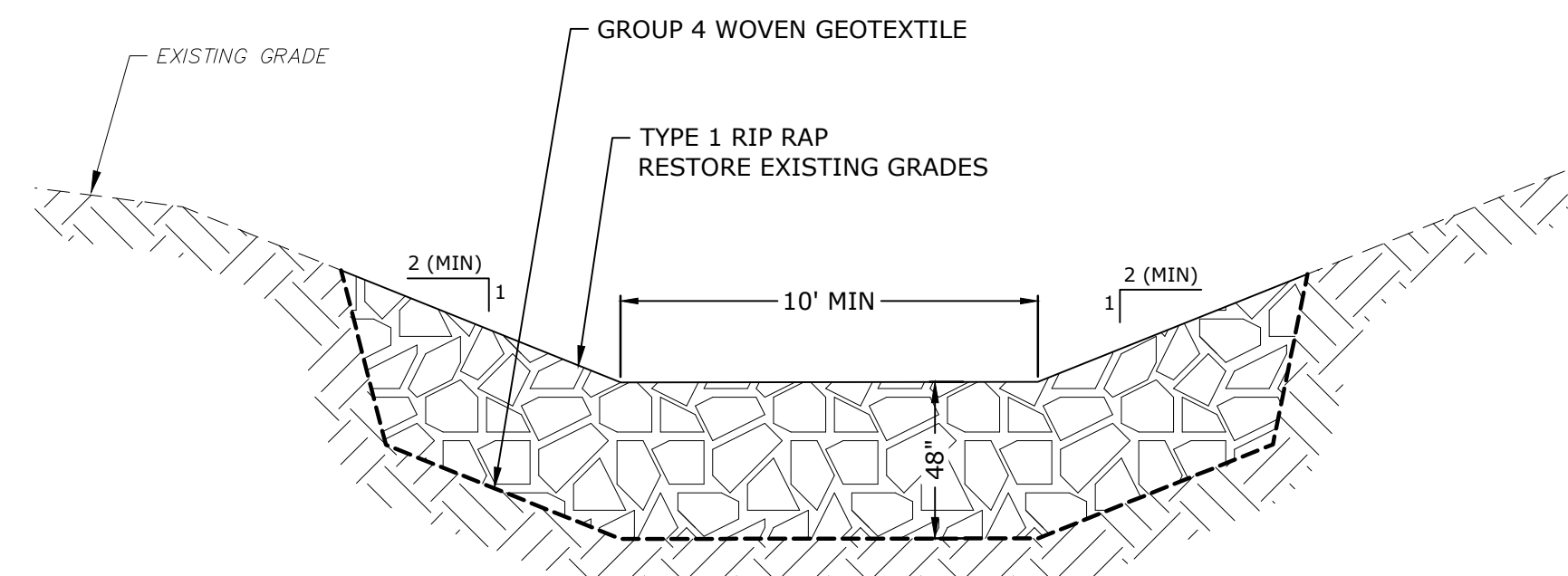
REINFORCED CONCRETE END SECTION AND SPLASH PAD

DETAIL	2
NO SCALE	C-101



CONSTRUCTION ENTRANCE

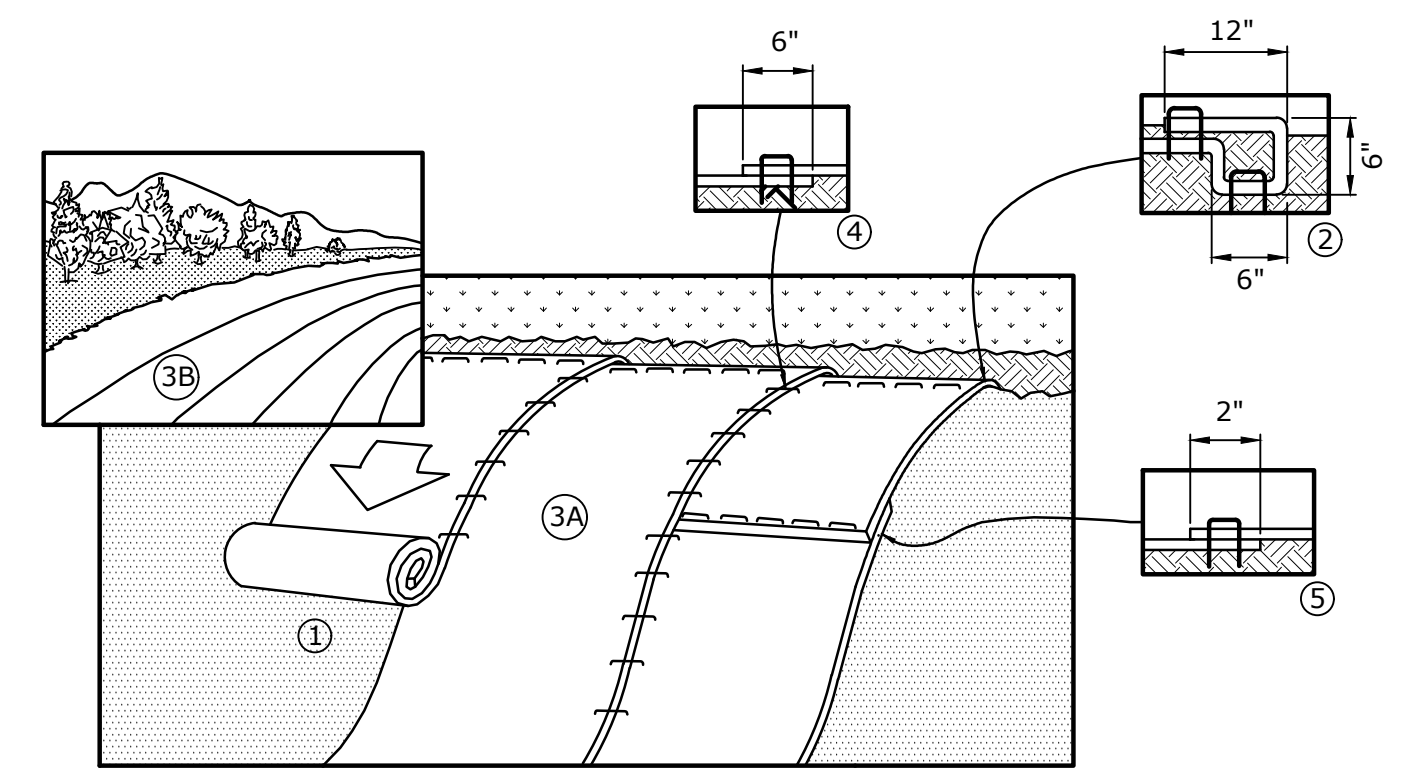
DETAIL	3
NO SCALE	D-101



- NOTES:**
- REUSE EXISTING RIP RAP TO THE EXTENT POSSIBLE. IF FULL DEPTH RECONSTRUCTION OF DOWNSTREAM CHANNEL IS NECESSARY, INSTALL PER THIS DETAIL, OTHERWISE SUPPLEMENT EXISTING RIP RAP AS REQUIRED OR DIRECTED BY ENGINEER.

DOWNSTREAM CHANNEL

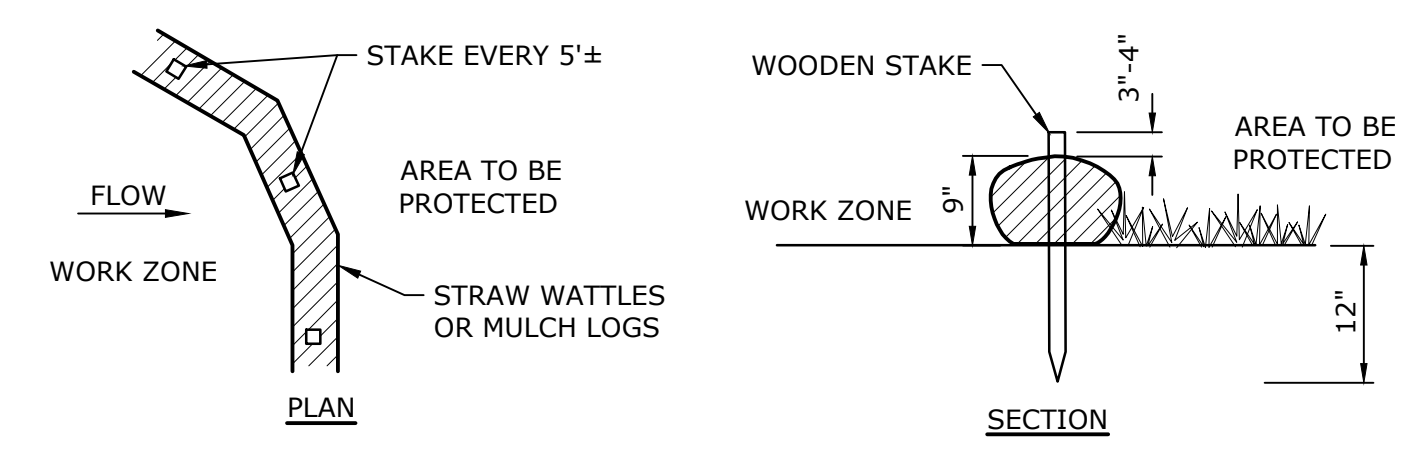
DETAIL	6
NO SCALE	C-101



- NOTES:**
- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
 - BEGIN AT THE TOP OF THE SLOPE, 36" OVER THE GRADE BREAK, BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
 - ROLL THE BLANKETS DOWN THE SLOPE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAPLE PATTERN GUIDE.
 - STAPLE LENGTHS SHALL BE A MINIMUM OF 8 INCHES.

EROSION CONTROL BLANKET FOR SLOPE PROTECTION

DETAIL	5
NO SCALE	-



COMPOST FILTER SOCK

DETAIL	7
NO SCALE	D-101

Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

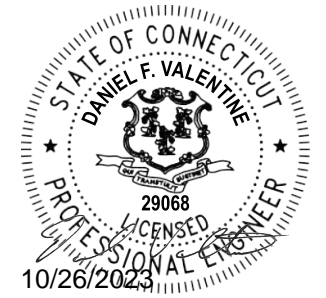
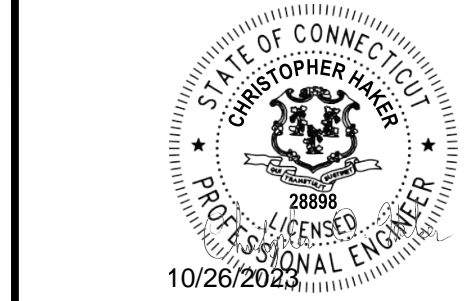
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A	10/23/2023	REV PER CTDEEP COMMENTS

PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-C-401.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: RS/DFV
 APPROVED BY: CDH

SITE DETAILS

SCALE: NO SCALE

C-401



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
A	10/23/2023	REV PER CTDEEP COMMENTS
PROJECT NO: A-1000-195A		
DATE: 05/2023		
FILE: A1000-195A-S-001.dwg		
DRAWN BY: MJC		
DESIGNED/CHECKED BY: JC/DBS		
APPROVED BY: CDH		

STRUCTURAL NOTES

SCALE: NO SCALE

S-001

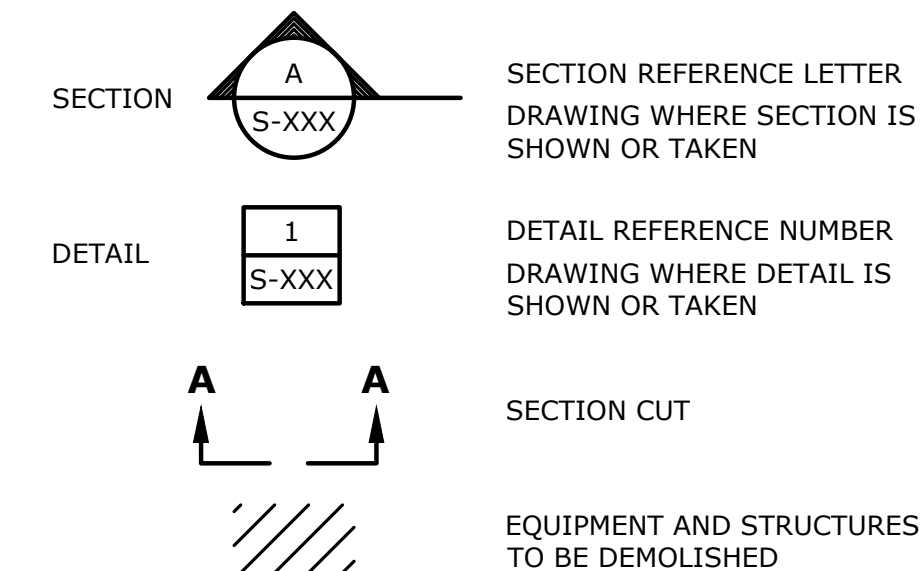
BAR SIZE DESIGNATION		DEVELOPMENT LENGTH (INCHES)	SPLICE LENGTH (INCHES)	
ENGLISH	METRIC	Ld	CLASS B	CLASS B TOP BARS
#3	#10	15	19	25
#4	#13	19	25	33
#5	#16	24	31	40
#6	#19	29	37	48
#7	#22	42	54	70

REBAR SPLICE LENGTH SCHEDULE

NOTES:

- IF CLEAR SPACING BETWEEN THE REBARS IS LESS THAN THREE BAR DIAMETERS, OR IF COVER IS LESS THAN TWO BAR DIAMETERS, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF EPOXY COATED REBAR IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF LIGHTWEIGHT CONCRETE IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 30%.
- THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON $F'_c = 4,000$ PSI AND $F_y = 60,000$ PSI. ADJUST FOR OTHER STRENGTHS USING ACI-318.
- FOR HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW, INCREASE THE DEVELOPMENT LENGTH BY AN ADDITIONAL 30%.
- WHEN BARS OF DIFFERENT SIZE ARE LAP SPICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.

GENERAL SYMBOLS



GENERAL

- STRUCTURAL WORK SHALL CONFORM TO STATE BUILDING CODE (IBC 2015), LATEST EDITION, INCLUDING MOST RECENT ADDENDA, AND CONTRACT DOCUMENTS. IN CASE OF CONFLICT, MOST STRINGENT REQUIREMENT SHALL GOVERN.
- CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS RELATED TO THIS PROJECT.
- THE CONTRACTOR SHALL RETAIN THE SERVICES OF AN INDEPENDENT TESTING LABORATORY FOR CONCRETE AND SOILS TESTING. ALL TESTING COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

REINFORCEMENT

- DETAILING, FABRICATION, AND ERECTION OF REINFORCEMENT, UNLESS OTHERWISE NOTED, SHALL CONFORM TO ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)" AND ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315)", LATEST EDITION.
- STEEL REINFORCEMENT UNLESS OTHERWISE SHOWN SHALL CONFORM TO ASTM A615 GRADE 60 MINIMUM (YIELD STRENGTH - 60,000 PSI).
- PROVIDE AND SCHEDULE ON SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION: MINIMUM REQUIREMENTS SHALL BE: HIGH CHAIRS, 4'-0" ON CENTER, #5 SUPPORT BAR FOR HIGH CHAIRS, SLAB BOLSTERS, 3'-6" ON CENTER, ALL WIRE CHAIRS AND BOLSTERS TO BE PLASTIC TIPPED.
- THE CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT SHALL BE 3 INCHES FOR CAST-IN-PLACE CONCRETE CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER AND 2 INCHES IF CAST-IN-PLACE IS NOT CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER, UNLESS OTHERWISE SHOWN.
- WHERE CONTINUOUS BARS ARE CALLED FOR THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS. REINFORCEMENT SHALL BE SPICED IN ACCORDANCE WITH THE REBAR SPLICE LENGTH SCHEDULE.
- WHERE REINFORCEMENT IS NOT SHOWN ON DRAWINGS, PROVIDE REINFORCEMENT IN ACCORDANCE WITH APPLICABLE TYPICAL DETAILS OR SIMILAR TO THAT SHOWN FOR MOST NEARLY SIMILAR SITUATIONS, AS DETERMINED BY THE ENGINEER. IN NO CASE SHALL REINFORCEMENT BE LESS THAN MINIMUM REINFORCEMENT PERMITTED BY THE APPLICABLE CODES.
- WHERE REINFORCEMENT IS CALLED FOR IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.
- REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 24 HOURS PRIOR TO SCHEDULED CONCRETE PLACEMENT. NOTIFY ENGINEER OF COMPLETION AT LEAST 24 HOURS PRIOR TO SCHEDULED COMPLETION OF REINFORCEMENT PLACEMENT.
- REINFORCEMENT SHALL BE SET BEFORE PLACING CONCRETE. SETTING ANY REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.

CONCRETE

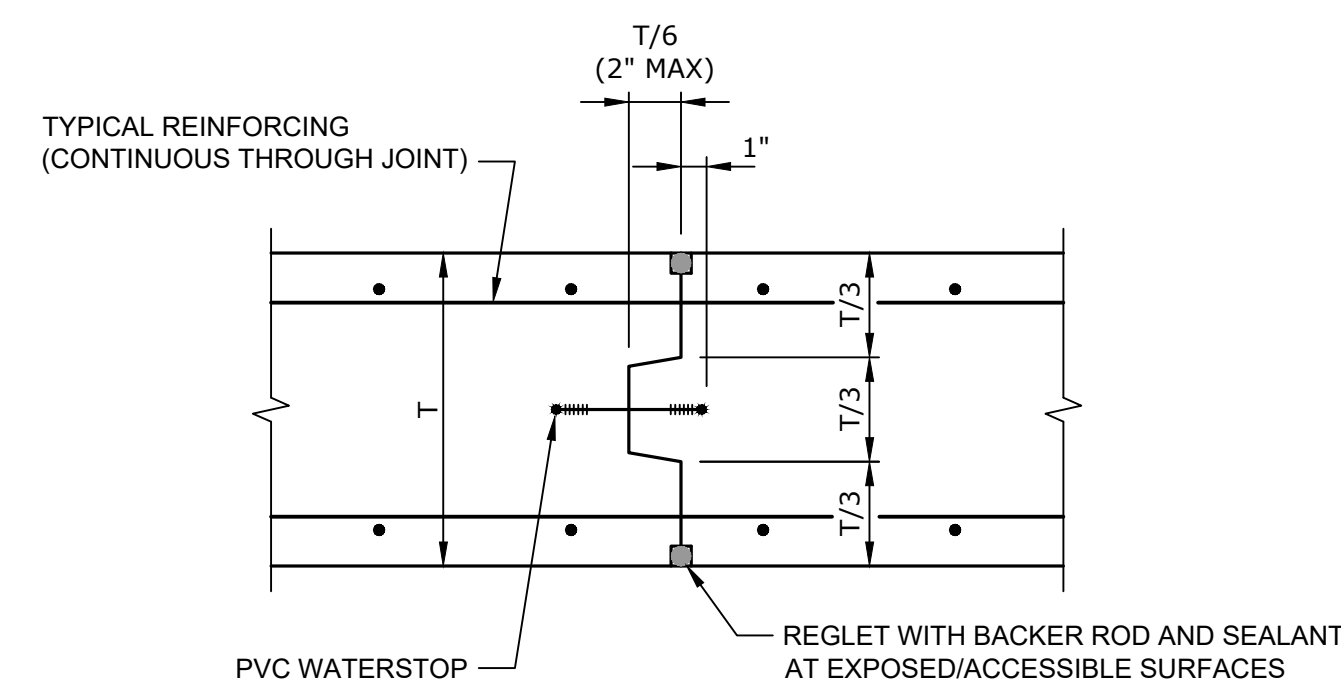
- CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318), AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDING (ACI 301).
- CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED, AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY OR THE ENGINEER.
- CONCRETE SHALL BE NORMAL WEIGHT CONCRETE AND SHALL HAVE A COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS, UNLESS OTHERWISE NOTED AND SHALL BE AIR ENTRAINED (SEE SPECS).
- THE USE OF CONSTRUCTION JOINTS WHERE SHOWN ON THE DRAWINGS IS MANDATORY. OMISSIONS, ADDITIONS OR CHANGES SHALL NOT BE MADE EXCEPT WITH THE SUBMISSION OF A WRITTEN REQUEST TOGETHER WITH DRAWINGS OF THE PROPOSED JOINT LOCATIONS FOR APPROVAL OF THE STRUCTURAL ENGINEER.
- WHERE CONSTRUCTION JOINTS ARE NOT SHOWN, DRAWINGS SHOWING LOCATION OF CONSTRUCTION JOINTS AND CONCRETE PLACING SEQUENCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PREPARATION OF THE REINFORCEMENT SHOP DRAWINGS.
- CONCRETE SLABS SHALL BE CAST SO THAT THE THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS.
- CONCRETE SLABS AND WALLS SHALL BE CAST ALTERNATELY OR IN A CHECKERBOARD FASHION SO THAT ADJACENT SECTIONS ARE PLACED NO SOONER THAN THREE DAYS APART. AT LEAST TWO DAYS MUST ELAPSE AFTER PLACING CONCRETE IN WALLS BEFORE PLACING FLOOR SYSTEM SUPPORTED THEREON.
- CONCRETE SHALL BE PLACED WITHOUT HORIZONTAL CONSTRUCTION JOINTS EXCEPT WHERE SHOWN OR NOTED.
- EXPOSED EDGES OF CONCRETE ELEMENTS SHALL HAVE CHAMFERED CORNERS
- ONLY CRITICAL CONSTRUCTION JOINTS ARE SHOWN. SEE SPECIFICATIONS FOR REQUIRED MAXIMUM SPACING OF CONSTRUCTION JOINTS.

HYDROPHILIC STRIP WATERSTOP

- HYDROPHILIC WATERSTOP SHALL BE HYDROTITE AS SUPPLIED BY SIKA GREENSTREAK OR EQUAL.
- THE WATERSTOP SHALL BE COMPOSED OF CHLOROPRENE RUBBER AND CHLORINEPENE RUBBER MODIFIED TO IMPART HYDROPHILIC PROPERTIES.
- THE WATERSTOP SHALL HAVE A DELAY COATING TO INHIBIT EXPANSION DUE TO MOISTURE PRESENT IN FRESH CONCRETE.
- HYDROPHILIC WATERSTOP SHALL MEET THE PERFORMANCE REQUIREMENTS LISTED IN THE SPECIFICATIONS
- HYDROPHILIC WATERSTOP SHALL BE ADHERED TO CONCRETE SURFACES IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.

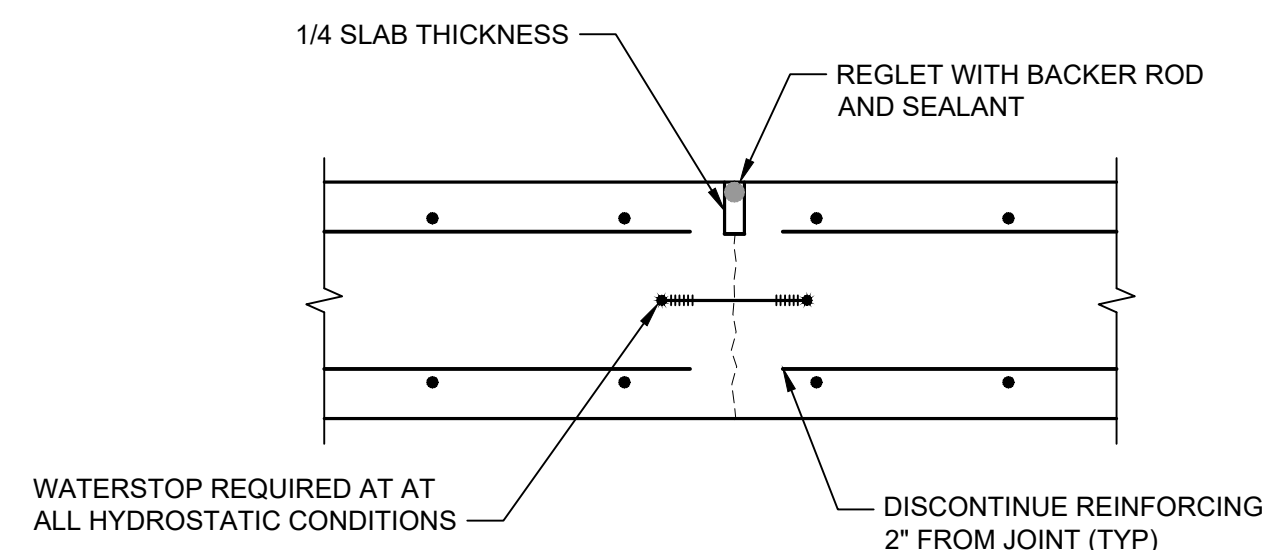
GROUT:

- ALL GROUT SHALL BE NON-SHRINK WITH A COMPRESS STRENGTH NOT LESS THAN 5000 PSI AT 7 DAYS, AND 7500 PSI AT 28 DAYS.
- PROVIDE NOTIFICATION PRIOR TO THE START OF ANY PHASE OF GROUT PLACEMENT WORK SO AS TO PROVIDE THE OPPORTUNITY TO INSPECT THE WORK. SUCH NOTIFICATION SHALL BE MADE AT LEAST 24 HOURS IN ADVANCE OF GROUT PLACEMENTS AND AT LEAST 36 HOURS IN ADVANCE.



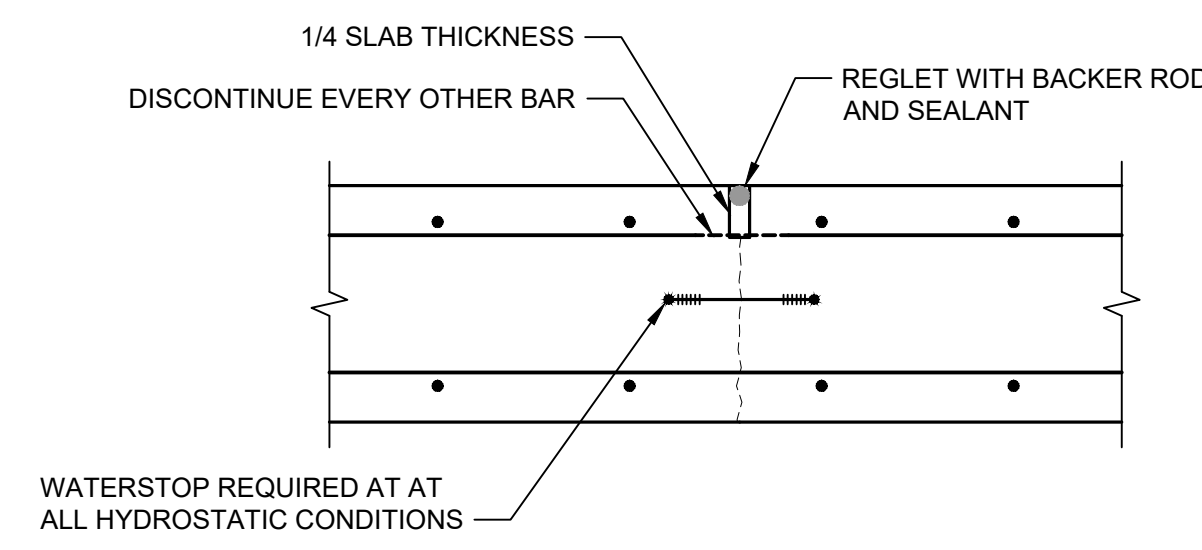
CONSTRUCTION JOINT

DETAIL	1
NO SCALE	S-001



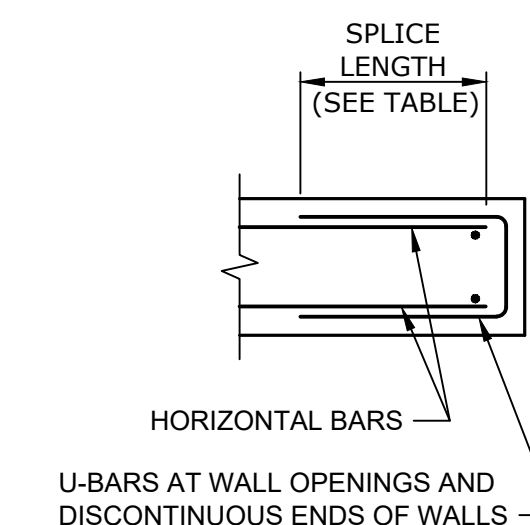
CONCRETE FULL CONTRACTION JOINT

DETAIL	2
NO SCALE	S-001



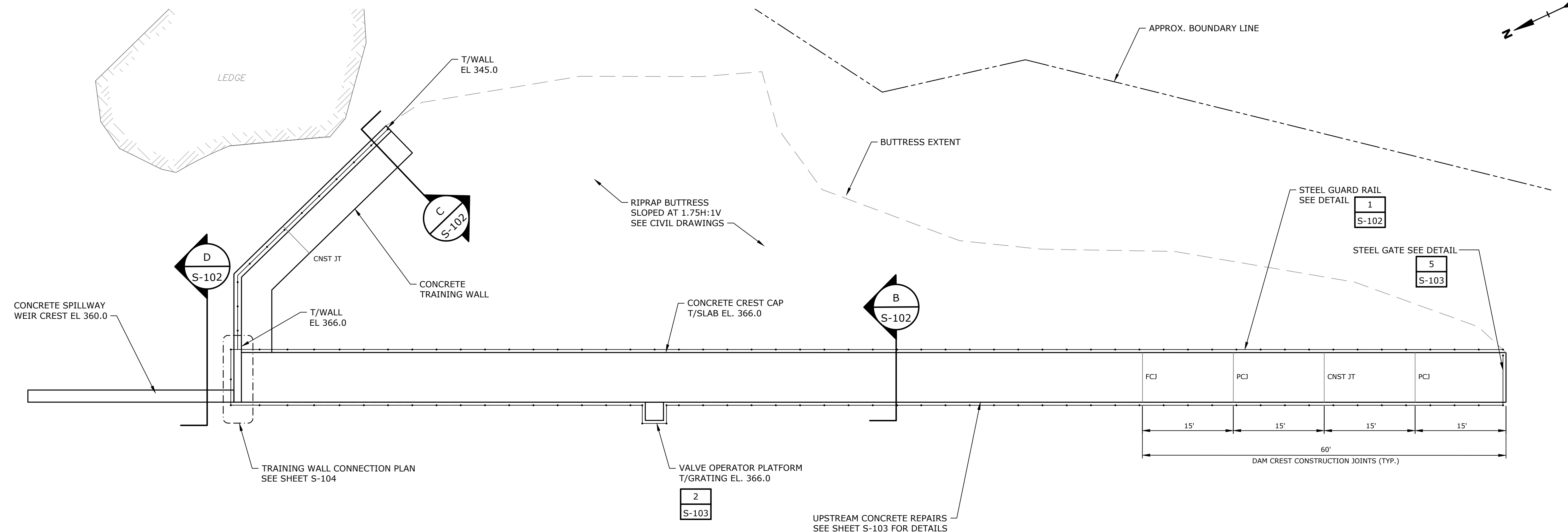
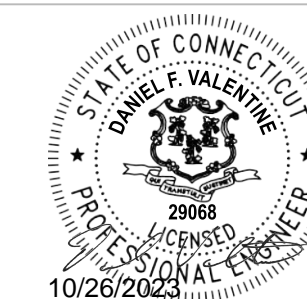
CONCRETE PARTIAL CONTRACTION JOINT

DETAIL	3
NO SCALE	S-001



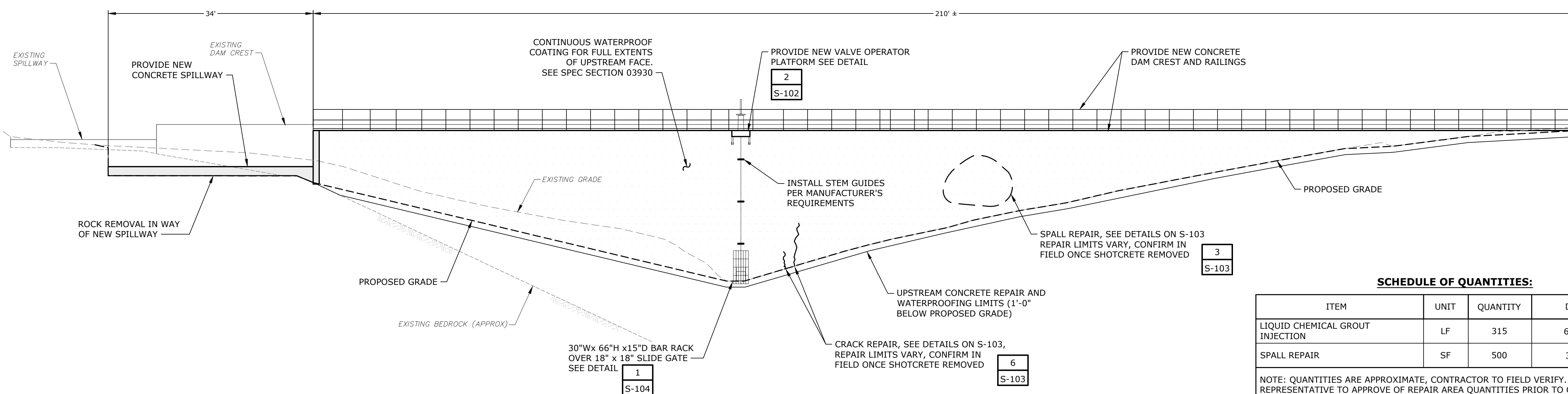
PLAN OF HORIZONTAL REINFORCING AT END OF CONCRETE WALLS

DETAIL	4
NO SCALE	S-001



PLAN
1" = 10'

NOTE:
1. PROVIDE EXPANSION JOINTS AT EXISTING DAM CONSTRUCTION JOINTS.



ELEVATION-UPSTREAM FACE
1" = 10'

SCHEDULE OF QUANTITIES:

ITEM	UNIT	QUANTITY	DETAIL
LIQUID CHEMICAL GROUT INJECTION	LF	315	6/S-103
SPALL REPAIR	SF	500	3/S-103

NOTE: QUANTITIES ARE APPROXIMATE, CONTRACTOR TO FIELD VERIFY. OWNER'S REPRESENTATIVE TO APPROVE OF REPAIR AREA QUANTITIES PRIOR TO COMPLETION OF REPAIRS.



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

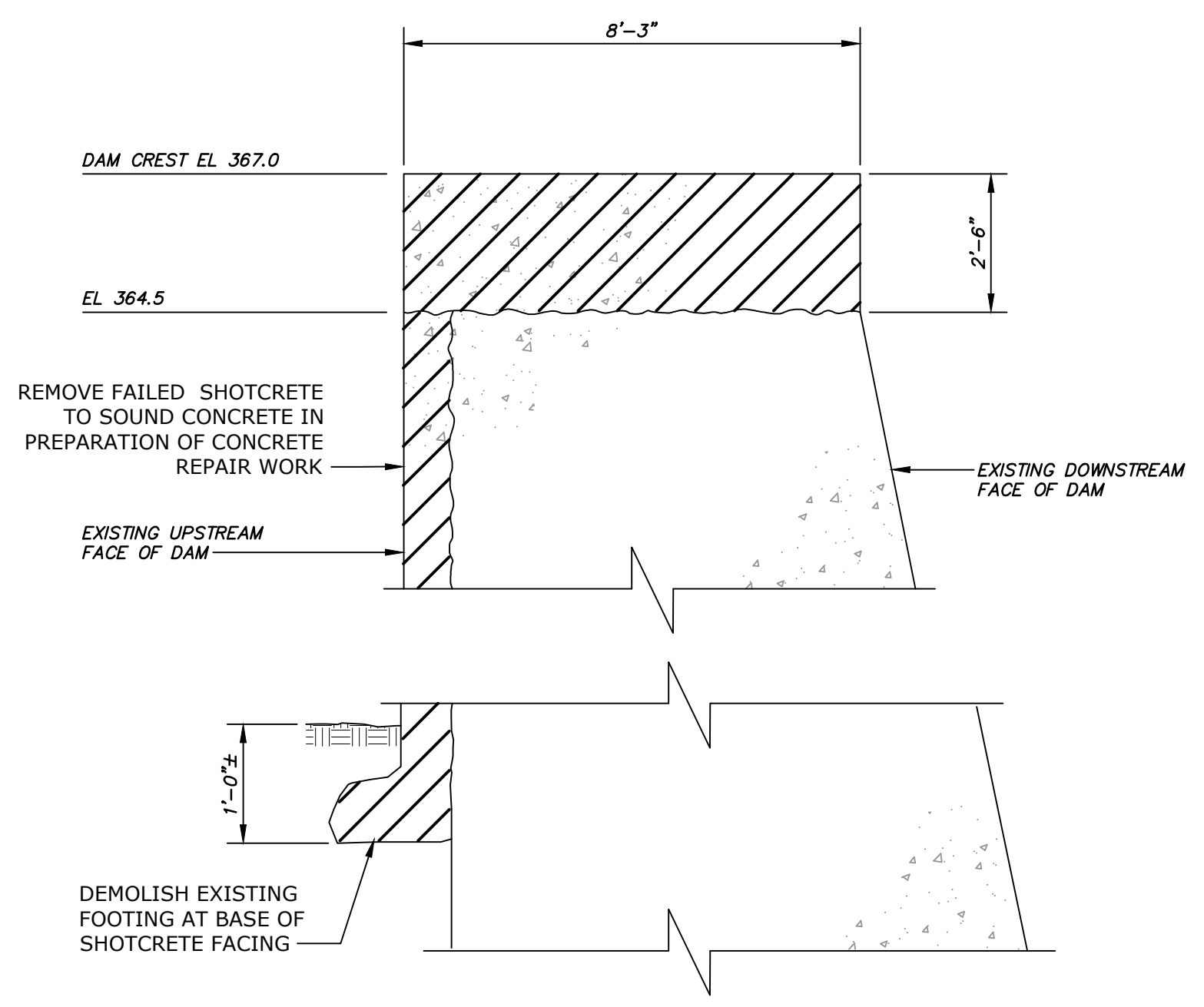
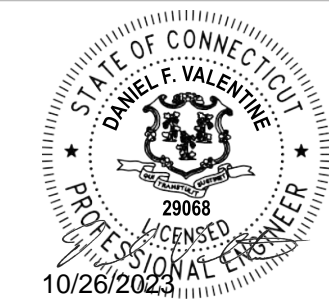
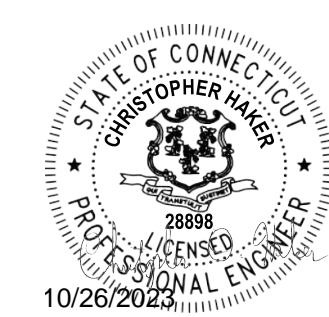
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PROJECT NO: A-1000-195A
 DATE: 05/2023
 FILE: A1000-195A-S-101.dwg
 DRAWN BY: MJC
 DESIGNED/CHECKED BY: JC/DBS
 APPROVED BY: CDH

STRUCTURAL PLAN AND UPSTREAM ELEVATION

SCALE: AS SHOWN

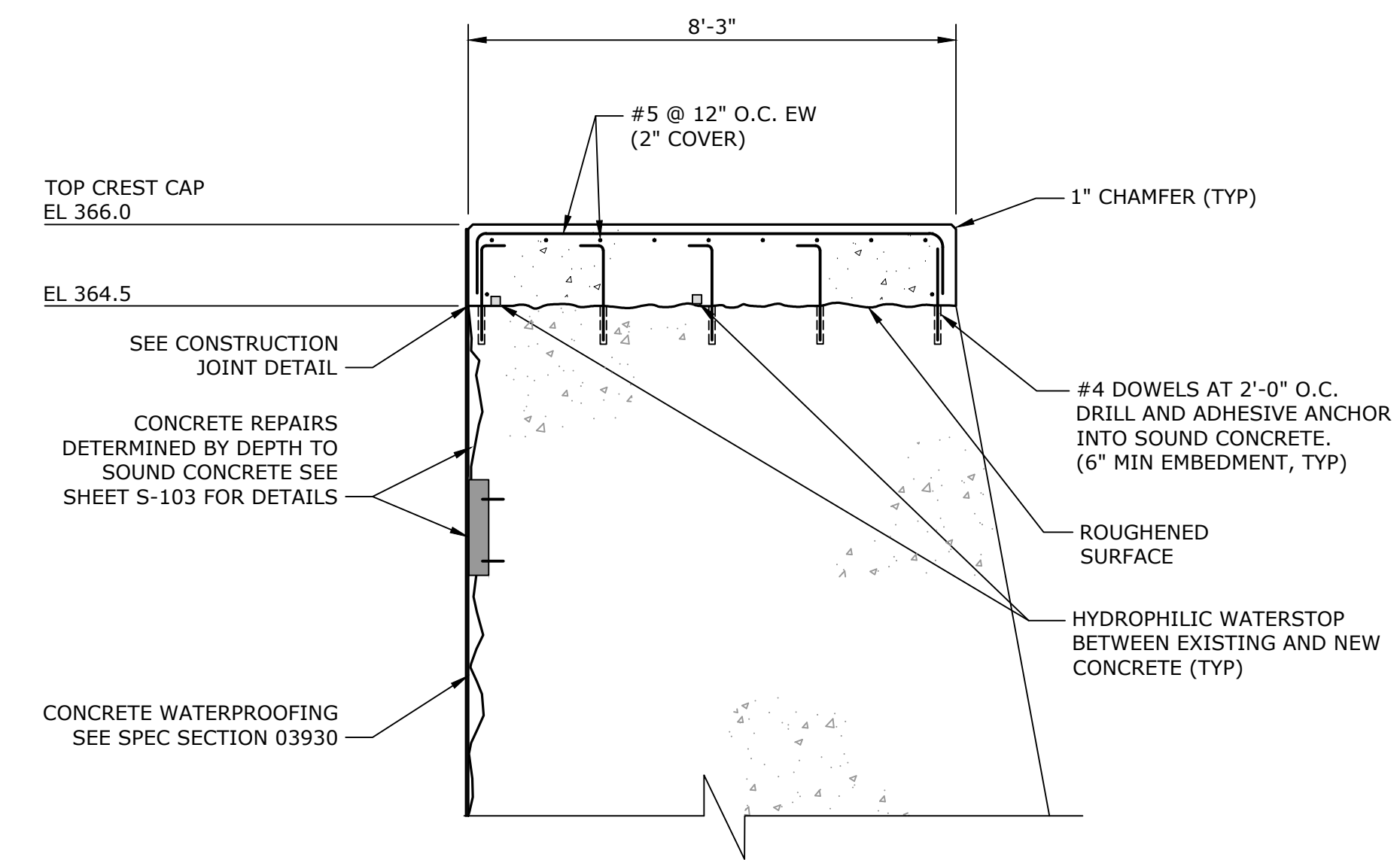
S-101



DAM CREST DEMO SECTION

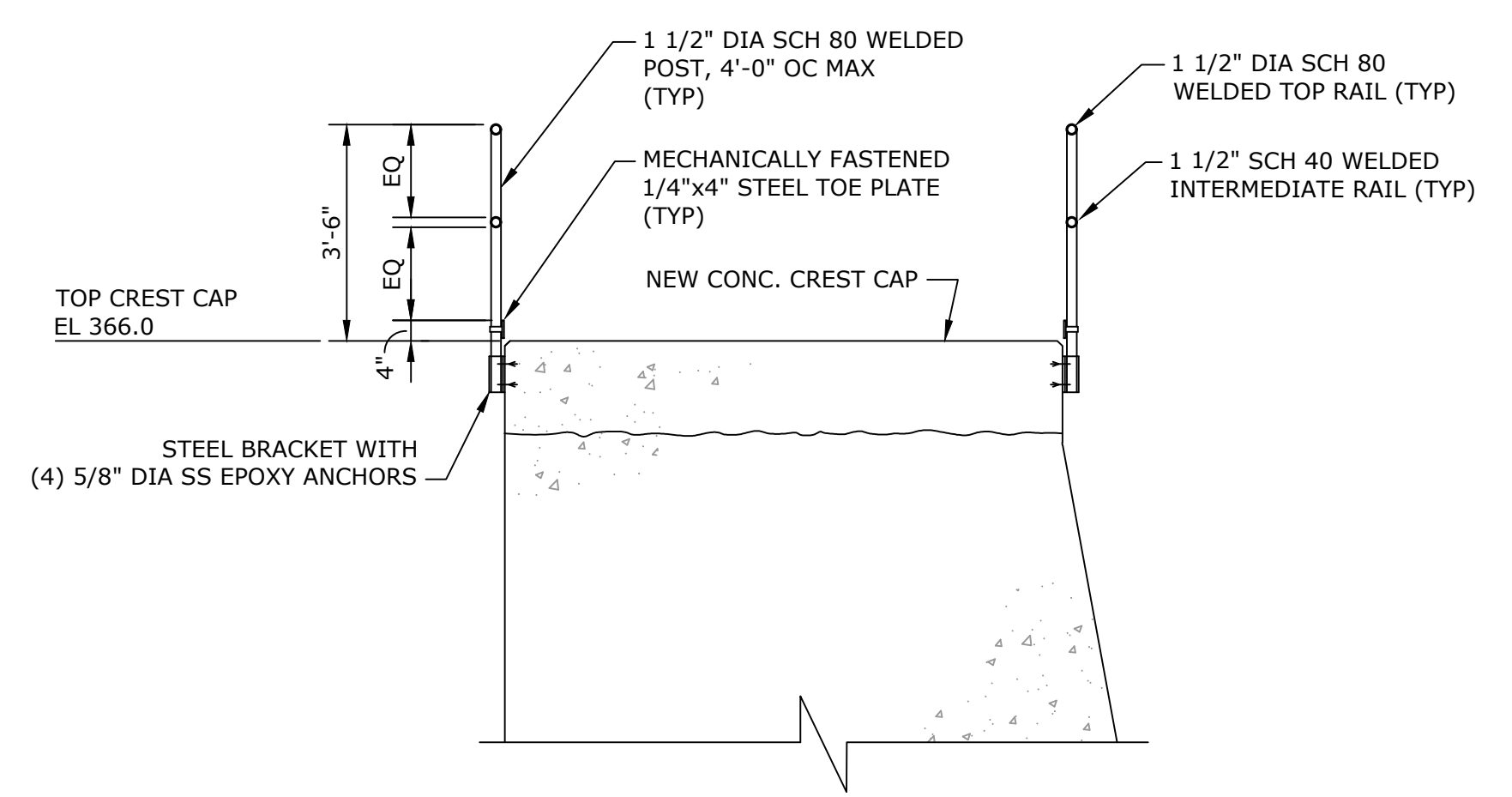
SECTION A
3/8" = 1'-0" D-101

- NOTES:**
1. CONCRETE "FOOTING" DIMENSIONS ARE APPROXIMATE ONLY.
 2. BASED ON A LIMITED SURVEY, IT IS ASSUMED THAT THE "FOOTING" FOLLOWS THE UPSTREAM EXISTING GRADE FOR THE ENTIRE LENGTH OF THE DAM.



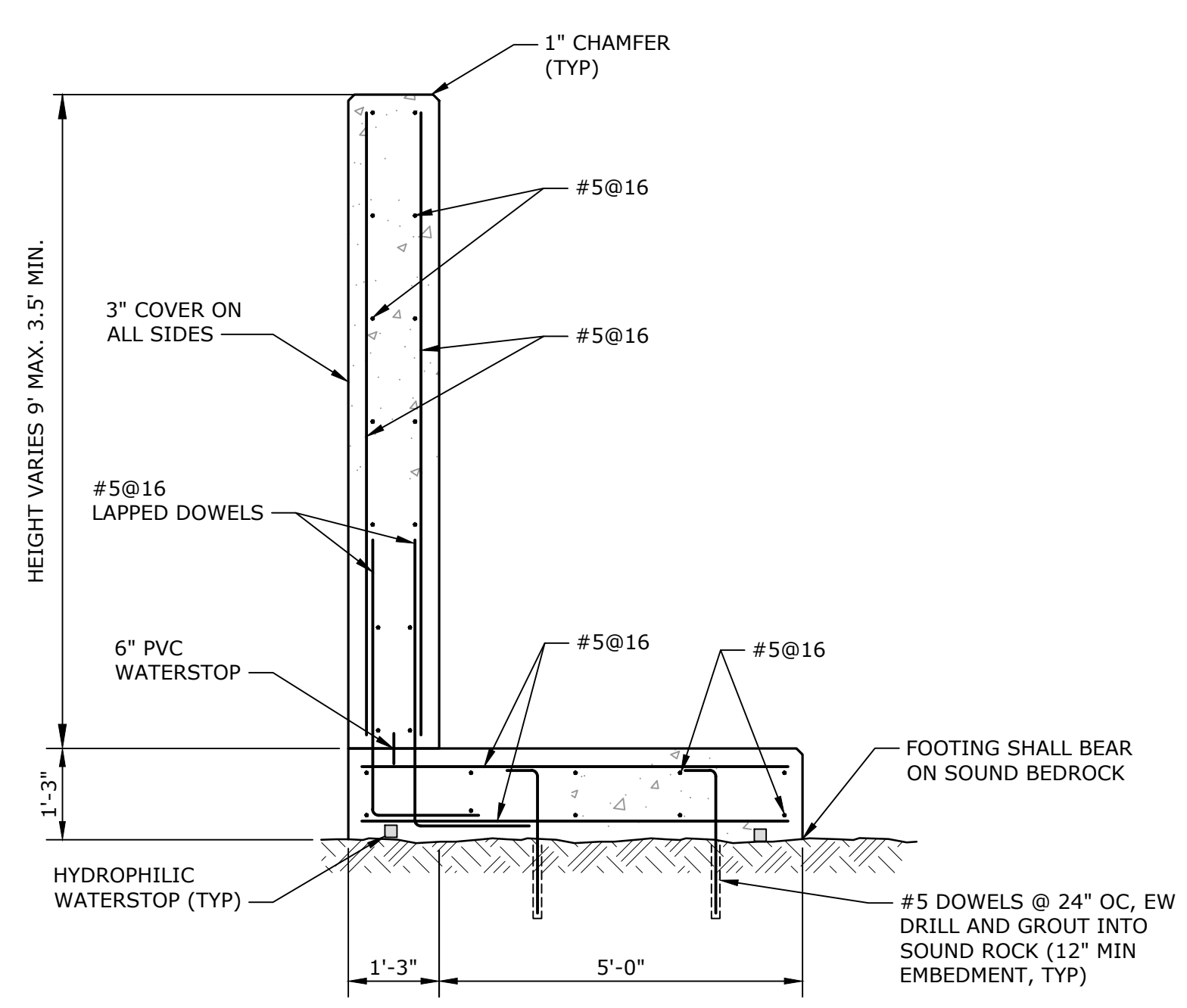
REINFORCED CONCRETE DAM CAP AND UPSTREAM FACING

SECTION B
3/8" = 1'-0" S-101



STEEL GUARDRAILS AT DAM CREST

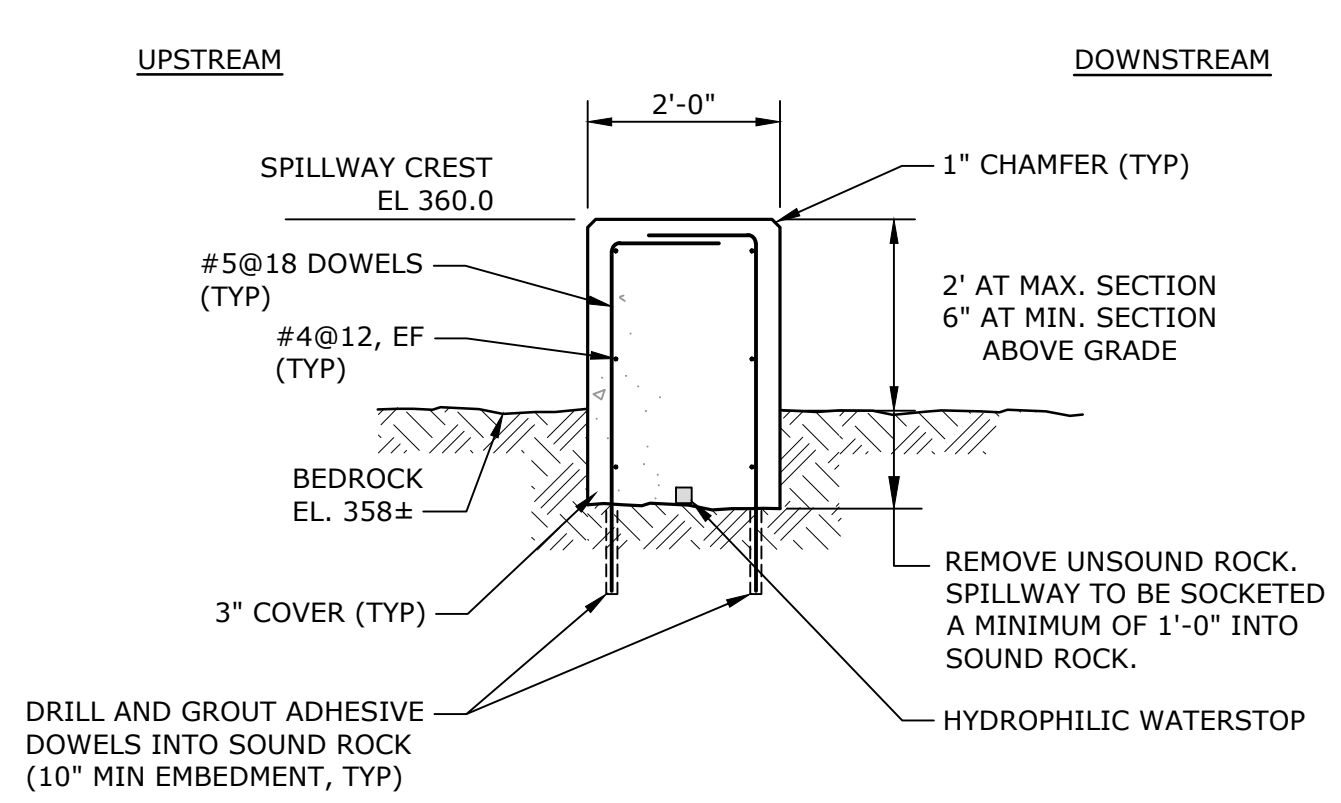
DETAIL 1
3/8" = 1'-0" S-101



TRAINING WALL

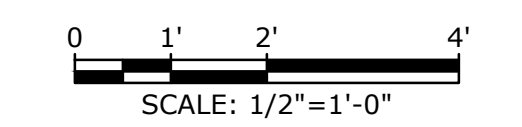
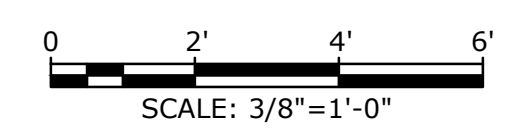
SECTION C
1/2" = 1'-0" S-101

- NOTES:**
1. BEDROCK TO BE LEVEL (±2") ACROSS TRAINING WALL CROSS SECTION.



SPILLWAY

SECTION D
1/2" = 1'-0" S-101



Brush Reservoir Dam Improvements

Aquarion Water Company

Stamford, Connecticut

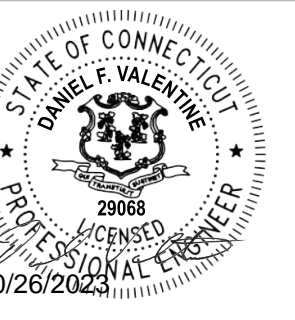
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PROJECT NO:	A-1000-195A
DATE:	05/2023
FILE:	A1000-195A-S-102-S-103 S-104.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	JC/DBS
APPROVED BY:	CDH

STRUCTURAL SECTIONS AND DETAILS - 1

SCALE: AS SHOWN

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 Plotted On: Oct 24, 2023 3:38pm
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Brush Reservoir Dam Improvements

Aquarion Water Company

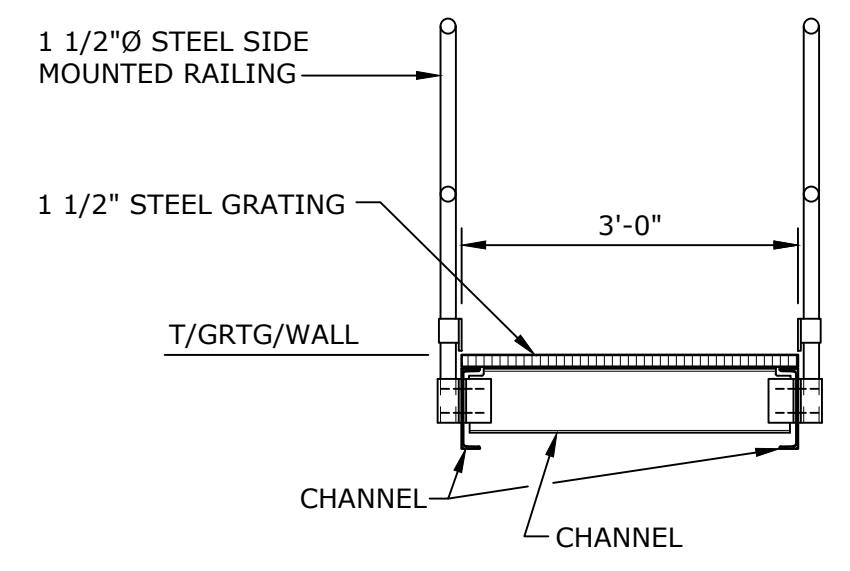
Stamford, Connecticut

MARK	DATE	DESCRIPTION
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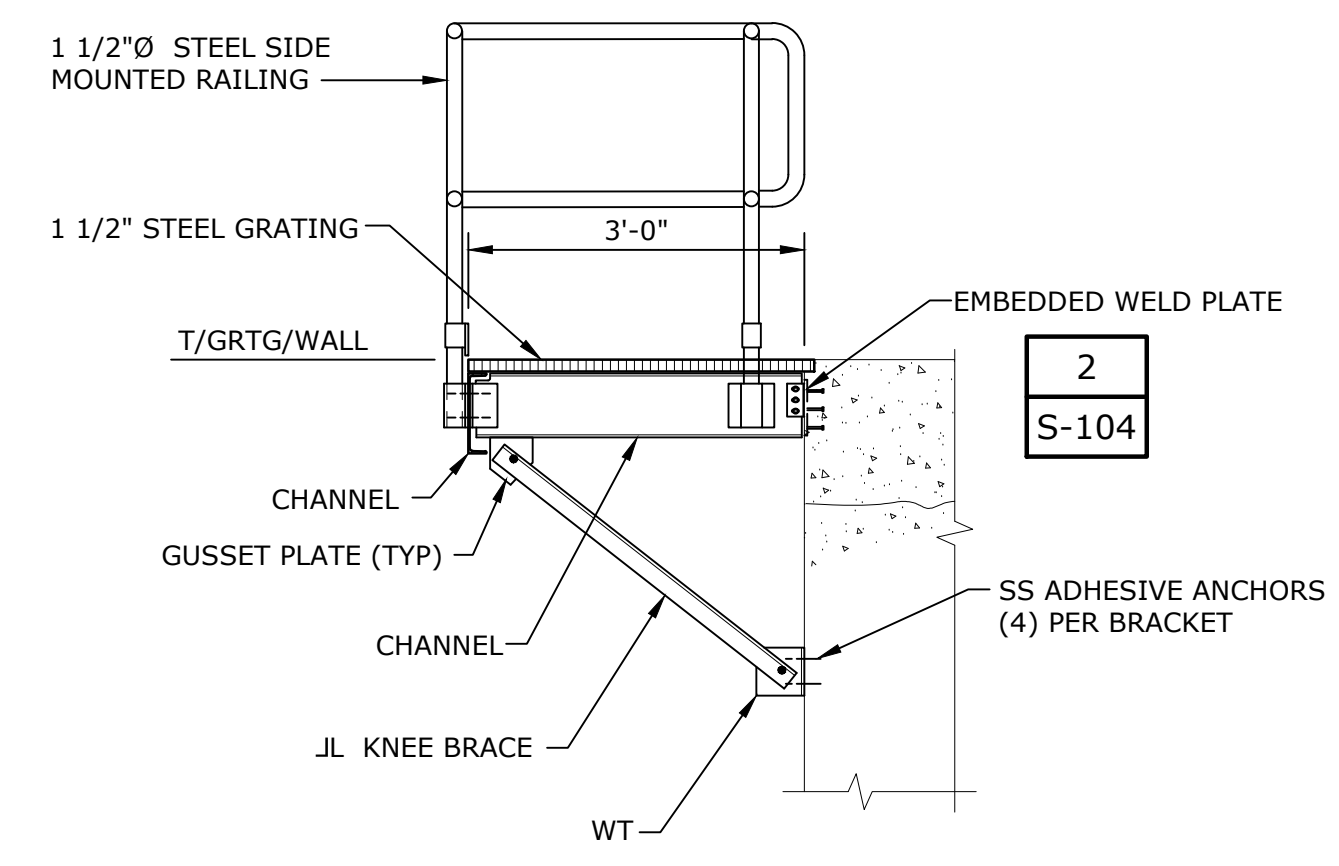
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FILE:	A1000-195A-S-102-S-103 S-104.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	JC/DBS
APPROVED BY:	CDH

STRUCTURAL SECTIONS AND DETAILS - 2

SCALE: NO SCALE



FRONT VIEW

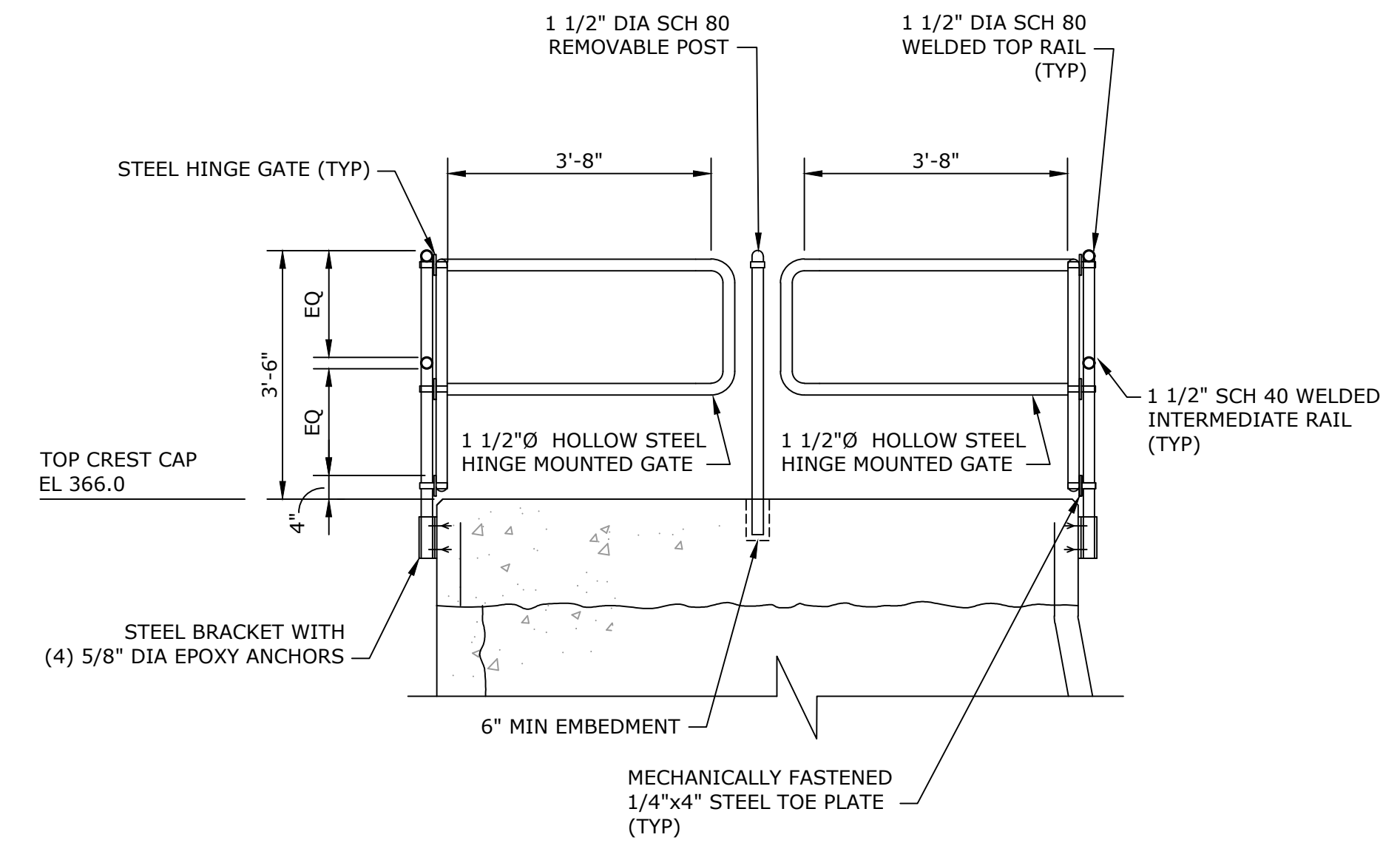


SIDE VIEW

- NOTES:**
1. FINAL FRAMING/MEMBER SIZES TO BE COMPLETED UPON SELECTION OF OPERATOR LIFT MECHANISM.

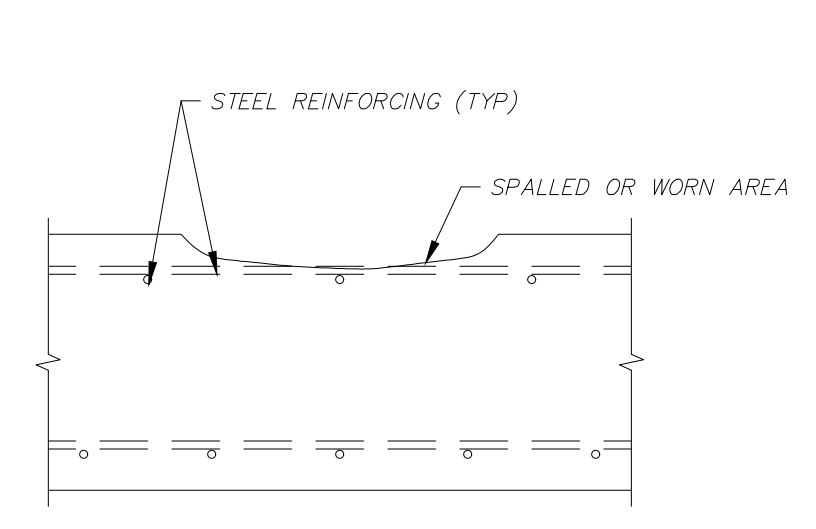
VALVE OPERATOR PLATFORM AT DAM CREST

DETAIL	2
1/2"=1'-0"	S-101

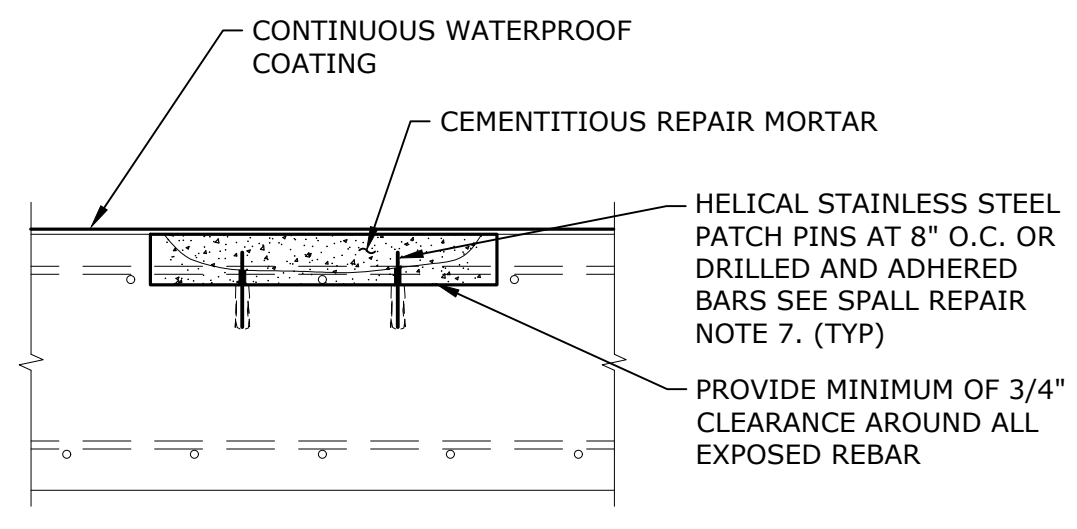


STEEL GATE AT DAM CREST

DETAIL	5
1/2"=1'-0"	S-101



EXISTING



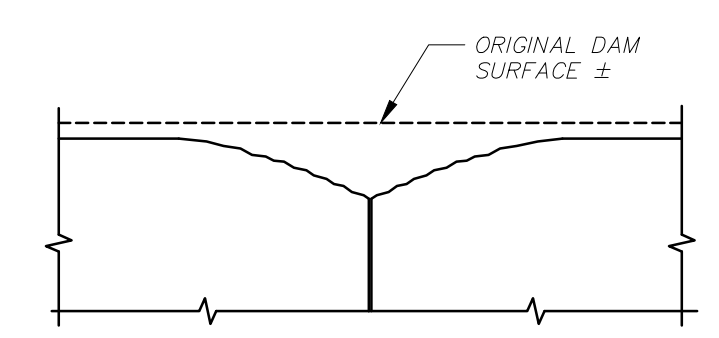
PROPOSED

- PREPARATION NOTES:**
1. REMOVE ALL LOOSE OR UNSOUND CONCRETE.
 2. PREPARE EDGES OF REPAIR TO VERTICAL PROFILE.
 3. PROVIDE MINIMUM OF 3/4" CLEARANCE AROUND ALL EXPOSED REBAR.
 4. CONSULT ENGINEER IF EXPOSED REBAR HAS SECTION LOSS.
 5. REPAIR AREA IN CONFORMANCE WITH SPECIFICATION SECTION 03930.

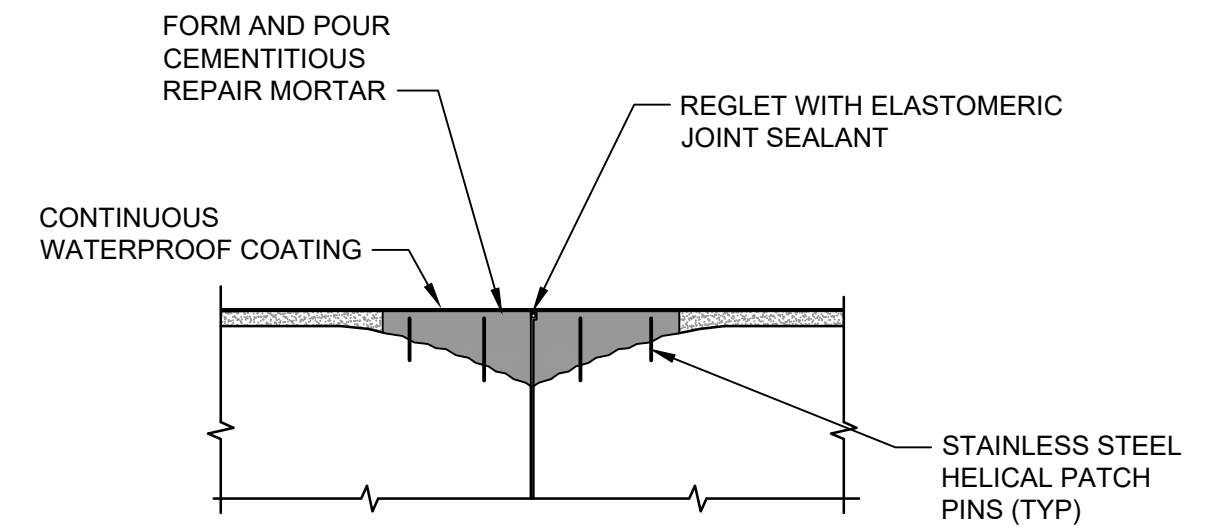
- REPAIR NOTES:**
1. SURFACE TO BE SATURATED SURFACE DRY PRIOR TO APPLICATION OF REPAIR MORTAR.
 2. SCRUB IN A BRUSH COAT OF THE REPAIR MORTAR INTO THE SUBSTRATE TO FILL ALL PORES AND VOIDS.
 3. INSTALL AND MOIST CURE THE REPAIR MORTAR IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
 4. REPAIR MORTAR SHALL BE A PORTLAND CEMENT BASED PRODUCT WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 7000 PSI.
 5. REPAIR MORTAR SHALL BE COMPATIBLE WITH THE PROPOSED WATERPROOF COATING SYSTEM.
 6. FOR REPAIRS LESS THAN 4" DEEP, INSTALL 316 STAINLESS STEEL HELICAL ANCHORS AT 8" OC EACH WAY WITH 1/2" MINIMUM COVER.
 7. FOR REPAIRS 4" OR DEEPER, DRILL AND ADHESIVE ANCHOR #3 REINF BARS AT 18" OC EACH WAY. PROVIDE A MINIMUM OF 1 1/2" CLEAR COVER OVER BARS WITH 3 1/2" EMBEDMENT INTO SOUND CONCRETE.

SPALL REPAIR

DETAIL	3
NO SCALE	S-101



EXISTING

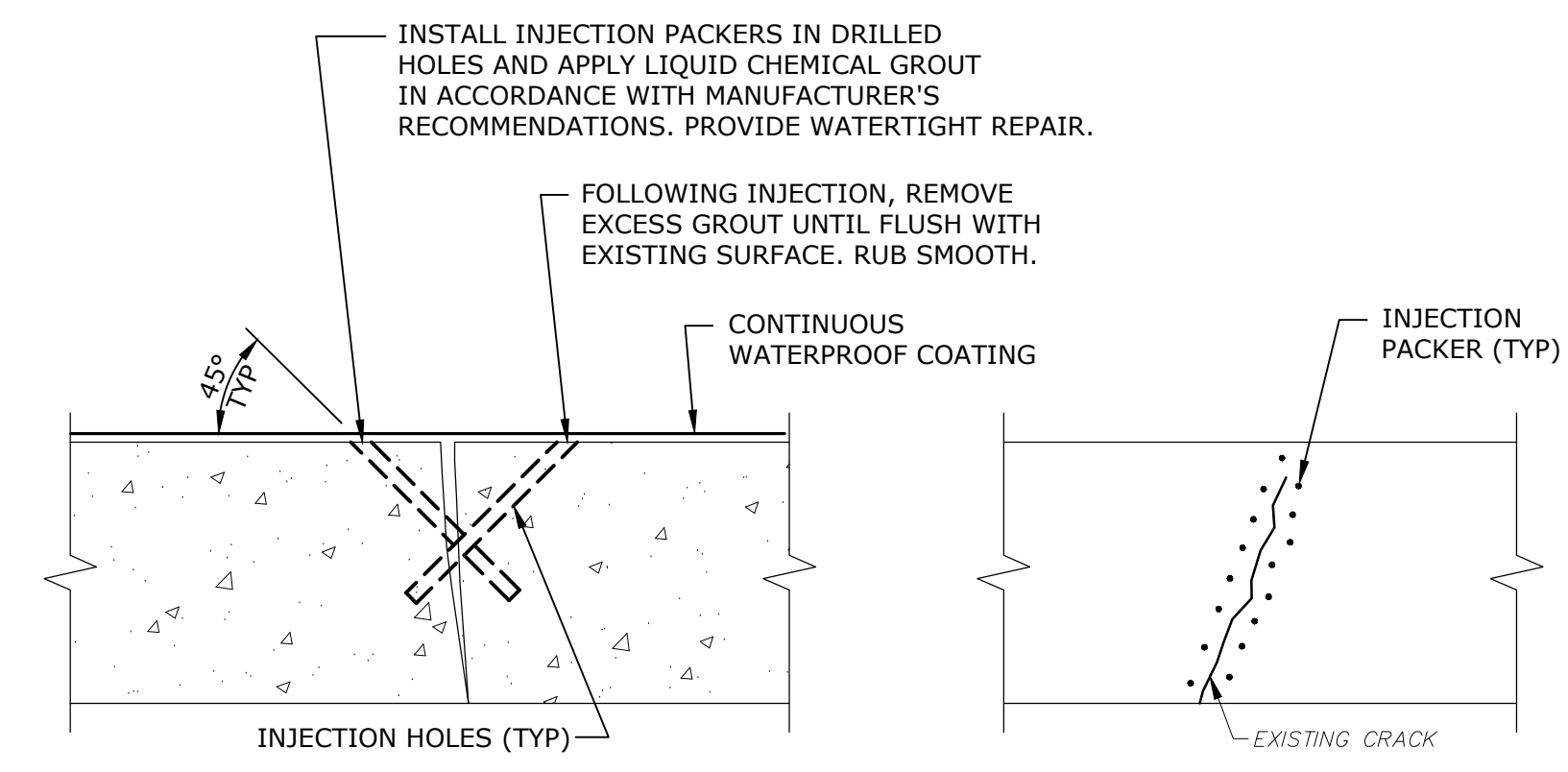


PROPOSED

- NOTES:**
1. PREPARE SURFACE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
 2. INSTALL STAINLESS STEEL HELICAL PATCH PINS AT 8" OC EACH WAY. PROVIDE MINIMUM OF 1/2" COVER ON ALL SIDES OF PATCH PINS.
 3. MIX, APPLY, AND CURE CEMENTITIOUS REPAIR MORTAR IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
 4. PERFORM GROUT INJECTION PRIOR TO SPALL REPAIR PER DETAIL 6 EXCEPT AT EXISTING EXPANSION JOINTS.

SPALL REPAIR AT JOINT

DETAIL	4
NO SCALE	S-101



SECTION

ELEVATION

- NOTES:**
1. ALL LEAKING CRACKS AND JOINTS TO BE FILLED IN ACCORDANCE WITH SPEC SECTION 03930.
 2. MAXIMUM HOLE SIZE IS 5/8" DIA. MINIMUM CRACK SIZE IS 1/16".
 3. PACKERS TO BE INSTALLED IN DRILLED HOLES.
 4. STAGGER PACKERS ON OPPOSITE SIDES OF CRACK.
 5. SPACE PACKERS IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. MAXIMUM SPACING OF PACKERS IS 12".
 6. INJECT LEAKING CONSTRUCTION JOINTS PER MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS SECTION 03930.

LIQUID CHEMICAL GROUT INJECTION

DETAIL	6
NO SCALE	S-101

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Attachment B

IPaC Official Species List and
Rangewide Determination Key Results



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project Code: 2023-0059646
Project Name: Brush Reservoir Dam

September 08, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the “**New England Field Office Endangered Species Project Review and Consultation**” website for step-by-step instructions on how to consider effects on listed

species and prepare and submit a project review package if necessary:

<https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review>

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (Updated 4/12/2023) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

<https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act

Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/service/section-7-consultations>

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to

consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

<https://www.fws.gov/program/migratory-bird-permit>

<https://www.fws.gov/library/collections/bald-and-golden-eagle-management>

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office

70 Commercial Street, Suite 300

Concord, NH 03301-5094

(603) 223-2541

PROJECT SUMMARY

Project Code: 2023-0059646

Project Name: Brush Reservoir Dam

Project Type: Dam - Maintenance/Modification

Project Description: Repairs to Brush Reservoir Dam to improve condition, stability, and hydraulic capacity for the 100-year spillway design flood. Repairs include modifications to the existing spillway to widen and deepen it, replacement of unsound concrete on the dam crest in approximately the same configuration, addition of an upstream facing wall to cutoff seepage through the concrete dam, addition of a rip rap buttress on the downstream face of the concrete dam to improve stability, and other ancillary improvements to the dam to bring it to good condition. As part of the project the normal pool elevation will be lowered and wetland buffer plantings are proposed in the area between the existing normal pool elevation and proposed normal pool elevation.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@41.139796849999996,-73.62380456848628,14z>



Counties: Fairfield County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

REPTILES

NAME	STATUS
Bog Turtle <i>Glyptemys muhlenbergii</i> Population: Wherever found, except GA, NC, SC, TN, VA No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6962	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Matthew Regan
Address: 213 Court Street, Suite 1100
City: Middletown
State: CT
Zip: 06457
Email: mregan@tighebond.com
Phone: 7169499131

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project code: 2023-0059646
Project Name: Brush Reservoir Dam

September 18, 2023

Federal Nexus: yes
Federal Action Agency (if applicable): Army Corps of Engineers

Subject: Technical assistance for 'Brush Reservoir Dam'

Dear Matthew Regan:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 18, 2023, for 'Brush Reservoir Dam' (here forward, Project). This project has been assigned Project Code 2023-0059646 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project. **Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter.**

Determination for the Northern Long-Eared Bat

Based on your IPaC submission and the standing analysis for the Dkey, your project has reached the determination of "May Affect" the northern long-eared bat.

Next Steps

Your action may qualify for the Interim Consultation Framework for the northern long-eared bat. To determine if it qualifies, review the Interim Consultation Framework posted here <https://www.fws.gov/library/collections/interim-consultation-framework-northern-long-eared-bat>. If you

determine it meets the requirements of the Interim Consultation Framework, follow the procedures outlined there to complete section 7 consultation.

If your project does **not** meet the requirements of the Interim Consultation Framework, please contact the New England Ecological Services Field Office for further coordination on this project. Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of “May Affect”.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Bog Turtle *Glyptemys muhlenbergii* Threatened
- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may cause prohibited take of the species listed above.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

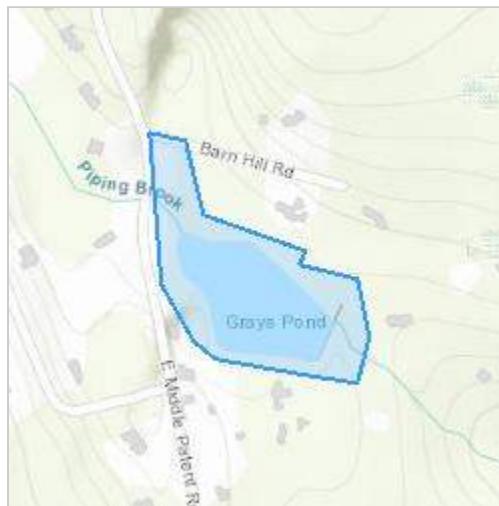
Brush Reservoir Dam

2. Description

The following description was provided for the project 'Brush Reservoir Dam':

Repairs to Brush Reservoir Dam to improve condition, stability, and hydraulic capacity for the 100-year spillway design flood. Repairs include modifications to the existing spillway to widen and deepen it, replacement of unsound concrete on the dam crest in approximately the same configuration, addition of an upstream facing wall to cutoff seepage through the concrete dam, addition of a rip rap buttress on the downstream face of the concrete dam to improve stability, and other ancillary improvements to the dam to bring it to good condition. As part of the project the normal pool elevation will be lowered and wetland buffer plantings are proposed in the area between the existing normal pool elevation and proposed normal pool elevation.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@41.139796849999996,-73.62380456848628,14z>



DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of “may affect” for the Endangered northern long-eared bat (*Myotis septentrionalis*).

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

No

2. Do you have post-white nose syndrome occurrence data that indicates that northern long-eared bats (NLEB) are likely to be present in the action area?

Bat occurrence data may include identification of NLEBs in hibernacula, capture of NLEBs, tracking of NLEBs to roost trees, or confirmed acoustic detections. With this question, we are looking for data that, for some reason, may have not yet been made available to U.S. Fish and Wildlife Service.

No

3. Does any component of the action involve construction or operation of wind turbines?

Note: For federal actions, answer ‘yes’ if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

No

4. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

Yes

5. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) funding or authorizing the proposed action, in whole or in part?

No

6. Are you an employee of the federal action agency or have you been officially designated in writing by the agency as its designated non-federal representative for the purposes of Endangered Species Act Section 7 informal consultation per 50 CFR § 402.08?

Note: This key may be used for federal actions and for non-federal actions to facilitate section 7 consultation and to help determine whether an incidental take permit may be needed, respectively. This question is for information purposes only.

No

7. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)? Is the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC) funding or authorizing the proposed action, in whole or in part?

No

8. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

No

9. Have you determined that your proposed action will have no effect on the northern long-eared bat? Remember to consider the [effects of any activities](#) that would not occur but for the proposed action.

If you think that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, answer “No” below and continue through the key. If you have determined that the northern long-eared bat does not occur in your project’s action area and/or that your project will have no effects whatsoever on the species despite the potential for it to occur in the action area, you may make a “no effect” determination for the northern long-eared bat.

Note: Federal agencies (or their designated non-federal representatives) must consult with USFWS on federal agency actions that may affect listed species [50 CFR 402.14(a)]. Consultation is not required for actions that will not affect listed species or critical habitat. Therefore, this determination key will not provide a consistency or verification letter for actions that will not affect listed species. If you believe that the northern long-eared bat may be affected by your project or if you would like assistance in deciding, please answer “No” and continue through the key. Remember that this key addresses only effects to the northern long-eared bat. Consultation with USFWS would be required if your action may affect another listed species or critical habitat. The definition of [Effects of the Action](#) can be found here: <https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

No

10. [Semantic] Is the action area located within 0.5 miles of a known northern long-eared bat hibernaculum?

Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your State wildlife agency.

Automatically answered

No

11. Does the action area contain any caves (or associated sinkholes, fissures, or other karst features), mines, rocky outcroppings, or tunnels that could provide habitat for hibernating northern long-eared bats?

No

12. Is suitable summer habitat for the northern long-eared bat present within 1000 feet of project activities?
(If unsure, answer "Yes.")

Note: If there are trees within the action area that are of a sufficient size to be potential roosts for bats (i.e., live trees and/or snags ≥ 3 inches (12.7 centimeter) dbh), answer "Yes". If unsure, additional information defining suitable summer habitat for the northern long-eared bat can be found at: <https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

Yes

13. Will the action cause effects to a bridge?

No

14. Will the action result in effects to a culvert or tunnel?

No

15. Does the action include the intentional exclusion of northern long-eared bats from a building or structure?

Note: Exclusion is conducted to deny bats' entry or reentry into a building. To be effective and to avoid harming bats, it should be done according to established standards. If your action includes bat exclusion and you are unsure whether northern long-eared bats are present, answer "Yes." Answer "No" if there are no signs of bat use in the building/structure. If unsure, contact your local U.S. Fish and Wildlife Services Ecological Services Field Office to help assess whether northern long-eared bats may be present. Contact a Nuisance Wildlife Control Operator (NWCO) for help in how to exclude bats from a structure safely without causing harm to the bats (to find a NWCO certified in bat standards, search the Internet using the search term "National Wildlife Control Operators Association bats"). Also see the White-Nose Syndrome Response Team's guide for bat control in structures

No

16. Does the action involve removal, modification, or maintenance of a human-made structure (barn, house, or other building) **known or suspected to contain roosting bats**?

No

17. Will the action cause construction of one or more new roads open to the public?

For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

No

18. Will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic on one or more existing roads?

Note: For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.). .

No

19. Will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

For federal actions, answer 'yes' when the construction or operation of these facilities is either (1) part of the federal action or (2) would not occur but for an action taken by a federal agency (federal permit, funding, etc.).

No

20. Will the proposed action involve the creation of a new water-borne contaminant source (e.g., leachate pond pits containing chemicals that are not NSF/ANSI 60 compliant)?

No

21. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

No

22. Will the action include drilling or blasting?

Yes

23. Will the drilling or blasting affect known or potentially suitable hibernacula, summer habitat, or active year-round habitat (where applicable) for the northern long-eared bat?

Note: In addition to direct impacts to hibernacula, consider impacts to hydrology or air flow that may impact the suitability of hibernacula. Additional information defining suitable summer habitat for the northern long-eared bat can be found at: <https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

No

24. Will the action involve military training (e.g., smoke operations, obscurant operations, exploding munitions, artillery fire, range use, helicopter or fixed wing aircraft use)?

No

25. Will the proposed action involve the use of herbicides or pesticides other than herbicides (e.g., fungicides, insecticides, or rodenticides)?

No

26. Will the action include or cause activities that are reasonably certain to cause chronic nighttime noise in suitable summer habitat for the northern long-eared bat? Chronic noise is noise that is continuous or occurs repeatedly again and again for a long time.

Note: Additional information defining suitable summer habitat for the northern long-eared bat can be found at:

<https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

No

27. Does the action include, or is it reasonably certain to cause, the use of artificial lighting within 1000 feet of suitable northern long-eared bat roosting habitat?

Note: Additional information defining suitable roosting habitat for the northern long-eared bat can be found at:

<https://www.fws.gov/media/northern-long-eared-bat-assisted-determination-key-selected-definitions>

No

28. Will the action include tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming?

Yes

29. Does the action include emergency cutting or trimming of hazard trees in order to remove an imminent threat to human safety or property? See hazard tree note at the bottom of the key for text that will be added to response letters

Note: A "hazard tree" is a tree that is an immediate threat to lives, public health and safety, or improved property and has a diameter breast height of six inches or greater.

No

30. Are any of the trees proposed for cutting or other means of knocking down, bringing down, topping, or trimming suitable for northern long-eared bat roosting (i.e., live trees and/or snags ≥ 3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities)?

Yes

31. [Semantic] Does your project intersect a known sensitive area for the northern long-eared bat?

Note: The map queried for this question contains proprietary information and cannot be displayed. If you need additional information, please contact your [state agency or USFWS field office](#)

Automatically answered

Yes

PROJECT QUESTIONNAIRE

Enter the extent of the action area (in acres) from which trees will be removed - round up to the nearest tenth of an acre. For this question, include the entire area where tree removal will take place, even if some live or dead trees will be left standing.

0.3

In what extent of the area (in acres) will trees be cut, knocked down, or trimmed during the inactive (hibernation) season for northern long-eared bat? **Note:** Inactive Season dates for spring staging/fall swarming areas can be found here: <https://www.fws.gov/media/inactive-season-dates-swarming-and-staging-areas>

0.3

In what extent of the area (in acres) will trees be cut, knocked down, or trimmed during the active (non-hibernation) season for northern long-eared bat? **Note:** Inactive Season dates for spring staging/fall swarming areas can be found here: <https://www.fws.gov/media/inactive-season-dates-swarming-and-staging-areas>

0

Will all potential northern long-eared bat (NLEB) roost trees (trees ≥ 3 inches diameter at breast height, dbh) be cut, knocked, or brought down from any portion of the action area greater than or equal to 0.1 acre? If all NLEB roost trees will be removed from multiple areas, select 'Yes' if the cumulative extent of those areas meets or exceeds 0.1 acre.

No

Enter the extent of the action area (in acres) from which all potential NLEB roost trees will be removed. If all NLEB roost trees will be removed from multiple areas, entire the total extent of those areas. Round up to the nearest tenth of an acre.

0.1

For the area from which all potential northern long-eared bat (NLEB) roost trees will be removed, on how many acres (round to the nearest tenth of an acre) will trees be allowed to regrow? Enter '0' if the entire area from which all potential NLEB roost trees are removed will be developed or otherwise converted to non-forest for the foreseeable future.

0.1

Will any snags (standing dead trees) ≥ 3 inches dbh be left standing in the area(s) in which all northern long-eared bat roost trees will be cut, knocked down, or otherwise brought down?

Yes

Will all project activities be completed by April 1, 2024?

No

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Matthew Regan
Address: 213 Court Street, Suite 1100
City: Middletown
State: CT
Zip: 06457
Email: mregan@tighebond.com
Phone: 7169499131

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers



United States Department of the Interior



FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To:
Project code: 2023-0059646
Project Name: Brush Reservoir Dam

September 18, 2023

Federal Nexus: yes
Federal Action Agency (if applicable): Army Corps of Engineers

Subject: Technical assistance for 'Brush Reservoir Dam'

Dear Matthew Regan:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 18, 2023, for "Brush Reservoir Dam" (here forward, Project). This project has been assigned Project Code 2023-0059646 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (Dkey), invalidates this letter. **Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.**

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Service concurs, in writing, that a

proposed action "is not likely to adversely affect (NLAA)" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

Species	Listing Status	Determination
Bog Turtle (<i>Glyptemys muhlenbergii</i>)	Threatened	May affect

To complete consultation for species that have reached a "May Affect" determination and/or species may occur in your project area and are not covered by this conclusion, please visit the "New England Field Office Endangered Species Project Review and Consultation" website for step-by-step instructions on how to consider effects on these listed species and/or critical habitats, avoid and minimize potential adverse effects, and prepare and submit a project review package if necessary: <https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review>

Consultation with the Service is not complete. Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of "May Affect". Please contact our New England Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species or designated critical habitats.

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Candidate
- Northern Long-eared Bat *Myotis septentrionalis* Endangered

To complete consultation for species that have reached a "May Affect" determination and/or species may occur in your project area and are not covered by this conclusion, please visit the "New England Field Office Endangered Species Project Review and Consultation" website for step-by-step instructions on how to consider effects on these listed species and/or critical habitats, avoid and minimize potential adverse effects, and prepare and submit a project review package if necessary: <https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review>

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference the Project Code associated with this Project.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

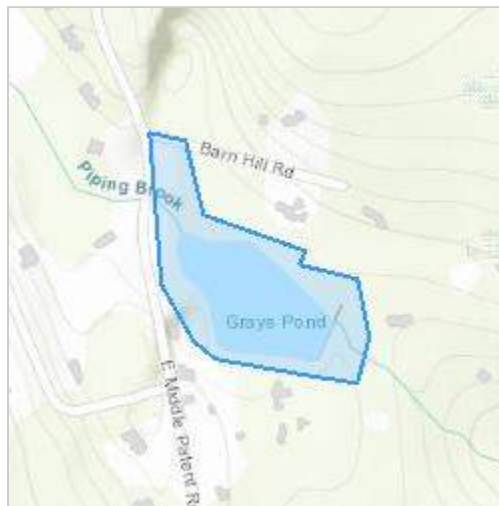
Brush Reservoir Dam

2. Description

The following description was provided for the project 'Brush Reservoir Dam':

Repairs to Brush Reservoir Dam to improve condition, stability, and hydraulic capacity for the 100-year spillway design flood. Repairs include modifications to the existing spillway to widen and deepen it, replacement of unsound concrete on the dam crest in approximately the same configuration, addition of an upstream facing wall to cutoff seepage through the concrete dam, addition of a rip rap buttress on the downstream face of the concrete dam to improve stability, and other ancillary improvements to the dam to bring it to good condition. As part of the project the normal pool elevation will be lowered and wetland buffer plantings are proposed in the area between the existing normal pool elevation and proposed normal pool elevation.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@41.139796849999996,-73.62380456848628,14z>



QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

Yes

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

Note: This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

No

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

Yes

4. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) the lead agency for this project?

No

5. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

Note: If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

Yes

6. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

No

7. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

No

8. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

No

9. Will the proposed project involve the use of herbicide where listed species are present?

No

10. Are there any caves or anthropogenic features suitable for hibernating or roosting bats within the area expected to be impacted by the project?

No

11. Does any component of the project associated with this action include structures that may pose a collision risk to **birds** (e.g., land-based or offshore wind turbines, communication towers, high voltage transmission lines, any type of towers with or without guy wires)?

Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

No

12. Does any component of the project associated with this action include structures that may pose a collision risk to **bats** (e.g., land-based wind turbines)?

Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

No

13. Will the proposed project result in permanent changes to water quantity in a stream or temporary changes that would be sufficient to result in impacts to listed species?

For example, will the proposed project include any activities that would alter stream flow, such as water withdrawal, hydropower energy production, impoundments, intake structures, diversion structures, and/or turbines? Projects that include temporary and limited water reductions that will not displace listed species or appreciably change water availability for listed species (e.g. listed species will experience no changes to feeding, breeding or sheltering) can answer "No". Note: This question refers only to the amount of water present in a stream, other water quality factors, including sedimentation and turbidity, will be addressed in following questions.

No

14. Will the proposed project affect wetlands where listed species are present?

This includes, for example, project activities within wetlands, project activities within 300 feet of wetlands that may have impacts on wetlands, water withdrawals and/or discharge of contaminants (even with a NPDES).

Yes

15. Will the proposed project activities (including upland project activities) occur within 0.5 miles of the water's edge of a stream or tributary of a stream where listed species may be present?

Yes

16. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream or tributary where listed species may be present?

Yes

17. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

No

18. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds) where listed species may be present?

No

19. Will the proposed project involve the removal of excess sediment or debris, dredging or in-stream gravel mining where listed species may be present?

Yes

20. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

Note New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

No

21. Will the proposed project involve perennial stream loss, in a stream or tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

No

22. Will the proposed project involve blasting where listed species may be present?

No

23. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

Yes

24. Will the proposed project involve earth moving that could cause erosion and sedimentation, and/or contamination along a stream or tributary of a stream where listed species may be present?

Note: Answer "Yes" to this question if erosion and sediment control measures will be used to protect the stream.

Yes

25. Will earth moving activities result in sediment being introduced to streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal, and/or change in site topography?

No

26. Will the proposed project involve vegetation removal within 200 feet of a perennial stream bank where aquatic listed species may be present?

No

27. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project? If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

Yes

28. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

No

29. [Semantic] Does the project intersect the Virginia big-eared bat critical habitat?

Automatically answered

No

30. [Semantic] Does the project intersect the Indiana bat critical habitat?

Automatically answered

No

31. [Semantic] Does the project intersect the candy darter critical habitat?

Automatically answered

No

32. [Semantic] Does the project intersect the diamond darter critical habitat?

Automatically answered

No

33. [Semantic] Does the project intersect the Big Sandy crayfish critical habitat?

Automatically answered

No

34. [Hidden Semantic] Does the project intersect the Guyandotte River crayfish critical habitat?

Automatically answered

No

35. [Hidden Semantic] Does the project intersect the Bog Turtle AOI?

Automatically answered

Yes

36. Are bog turtles known to occur within the action area?

If unsure, data can be requested from the appropriate state Natural Heritage program.

No

37. Does the project include activity in or within 300 feet of a freshwater wetland?

Note:Activities include, but are not limited to, wetland draining, ditching, tilling, filling, excavating, stream diversion, impoundments; mowing or grazing of vegetation; access roads; detention basins; water or sewer lines; irrigation; increase in impervious surfaces; and application of pesticides, deicing agents or fertilizers.

Yes

38. Has a bog turtle [Phase 1 habitat assessment](#) been conducted?

No

39. Do you have any other documents that you want to include with this submission?

No

PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

0.1

2. Approximately how many total acres of disturbance are within the disturbance/ construction limits of the proposed project?

1.6

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

The action area includes Brush Reservoir Dam. The dam serves to impound water, also known as Grays Pond, a former water supply reservoir. Grays Pond is located northwest of the Brush Reservoir Dam and is classified as an excavated palustrine unconsolidated bottom wetland with a permanently flooded water regime (PUBHx) by the U.S. Fish & Wildlife Service (USFWS) National Wetland Inventory (NWI). There is a wetland classified by the USFWS NWI as a palustrine forested broad leaved deciduous wetland with a seasonally flooded/saturated water regime (PFO1E) immediately upstream of Grays Pond. The pond serves to store a relatively small volume of water in the watershed that contributes to the Greenwich Reservoir System through Bargh or Rockwood Reservoirs. The dam's spillway discharges to Grays Pond Brook downstream of the dam, which conveys flow to Bargh Reservoir. Grays Pond Brook is classified as a riverine upper perennial unconsolidated bottom wetland with a permanently flooded water regime (R3UBH).

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Matthew Regan
Address: 213 Court Street, Suite 1100
City: Middletown
State: CT
Zip: 06457
Email: mregan@tighebond.com
Phone: 7169499131

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers

Attachment C

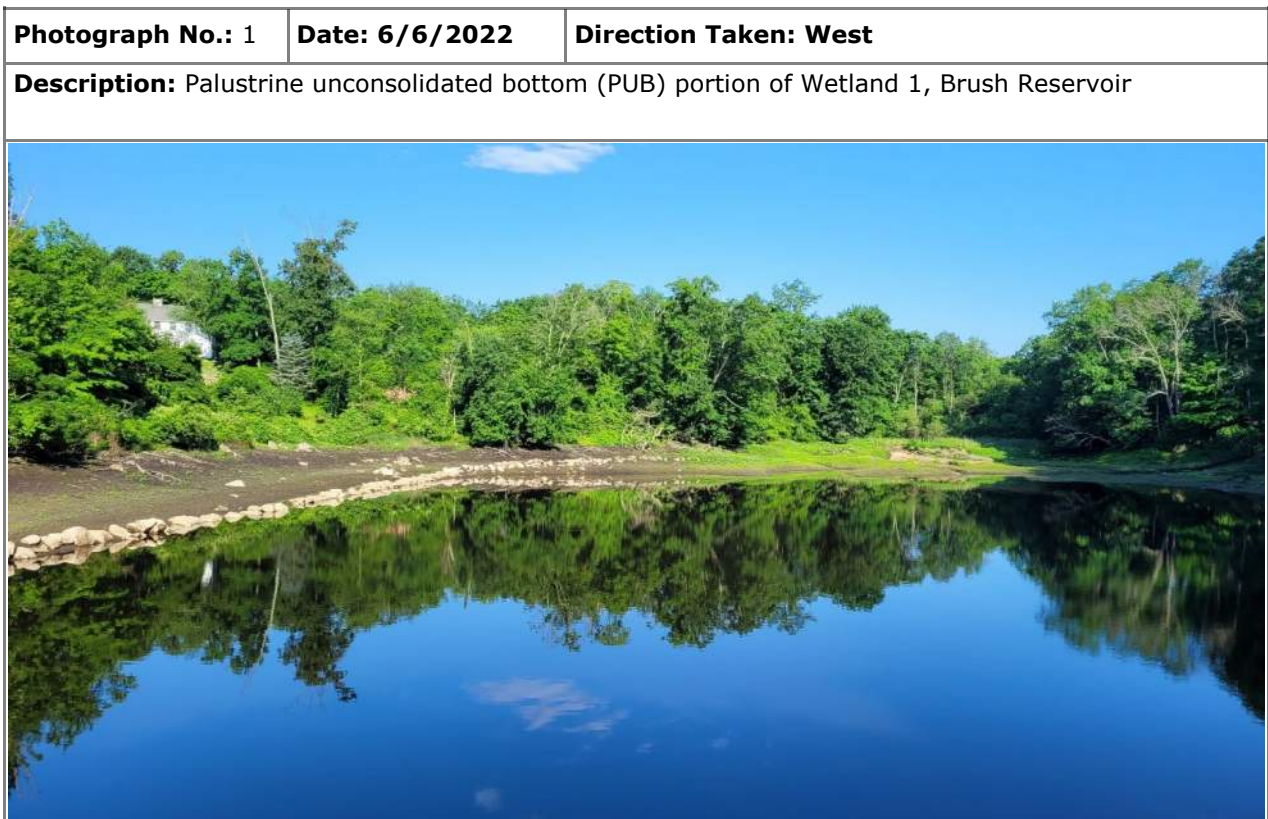
Site Photographs

Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

Photograph No.: 3	Date: 6/6/2022	Direction Taken: East
--------------------------	-----------------------	------------------------------

Description: Wetland 1, Brush Reservoir, view from inlet stream toward the dam.



Photograph No.: 4	Date: 6/6/2022	Direction Taken: Northwest
--------------------------	-----------------------	-----------------------------------

Description: Palustrine emergent (PEM) vegetation surrounded by palustrine forested (PFO) vegetation in northwestern portion of Wetland 1



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

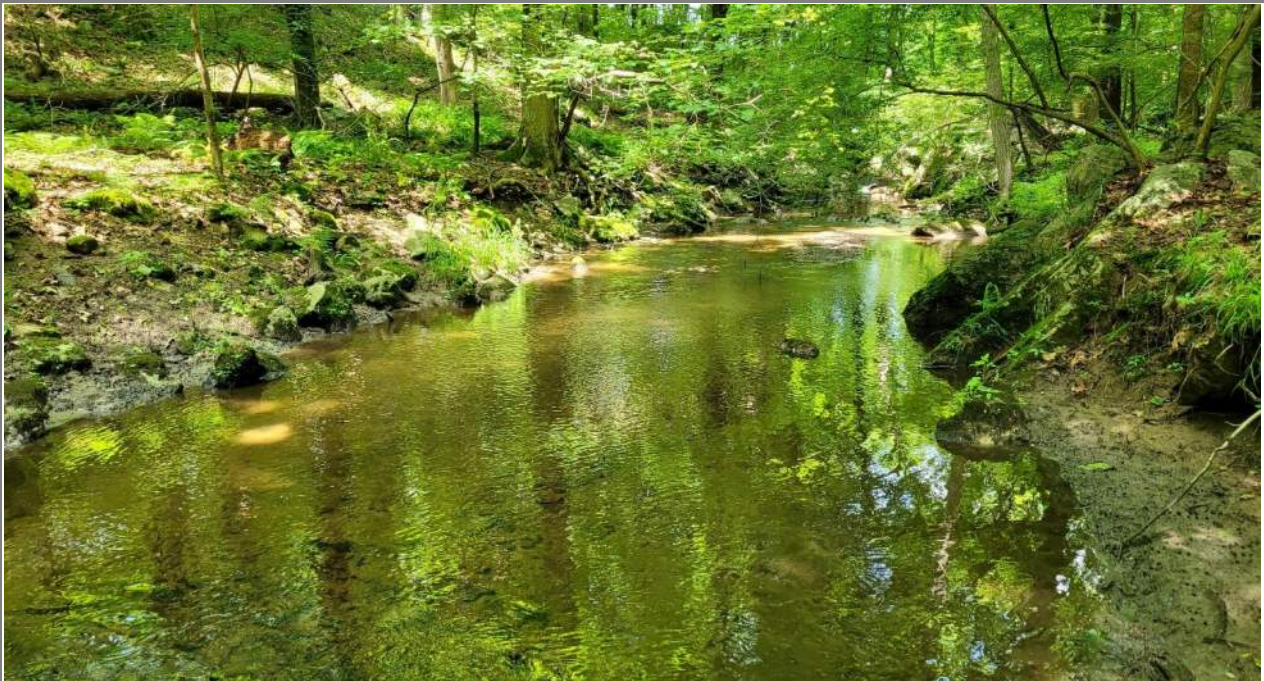
Photograph No.: 5	Date: 6/6/2022	Direction Taken: North
--------------------------	-----------------------	-------------------------------

Description: PFO cover type in the northwestern portion of Wetland 1



Photograph No.: 6	Date: 6/6/2022	Direction Taken: East
--------------------------	-----------------------	------------------------------

Description: Perennial stream (Grays Pond Brook) bordered by Wetland 2



Photographic Log

Client: Aquarion Water Company

Job Number: 101000195A

Site: Brush Reservoir Dam

Photograph No.: 7	Date: 6/6/2022	Direction Taken: West
--------------------------	-----------------------	------------------------------

Description: Perennial stream (Grays Pond Brook) bordered by PEM cover type in Wetland 2



Photograph No.: 8	Date: 6/6/2022	Direction Taken: North
--------------------------	-----------------------	-------------------------------

Description: PEM cover type bordering perennial stream (Grays Pond Brook) in Wetland 2



Attachment D

Species Determination Table

Species Determination Table for Endangered Species Project Review

Date: October 9, 2023

Your Name: Matthew Regan

Project Name used in IPaC: Brush Reservoir Dam

Project Code (from IPaC): 2023-0059646

Listed Species Determination Table

Species Name	Suitable Habitat	Species Presence	Conservation Measures Incorporated into Project	Determination	Notes/Information
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Suitable habitat present	Unknown	All tree-clearing will be completed by April 15, 2024.	NLAA	Only six trees are proposed to be removed as part of the project. All tree-clearing will be completed in the inactive season by April 15, 2024. The project is not within an area identified by the Connecticut Natural Diversity Database as an area within the proximity of rare wildlife species.
Bog Turtle (<i>Glyptemys muhlenbergii</i>)	Unknown	Unknown	Exclusionary fencing be installed around the site. A recognized qualified bog turtle phase 2 surveyor for the Hudson River/Housatonic recovery unit will inspect the exclusionary fencing to ensure no bog turtles are within the project area. An education and encounter plan will be developed to train everyone on site should they encounter a bog turtle.	NLAA	According to the USFWS, Fairfield County, Connecticut has historic records of bog turtles dating back 30 years or more and their presence in Fairfield County has not been recently confirmed. The project is not within an area identified by the Connecticut Natural Diversity Database as an area within the proximity of rare wildlife species.

Appendix E

State and Tribal Historic Preservation Office Notifications

A1000-195
March 23, 2023

State Historic Preservation Office
Attn: Environmental Review
450 Columbus Boulevard, Suite 5
Hartford, CT 06103

Re: **Project Review Request
Brush Reservoir (Gray's Pond) Dam Improvements**

Dear Project Reviewer:

On behalf of Aquarion Water Company (AWC), Tighe & Bond, Inc. is submitting a project review request for information regarding the potential presence of significant historic and/or archeological resources at or near a proposed modifications to an existing dam in Stamford, Connecticut. This project is seeking state and federal permits that require compliance with state and federal historic preservation regulations. This project review request submittal includes a project description in this cover letter and the following attachments:

- Project Review Cover Form
- Soil survey
- Maps depicting the project area
- Photographs of the project area
- Project plans depicting the proposed work area

Project Description

The AWC is proposing improvements to the existing Brush Reservoir Dam (CT Dam ID #13504). The Dam has been classified as a Class BB (moderate) hazard potential by the Connecticut Department of Energy & Environmental Protection (DEEP) Dam Safety Program in accordance with the classification procedures contained in CGS Section 22a-401 through 22a-411 and RCSA Sections 22a-409-1 through 22a-409-2.

The proposed work includes the following improvements at the Brush Reservoir Dam:

- Lowering the dam spillway elevation from 364.5 feet to 360 feet
- Widening the spillway
- Installing a downstream riprap buttress
- Installing seepage cutoff at the upstream face
- Demolishing and replacing the upper portion of the concrete dam crest
- Extending the low-level outlet pipe downstream past the proposed riprap buttress
- Replacing the upstream low-level outlet control valve
- Lowering the normal pool elevation
- Water tolerant plantings in the formerly inundated area



Historic Property Review

A desktop review of publicly available data from The Connecticut State Historic Preservation Office (SHPO), Historic Property Database and the National Register of Historic Places was completed for the presence of properties near the Project Site in Stamford. No historical landmarks were identified within or near the proposed project or construction areas.

If you have any questions or require additional information, please contact me at 716-949-9131 or MRegan@tighebond.com.

Very truly yours,

TIGHE & BOND, INC.



Matthew Regan, PWS
Project Environmental Scientist

Enclosures

Copy: Mr. James Quinn, THPO, The Mohegan Tribe
Ms. Marissa Turnbull, THPO, Mashantucket Pequot Tribal Nation
Ms. Bettina Washington, THPO, Wampanoag Tribe of Gay Head

Project Review Cover Form



PROJECT REVIEW COVER FORM

This is: a new submittal supplemental information other Date Submitted: _____

PROJECT INFORMATION

Project Name: _____

Project Proponent: _____
The individual or group sponsoring, organizing, or proposing the project.

Project Street Address: _____
Include street number, street name, and or Route Number. If no street address exists give closest intersection.

City or Town: _____ County: _____
Please use the municipality name and not the village or hamlet.

PROJECT DESCRIPTION (REQUIRED)

Please summarize the project below. In a separate attachment, describe the project in detail. As applicable, provide any information regarding past land use, project area size, renovation plans, demolitions, and/or new construction.

List all state and federal agencies involved in the project and indicate the funding, permit, license or approval program pertaining to the proposed project:

Table with 3 columns: Agency Type, Agency Name, Program Name. Includes checkboxes for State and Federal.

If there is no state or federal agency involvement, please state the reason for your review request:

FOR SHPO USE ONLY

Based on the information submitted to our office for the above named property and project, it is the opinion of the Connecticut State Historic Preservation Office that no historic properties will be affected by the proposed activities.*

Jonathan Kinney
Deputy State Historic Preservation Officer

Date

*All other determinations of effect will result in a formal letter from this office



PROJECT REVIEW COVER FORM

CULTURAL RESOURCES IDENTIFICATION

Background research for previously identified historic properties within a project area may be undertaken at the SHPO's office. To schedule an appointment, please contact Catherine Labadia, 860-500-2329 or Catherine.labadia@ct.gov. Some applicants may find it advantageous to hire a qualified historic preservation professional to complete the identification and evaluation of historic properties.

Are there any historic properties listed on the State or National Register of Historic Places within the project area? (Select one)

- Yes No Do Not Know

If yes, please identify: _____

Architecture

Are there any buildings, structures, or objects within the Area of Potential Effects (houses, bridges, barns, walls, etc.)? The area of potential effects means the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties. If you're not sure, check "I don't know."

- Yes (attach clearly labeled photographs of each resource and applicable property cards from the municipality assessor)
 No (proceed to next section)
 I don't know (proceed to next section)

Date the existing building/structures/objects were constructed: _____

If the project involves rehabilitation, demolition, or alterations to existing buildings older than 50 years, provide a work plan (If window replacements are proposed, provide representative photographs of existing windows).

Archeology

Does the proposed project involve ground disturbing activities?

- Yes (provide below or attach a description of current and prior land use and disturbances. Attach an excerpt of the soil survey map for the project area. These can be created for free at: <https://websoilsurvey.nrcs.usda.gov>

- No

CHECKLIST (Did you attach the following information?)

<p style="text-align: center;">Required for all Projects</p> <input type="checkbox"/> Completed Form <input type="checkbox"/> Map clearly labelled depicting project area <input type="checkbox"/> Photographs of current site conditions <input type="checkbox"/> Site or project plans for new construction	<p style="text-align: center;">Required for Projects with architectural resources</p> <input type="checkbox"/> Work plans for rehabilitation or renovation <input type="checkbox"/> Assessor's Property Card <p style="text-align: center;">Required for Projects with ground disturbing activities</p> <input type="checkbox"/> Soil survey map
<p>Suggested Attachments, as needed</p> <input type="checkbox"/> Supporting documents needed to explain project <input type="checkbox"/> Supporting documents identifying historic properties <input type="checkbox"/> Historic maps or aerials (available at http://magic.lib.uconn.edu or https://www.historicaerials.com/)	

PROJECT CONTACT

Name: _____ Firm/Agency: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Email: _____

Federal and state laws exist to ensure that agencies, or their designated applicants, consider the impacts of their projects on historic resources. At a minimum, submission of this completed form with its attachments constitutes a request for review by the Connecticut SHPO. The responsibility for preparing documentation, including the identification of historic properties and the assessment of potential effects resulting from the project, rests with the federal or state agency, or its designated applicant. The role of SHPO is to review, comment, and consult. SHPO's ability to complete a timely project review largely depends on the quality of the materials submitted. Please mail the completed form with all attachments to the attention of: Environmental Review, State Historic Preservation Office, 450 Columbus Boulevard, Suite 5, Hartford, CT. **Electronic submissions are not accepted at this time.**

Soil Survey

Custom Soil Resource Report Soil Map

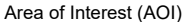





































Map Scale: 1:1,990 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 -  Soil Map Unit Polygons
 -  Soil Map Unit Lines
 -  Soil Map Unit Points
- Special Point Features**
 -  Blowout
 -  Borrow Pit
 -  Clay Spot
 -  Closed Depression
 -  Gravel Pit
 -  Gravelly Spot
 -  Landfill
 -  Lava Flow
 -  Marsh or swamp
 -  Mine or Quarry
 -  Miscellaneous Water
 -  Perennial Water
 -  Rock Outcrop
 -  Saline Spot
 -  Sandy Spot
 -  Severely Eroded Spot
 -  Sinkhole
 -  Slide or Slip
 -  Sodic Spot
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
- Other Features**
 -  Spoil Area
 -  Stony Spot
 -  Very Stony Spot
 -  Wet Spot
 -  Other
 -  Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
 Survey Area Data: Version 22, Sep 12, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 21, 2022—Oct 27, 2022

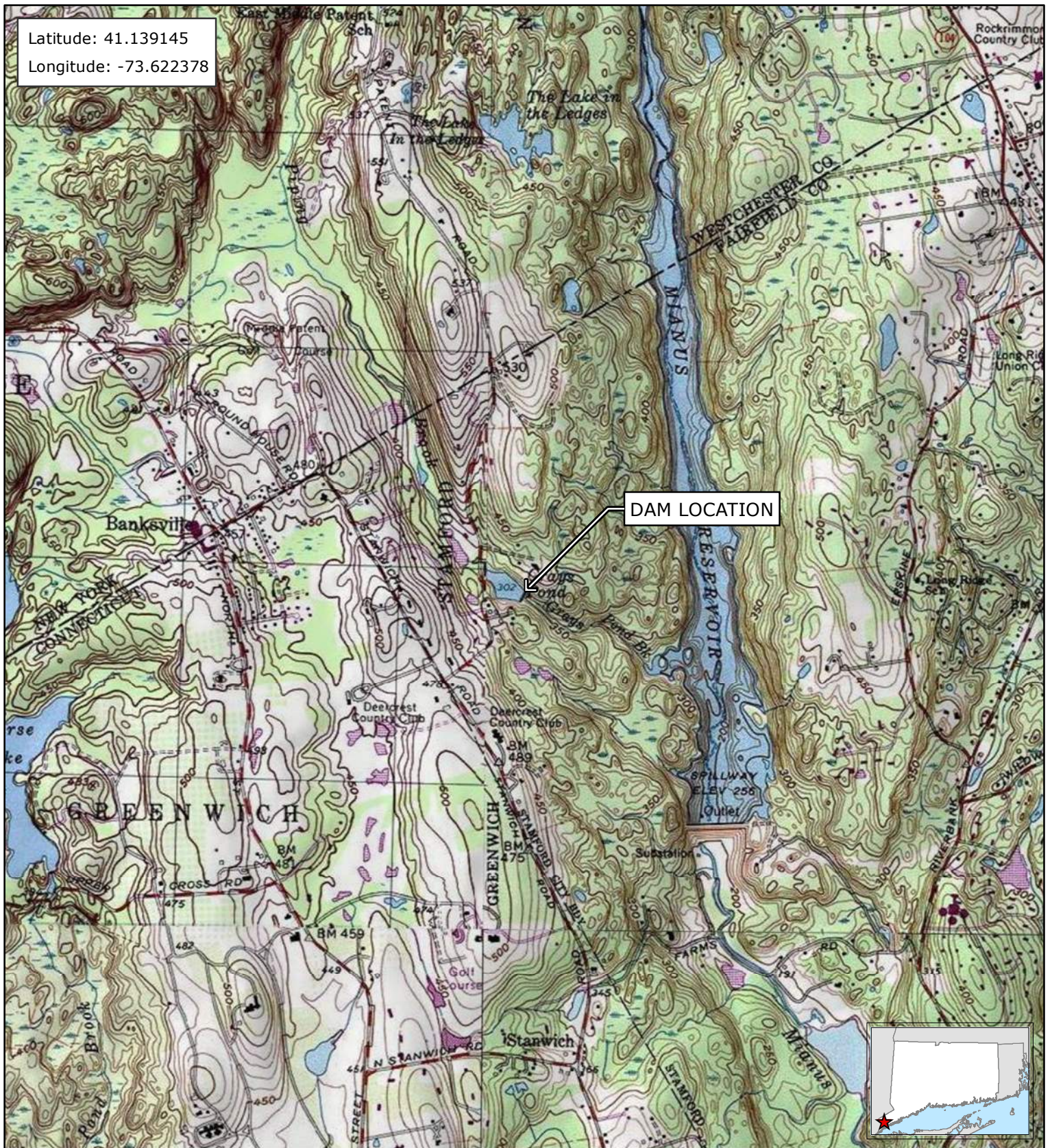
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	0.8	8.8%
61C	Canton and Charlton fine sandy loams, 8 to 15 percent slopes, very stony	1.8	20.2%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	2.2	24.9%
75C	Hollis-Chatfield-Rock outcrop complex, 3 to 15 percent slopes	0.2	2.8%
W	Water	3.8	43.2%
Totals for Area of Interest		8.8	100.0%

Figures

Latitude: 41.139145
Longitude: -73.622378

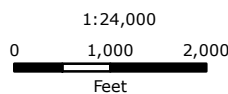


**FIGURE 1
SITE LOCATION MAP**

Brush Dam - CT13504
Aquarion Water Company
Stamford, Connecticut



Based on USGS Topographic Map for
Pound Ridge, NY [Site Quad]
Stamford, CT,
Glenville, NY,
Mount Kisco, NY.
Contour Interval Equals 10ft..
Circles indicate 500-foot and half-mile radii



March 2023

Photographs

Photograph 1 – Right abutment contact point with dam crest from downstream.



Photograph 2 – Right abutment contact point with dam crest from upstream.



Photograph 3 – Upstream face from right abutment.



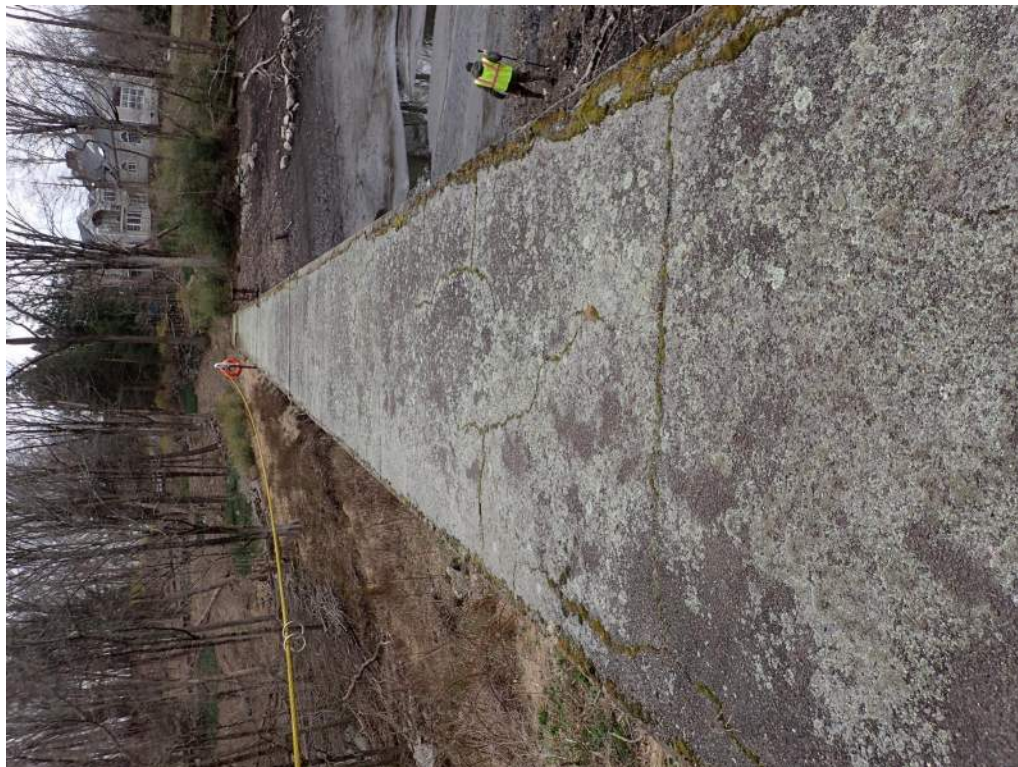
Photograph 4 – Upstream face from left abutment.



Photograph 5 – Dam crest from right abutment.



Photograph 6 – Dam crest from spillway training wall.



Photograph 7 – Downstream face from left abutment.



Photograph 8 – Downstream face from right abutment.



Photograph 9 – Downstream face from low-level outlet discharge point.



Photograph 10 – Primary spillway looking from downstream discharge channel.



Photograph 11 – Primary spillway weir from spillway channel.



Photograph 12 – Primary spillway weir (flowing) from dam crest.



Photograph 13 – Primary spillway channel and training wall from upstream.



Photograph 14 – Primary spillway discharge channel and training wall from upstream.



Photograph 15 –Low-level outlet discharge point from downstream.



Photograph 16 – Low-level outlet from downstream.



Photograph 17 – Downstream channel area from upstream.



Photograph 18 – Continuation of downstream channel area looking downstream.



Photograph 19 – Continuation of downstream channel area looking downstream.



Photograph 20 – Impoundment area (fully drawn down condition) from upstream end.



Photograph 21 – Impoundment area (partially drawn down condition) from dam.



Photograph 22 – Upstream dam overview (partially drawn down) looking from shoreline.



Photograph 23 – Left shoreline (partially drawn down) from dam crest.



Photograph 24 – Left shoreline (fully drawn down) from dam crest.



Photograph 25 – Right shoreline (fully drawn down) from dam crest.



Photograph 26 – Right shoreline (partially drawn down) from upstream.



Photograph 27 – Dam access from Barn Hill Road.



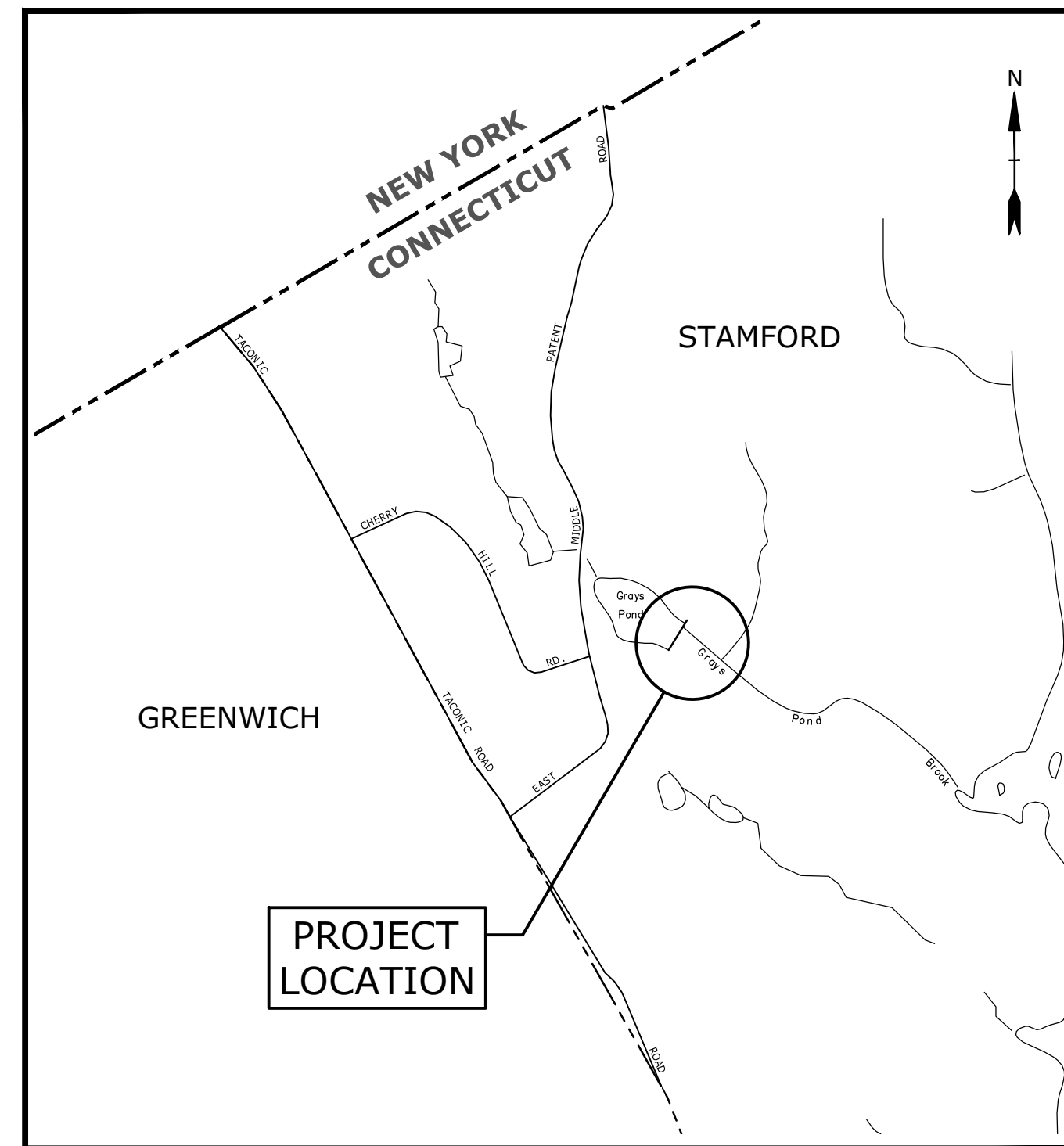
Project Plans

TOWN OF STAMFORD, CONNECTICUT BRUSH RESERVOIR DAM IMPROVEMENTS

50% DESIGN FEBRUARY 2023

LIST OF DRAWINGS		
SHEET NO.	DRAWING NO.	DRAWING TITLE
GENERAL		
1	G-001	COVER SHEET AND LIST OF DRAWINGS
2	G-002	LEGEND AND GENERAL NOTES
3	G-003	EXISTING CONDITIONS SITE PLAN
DEMOLITION		
4	D-101	SITE DEMOLITION & EROSION CONTROL
CIVIL		
5	C-101	SITE PLAN
6	C-102	PLANTING PLAN
7	C-201	DAM PROFILES
8	C-301	DAM SECTIONS
9	C-501	SITE DETAILS
10	C-502	SITE DETAILS
11	C-503	PLANTING DETAILS
STRUCTURAL		
12	S-001	STRUCTURAL NOTES
13	S-101	STRUCTURAL PLAN AND UPSTREAM ELEVATION
14	S-102	STRUCTURAL SECTIONS AND DETAILS

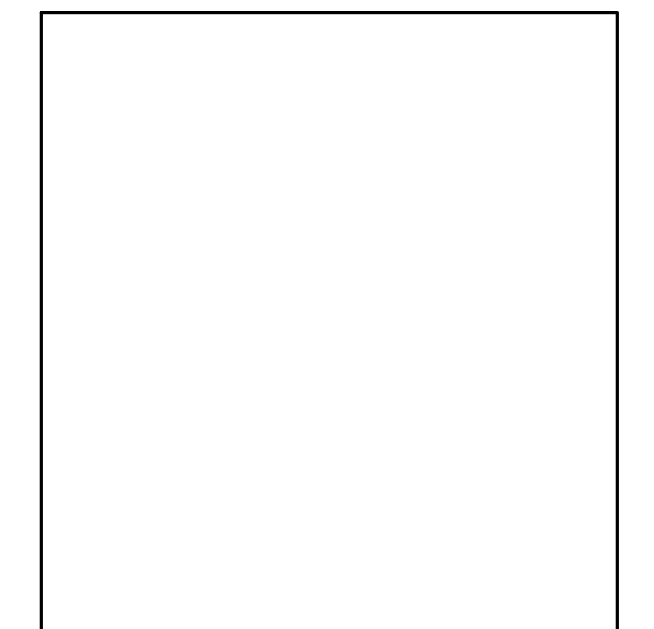
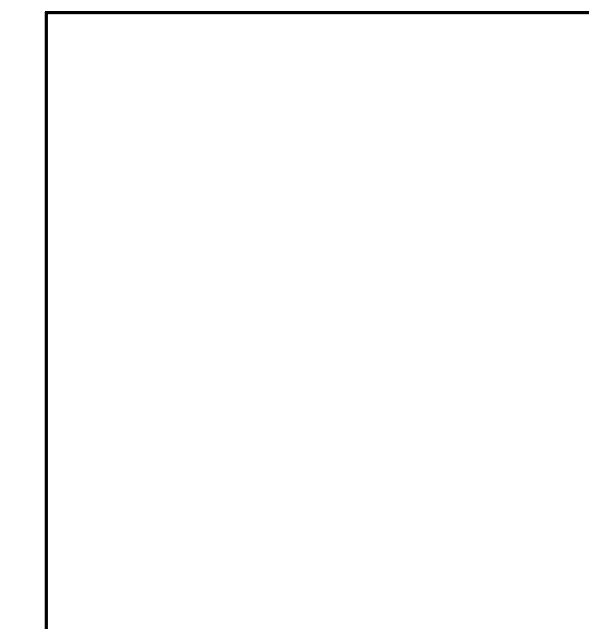
*BOLD TITLES ONLY INCLUDED IN THIS SUBMITTAL



LOCATION MAP
SCALE: 1" = 1000'

PREPARED BY:

Tighe&Bond



PREPARED FOR:

AQUARION WATER COMPANY

NOT FOR CONSTRUCTION

COMPLETE SET 10 SHEETS

THIS DOCUMENT IS INCOMPLETE AND IS
RELEASED TEMPORARILY FOR PROGRESS
REVIEW ONLY. IT IS NOT INTENDED FOR
BIDDING OR CONSTRUCTION PURPOSES.

EROSION AND SEDIMENTATION CONTROL NOTES:

- E1. TEMPORARY SEDIMENT AND EROSION CONTROL BY THE CONTRACTOR SHALL BE PERFORMED IN ACCORDANCE WITH CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, PROJECT SPECIFICATIONS, AND PERMIT REQUIREMENTS.
- E2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES NECESSARY TO EXECUTE AND COMPLETE THE WORK OF THE CONTRACT, IN COMPLIANCE WITH THE TERMS AND CONDITIONS CONTAINED IN THE CONTRACT AND PROJECT PERMITS. CONTROLS SHOWN ON THE CONTRACT DRAWINGS AND MENTIONED IN THE TECHNICAL SPECIFICATIONS SHALL BE CONSIDERED MINIMUM REQUIREMENTS. THE CONTRACTOR SHALL EMPLOY WHATEVER SUPPLEMENTARY MEASURES NECESSARY TO PROTECT WETLANDS, WATERS, AND ADJACENT AREAS FROM DISTURBANCE OR DISCHARGE OF SEDIMENTS.
- E3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING SEDIMENT AND EROSION CONTROLS TO MEET THE CONDITIONS OF ALL APPLICABLE PERMITS AND REGULATIONS. SUCH CONTROLS SHALL BE INSTALLED WHEREVER THE POTENTIAL EXISTED FOR THE DISTURBANCE OF LAND OR THE TRANSPORT OF SEDIMENT.
- E4. EROSION AND SEDIMENTATION CONTROLS BARRIERS SHALL BE INSTALLED PER DETAILS PROVIDED ON SHEET X.
- E5. EROSION CONTROL BARRIERS SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF CLEARING AND GRUBBING ACTIVITIES. LOCATION OF EROSION CONTROL BARRIERS TO BE ADJUSTED UPON COMPLETION OF CLEARING AND GRUBBING BUT PRIOR TO COMMENCEMENT OF GRADING ACTIVITIES.
- E6. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE MAINTAINED IN GOOD CONDITION AND IN PROPER WORKING ORDER. NECESSARY REPAIRS SHALL BE MADE IMMEDIATELY.
- E7. ALL EROSION AND SEDIMENTATION CONTROLS SHALL BE PROPERLY DISPOSED OFF-SITE UPON COMPLETION OF WORK, SITE STABILIZATION AND/OR AUTHORIZATION FROM THE OWNER.
- E8. COFFERDAMS SHALL BE INSTALLED IN PHASES AS INDICATED ON THE CONTRACT DRAWINGS. ALL COFFERDAMS SHALL CONSIST OF NON-ERODIBLE MATERIAL.

BEST MANAGEMENT PRACTICES:

INSPECTION AND MAINTENANCE

- SEDIMENT AND EROSION CONTROLS AND BMPs SHALL BE INSTALLED PRIOR TO COMMENCING CONSTRUCTION AT THE SITE. NO WORK WHICH SHALL DISTURB THE SITE OR CREATE THE POTENTIAL FOR SEDIMENT RELEASE SHALL COMMENCE UNTIL THE SEDIMENT AND EROSION CONTROLS HAVE BEEN INSPECTED AND APPROVED BY THE OWNER, ENGINEER, AND REGULATORY AGENCIES. ALL CONTROLS AND BMPs WERE SUBJECT TO INSPECTION BY THE OWNER, HIS REPRESENTATIVE, AND REGULATORY AGENCIES AT ANYTIME THEREAFTER.
- PERIODIC INSPECTION, MAINTENANCE, AND CLEANING OF TEMPORARY EROSION OF SEDIMENT CONTROL MEASURES AND BEST MANAGEMENT PRACTICES (BMPs) WERE REQUIRED. ALL CONTROLS AND BMPs SHALL BE INSPECTED EVERY 7 DAYS AND WITHIN 24 HOURS OF RAINFALL EVENTS OF 0.5 INCHES OR GREATER. ROUTINE INSPECTION AND MAINTENANCE WILL REDUCE THE CHANCE OF POLLUTING STORMWATER BY FINDING AND CORRECTING PROBLEMS BEFORE THE NEXT RAIN EVENT. THE FOCUS OF THE INSPECTION WILL BE TO DETERMINE:
 - 1) WHETHER OR NOT THE MEASURE WAS INSTALLED / PERFORMED CORRECTLY;
 - 2) WHETHER OR NOT THERE HAS BEEN ANY DAMAGE TO THE MEASURE SINCE IT WAS INSTALLED OR PERFORMED; AND
 - 3) WHAT SHOULD BE DONE TO CORRECT ANY PROBLEMS WITH THE MEASURE. EACH MEASURE IS TO BE OBSERVED TO DETERMINE IF IT IS STILL EFFECTIVE.
 IN SOME CASES, SPECIFIC MEASUREMENTS MAY BE TAKEN TO DETERMINE IF MAINTENANCE OF THE MEASURES IS REQUIRED.

SITE MANAGER

- PRIOR TO CONSTRUCTION, A SITE MANAGER WILL BE DESIGNATED BY THE CONTRACTOR TO BE RESPONSIBLE FOR INSTALLATION, MONITORING, INSPECTION, AND CORRECTION OF EROSION AND SEDIMENT CONTROL MEASURES.

CONSTRUCTION SITE ENTRANCE

- TO REDUCE THE TRACKING OF SEDIMENT FROM THE CONSTRUCTION SITE ONTO OTHER AREAS OF THE PROPERTY AND/OR PUBLIC ROADS, AS WELL AS THE PRODUCTION OF AIRBORNE DUST, A STABILIZED CONSTRUCTION ENTRANCE IS TO BE ESTABLISHED AND AT ANY ADDITIONAL AUTHORIZED PERMANENT CONSTRUCTION STAGING AREA.
- THE ENTRANCE IS TO CONSIST OF A 6-INCH THICK PAD OF CRUSHED STONE UNDERLAIN WITH FILTER FABRIC OR A BITUMINOUS CONCRETE APRON. IT IS TO BE REMOVED AND THE AREA RESTORED FOLLOWING CONSTRUCTION.

SITE CLEARING

- DURING SITE CLEARING, EXISTING VEGETATION WITHIN THE OVERALL LIMITS OF CLEARING AND GRUBBING SHALL BE CLEARED AND REMOVED, EXCEPT AS OTHERWISE DIRECTED. THIS INCLUDES ALL VEGETATION ON THE DAM EMBANKMENT AND WITHIN 20 FEET OF THE DAM EMBANKMENT.
- PRIOR TO ANY SITE CLEARING ACTIVITIES, SEDIMENT CONTROL BARRIERS SHALL BE PLACED ALONG THE OUTER LIMIT OF DISTURBANCE.
- CLEARING IS TO BE LIMITED TO THOSE AREAS OF PROPOSED WORK. DISTURBED AREAS ARE TO BE KEPT TO A MINIMUM. NO TREE WITH A BREAST HEIGHT DIAMETER OF GREATER THAN 6 INCHES SHALL BE CLEARED FROM AREAS OUTSIDE THE LIMITS OF CLEARING AND GRUBBING WITHOUT PRIOR APPROVAL FROM THE OWNER.

EROSION CONTROL BARRIERS

- COMPOST WATTLE BARRIERS ARE TO BE PLACED TO TRAP SEDIMENT TRANSPORTED BY RUNOFF BEFORE IT REACHES THE DRAINAGE FEATURES, WATERBODIES, OR WETLANDS, IN ADDITION TO AREAS WHERE HIGH RUNOFF VELOCITIES OR HIGH SEDIMENT LOADS ARE EXPECTED. THE COMPOST WATTLES SHALL BE REPLACED AS DETERMINED BY PERIODIC FIELD INSPECTIONS.

DUST CONTROL

- STANDARD DUST CONTROL MEASURES, INCLUDING SPRAYING AND MISTING SHALL BE USED AS NECESSARY. CALCIUM CHLORIDE SHALL NOT BE ALLOWED ON THIS PROJECT.

STAGING AREAS

- THE CONTRACTOR SHALL COORDINATE LAYDOWN STAGING AREAS IN WHICH TO STORE EQUIPMENT AND MATERIALS WITH THE OWNER.
- STAGING AREAS SHALL BE SURROUNDED WITH COMPOST WATTLE EROSION BARRIERS ON THE DOWN HILL SIDE.
- DURING AND AFTER CONSTRUCTION, ALL PAVED ROAD AND DRIVEWAY SURFACES SHALL BE SCRAPED AND BROOMED FREE OF EXCAVATED MATERIALS ON A DAILY BASIS, UNLESS APPROVED BY THE OWNER.

STOCKPILED MATERIALS

- STOCKPILES OF SOIL CREATED DURING CONSTRUCTION ACTIVITIES ARE TO BE SURROUNDED WITH EROSION CONTROL BARRIER AROUND THE PERIMETER OF THE STOCKPILE. STOCKPILES OF ERODIBLE MATERIAL ARE TO BE COVERED PRIOR TO INCLEMENT WEATHER WITH A MINIMUM OF 20 MIL POLYETHYLENE SHEETING. STOCKPILES LEFT UNDISTURBED LONGER THAN 14 DAYS SHALL BE SEEDED OR COVERED.

EQUIPMENT FUELING

- EQUIPMENT FUELING AND OTHER ACTIVITIES INVOLVING PETROLEUM, OIL, OR OTHER POTENTIALLY HAZARDOUS SUBSTANCES ARE TO BE PERFORMED AT PRE-APPROVED, DESIGNATED AREAS WITH APPROPRIATE SPILL PREVENTION AND CONTROL MEASURES. PORTABLE SECONDARY CONTAINMENT IS TO BE USED, AND SORBENT MATERIALS ARE TO BE PLACED AROUND THE PERIMETER OF THE FUELING AREA.

CONSTRUCTION DEWATERING

- CONSTRUCTION DEWATERING SHALL BE REQUIRED DURING PORTIONS OF CONSTRUCTION WHICH REQUIRED EXCAVATION OR OTHER ACTIVITIES WHERE GROUNDWATER INTERFERED WITH THE WORK. CONSTRUCTION DEWATERING DISCHARGE TO A SURFACE WATER BODY SHALL BE PRE-TREATED FOR SEDIMENT REMOVAL BY PASSING THROUGH AN APPROPRIATELY SIZED FILTER SOCK, SILT BAG, FRACTIONATION / SEDIMENTATION TANK, OR SEDIMENT TRAP PRIOR TO DISCHARGE, AS NECESSARY.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING DEWATERING TECHNIQUES AND MAINTAINING DEWATERING PROCEDURES THROUGHOUT THE DURATION OF THE PROJECT.

OUTLET PROTECTION

- APPROPRIATE OUTLET PROTECTION, CONSISTING OF RIPRAP CHANNEL LINING, A LEVEL SPREADER, OR OTHER SUCH MEASURE SHALL BE PROVIDED AT THE OUTLET OF ANY DEWATERING CONDUIT OR STORMWATER CULVERT OR CHANNEL OUTFALL TO REDUCE VELOCITIES AND ENHANCE SEDIMENTATION PRIOR TO DISCHARGE.

SURFACE WATER CONTROL

- FLOW THROUGH A PORTION OF SPILLWAY AND/OR THE PROPOSED OUTLET STRUCTURE AT ALL TIMES, THE IMPOUNDMENT MAY BE DRAWN DOWN TO ACCOMMODATE THE WORK. THE CONTRACTOR SHALL SUBMIT A WATER CONTROL PLAN THAT ADDRESSED EMERGENCY MEASURES TO IMPLEMENT IN THE EVENT A STORM OCCURS DURING CONSTRUCTION.
- DRAWDOWN LIMITATIONS INCLUDE:
 - MAXIMUM DRAWDOWN (ELEVATION 117' MIN.)
 - LIMITED OUTFLOW TO 32 CFS WHILE REDUCING WATER LEVEL.
 - MAINTAINED OUTFLOW AT 4 CFS MINIMUM DURING REFILL.

TURBIDITY MONITORING AND CONTROL

- TURBIDITY SHALL BE MONITORED AND CONTROLLED BY THE CONTRACTOR. A TURBIDITY CURTAIN SHALL BE INSTALLED SURROUNDING AREAS OF EXCAVATION AT AND BELOW THE IMPOUNDMENT WATER LINE.
- IF TURBIDITY LEVELS ARE UNACCEPTABLE AS JUDGED BY THE OWNER, ENGINEER, OR REGULATORY AGENCY, ADDITIONAL MEASURES SHALL BE IMPLEMENTED AT NO EXPENSE TO THE OWNER.

DRAW-DOWN DISCHARGE PROTECTION

- CONTRACTOR SHALL VISUALLY MONITOR DISCHARGE ON A REGULAR BASIS DURING DRAW-DOWN LOOKING FOR DISCOLORED WATER LEAVING THE PROJECT SITE. IF DISCOLORED WATER LEAVING THE PROJECT SITE LASTS LONGER THAN TWO HOURS, THE CONTRACTOR SHALL PERFORM INCIDENT MONITORING AT THEIR OWN EXPENSE IN ACCORDANCE WITH THE APPLICABLE PERMIT REQUIREMENTS, INCLUDING BUT NOT LIMITED TO:
 - RECORD TURBIDITY LEVELS WITH A TURBIDITY METER THREE TIMES PER DAY BETWEEN SUNRISE AND SUNSET, AT AN INTERVAL OF FOUR TO SIX HOURS, UNTIL THE TURBIDITY PLUME IS NO LONGER OBSERVED.

LIMITS OF WORK

- THE CONTRACTOR SHALL LINE THE UPGRADIENT BOUNDARY OF WORK AREAS WITH ORANGE SAFETY FENCING BEFORE THE START OF SITE CLEARING ACTIVITIES.

ABBREVIATIONS:

TEMPORARY STABILIZATION

- WHEN NECESSARY, TEMPORARY SLOPE PROTECTION WAS PROVIDED BY INSTALLING SEDIMENT TRAP BARRIERS AT THE TOE OF FILLS OR CUT SLOPES. IF ADDITIONAL STABILIZATION WAS NEEDED, THEN THE CONTRACTOR INSTALLED MULCH LOGS, MATTING, SUCH AS STRAW, JUTE, WOOD FIBER, OR BIODEGRADABLE MESH. A TACKIFIER WAS USED ON LOOSE MATERIALS USED FOR TEMPORARY EROSION CONTROL.
- IN THE EVENT THAT DISTURBED AREAS AT THE SITE WERE LEFT UN-WORKED FOR MORE THAN TWO WEEKS, THE AREAS WERE MULCHED WITH STRAW AT A RATE OF 100 LBS. PER 1,000 S.F. TO HELP CONTROL EROSION. 100% BIODEGRADABLE EROSION CONTROL BLANKETS OR TWO INCHES OF WOOD CHIP MULCH WAS ALSO USED AS TEMPORARY COVER.
- IN THE EVENT THAT DISTURBED AREAS AT THE SITE WERE LEFT UN-WORKED FOR MORE THAN ONE MONTH, THE AREAS WERE TOPSOILED AND SEEDED AS PER THE SPECIFICATIONS AND AT NO ADDITIONAL COST TO THE OWNER.
- LEFT THE SURFACE OF ALL EXCAVATIONS AND FILLS IN A FIRM AND STABLE CONDITION AT THE END OF EACH DAY. ROLLED OR OTHERWISE TREATED THE SURFACE AS NEEDED.

SITE RESTORATION

- STABILIZATION OF DISTURBED AREAS OR NEW SOIL FILLS WERE IMPLEMENTED WITHIN 14 DAYS AFTER GRADING OR CONSTRUCTION ACTIVITIES WERE PERMANENTLY CEASED. APPROPRIATE VEGETATIVE SOIL STABILIZATION WAS USED TO MINIMIZE EROSION. TEMPORARY AND PERMANENT VEGETATIVE COVER WAS ESTABLISHED IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS.
- THE CONTRACTOR WAS RESPONSIBLE FOR RESTORATION OF PREVIOUSLY VEGETATED UPLAND AREAS DISTURBED BY CONSTRUCTION ACTIVITIES. RESTORATION OF UPLAND AREAS CONSISTED OF REPLACEMENT OF TOPSOIL AND APPROPRIATELY SEEDED AND STABILIZED.
- DISTURBED UPLAND AREAS WERE THEN HYDROSEEDED WITH AN APPROVED SEED MIX AT THE RATE RECOMMENDED BY THE MANUFACTURER. SEEDING RATE WAS DOUBLED FOR DORMANT SEEDING. SEED MIX SHALL BE AS FOLLOWS OR AS APPROVED BY THE ENGINEER:

THE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES:	THE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR MOIST SITES:
--	--

<p><u>COMMON NAME</u></p> <p>CREEPING RED FESCUE CANADA WILD RYE ANNUAL RYEGRASS PERENNIAL RYEGRASS BLUE GRAMA LITTLE BLUESTEM INDIAN GRASS ROUGH BENTGRASS/TICKLEGRASS UPLAND BENTGRASS</p>	<p><u>BOTANICAL NAME</u></p> <p><i>Festuca rubra</i> <i>Elymus canadensis</i> <i>Lolium multiflorum</i> <i>Lolium perenne</i> <i>Bouteloua gracilis</i> <i>Schizachyrium scoparium</i> <i>Sorghastrum nutans</i> <i>Agrostis scabra</i> <i>Agrostis perennans</i></p>
<p><u>COMMON NAME</u></p> <p>RIVERBANK WILD RYE RED FESCUE LITTLE BLUESTEM SWITCH GRASS BIG BLUESTEM BLUE VERVAIN UPLAND BENTGRASS NODDING BUR MARIGOLD HOLLOW-STEM JOE PYE WEED BONESET NEW ENGLAND ASTER WOOL GRASS SOFT RUSH</p>	<p><u>BOTANICAL NAME</u></p> <p><i>Elymus riparius</i> <i>Festuca rubra</i> <i>Schizachyrium scoparium</i> <i>Panicum</i> <i>Andropogon gerardii</i> <i>Verbena hastata</i> <i>Agrostis perennans</i> <i>Bidens cernua</i> <i>Eupatorium fistulosum</i> <i>Eupatorium perfoliatum</i> <i>Aster novae-angliae</i> <i>Scirpus cyperinus</i> <i>Juncus effusus</i></p>

- 100% BIODEGRADABLE EROSION CONTROL BLANKETS WERE USED IN LIEU OF HYDROSEEDING AT THE CONTRACTOR'S DISCRETION TO PROVIDE ADDITIONAL EROSION PROTECTION AND WERE USED FOR STABILIZATION OF SLOPES IN EXCESS OF 3H:1V.
- FINAL STABILIZATION WAS CONSIDERED COMPLETE WHEN ALL SOIL-DISTURBING ACTIVITIES WERE COMPLETED AND A UNIFORM, PERENNIAL VEGETATIVE COVER WITH A DENSITY OF EIGHTY PERCENT WAS ESTABLISHED OR EQUIVALENT STABILIZATION MEASURES (SUCH AS THE USE OF MULCHES OR EROSION CONTROL MATTING) WERE EMPLOYED ON ALL UNPAVED AREAS AND AREAS NOT COVERED BY PERMANENT STRUCTURES.
- THE CONTRACTOR WAS RESPONSIBLE FOR MAINTENANCE OF ALL VEGETATED SURFACES, INCLUDING WATERING, FERTILIZING, REPAIRING EROSION, AND RE-SEEDING UNTIL ESTABLISHMENT CONDITIONS WERE MET AND UNTIL THE END OF THE CONTRACTUAL MAINTENANCE PERIOD.

GENERAL NOTES:

1. THE EXISTING TOPOGRAPHY WAS TAKEN FROM "TOPOGRAPHIC SURVEY OF BRUSH DAM AT GRAY'S POND" PREPARED BY D'ANDREA SURVEYING AND ENGINEERING, P.C. DATED MAY 26, 2022.
2. THE HORIZONTAL DATUM REFERENCES THE CONNECTICUT COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83).
3. THE VERTICAL DATUM REFERENCES THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAD88).
4. THE SURVEYED PROPERTY IS SUBJECT BUT NOT LIMITED TO THE INFORMATION SHOWN HEREON. ALL INFORMATION THAT MAY AFFECT THE QUALITY OF THE TITLE TO BOTH THE SUBJECT AND ADJOINING PARCELS SHOULD BE VERIFIED BY AN ACCURATE AND CURRENT TITLE REPORT. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT.
5. WETLAND RESOURCE AREAS WERE DELINEATED BY TIGHE & BOND ON JUNE 6, 2022.
6. BOLD TEXT AND LINES INDICATE PROPOSED WORK.
7. LIGHT TEXT AND LINES INDICATE APPROXIMATE EXISTING CONDITIONS
8. THE TERM "DEMOLISH" USED ON THE DRAWINGS MEANS TO REMOVE AND DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS.
9. THE TERM "ABANDON" USED ON THE DRAWINGS MEANS TO LEAVE IN PLACE AND TAKE APPROPRIATE MEASURES TO DECOMMISSION AS SPECIFIED OR NOTED ON THE DRAWINGS.
10. THIS PROJECT IS BEING PERFORMED AT AN ACTIVE DRINKING WATER SUPPLY RESERVOIR. CONSTRUCTION MUST FOLLOW A SPECIFIC SEQUENCE AND CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO PROTECT RESERVOIR WATER QUALITY AND ALLOW OWNER TO MAINTAIN CONTINUOUS OPERATIONS DURING CONSTRUCTION.

LEGEND:

	SURVEY POINT
	IRON ROD FOUND
	TREE
	BORING
	TEST PIT
	PROPERTY LINE
	EASEMENT LINE
	EXISTING TREE LINE
	EXISTING INTERMEDIATE CONTOURS
	EXISTING INDEX CONTOURS
	EXISTING STONE WALL
	EXISTING RUBBLE WALL
	EXISTING GUARD RAIL
	EXISTING RETAINING WALL
	EXISTING STORM DRAIN > 15"
	EXISTING STORM BASIN
	EXISTING UTILITY POLE
	EXISTING GUY WIRE
	PROPOSED SPOT ELEVATION
	PROPOSED INTERMEDIATE CONTOUR
	PROPOSED INDEX CONTOUR
	EDGE OF WATER
	WETLAND FLAG AND NUMBER
	VEGETATED WETLAND BOUNDARY
	EROSION CONTROL BARRIER
	PROPOSED COFFERDAM
	PROPOSED RIP-RAP
	PROPOSED GUARDRAIL
	PROPOSED LIMIT OF CLEARING AND GRUBBING
	PROPOSED TREE REMOVAL

ABBREVIATIONS:

BLSF	BORDERING LAND SUBJECT TO FLOODING	LSA	LANDSCAPED AREA
BTM	BOTTOM	MIN	MINIMUM
B/FTG	BOTTOM OF FOOTING	MAX	MAXIMUM
CMP	CORRUGATED METAL PIPE	OC	ON CENTER
CONC	CONCRETE	PSI	POUNDS PER SQUARE INC
CPP	CORRUGATED PLASTIC PIPE	PVC	POLYVINYLCHLORIDE PIPE
CRW	CONCRETE RETAINING WALL	R&D	REMOVE AND DISPOSE
DIA	DIAMETER	RCP	REINFORCED CONCRETE PIPE
DWG	DRAWING	RET	RETAINING
EF	EACH FACE	SCH	SCHEDULE
EJ	EXPANSION JOINT	SHT	SHEET
ELEV, EL	ELEVATION	SPK	SPIKE
EOP	EDGE OF PAVEMENT	SRW	STONE RETAINING WALL
EW	EDGE OF WATER	SS	STAINLESS STEEL
EW	EACH WAY	T	TOP
HMA	HOT MIX ASPHALT	TBM	TEMPORARY BENCHMARK
HORIZ	HORIZONTAL	T/WALL	TOP OF WALL
INV	INVERT	TYP	TYPICAL
IPF	IRON PIN FOUND	VERT	VERTICAL

50% DESIGN

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Brush Reservoir Dam Improvements

Aquarian Water Company

Stamford, Connecticut

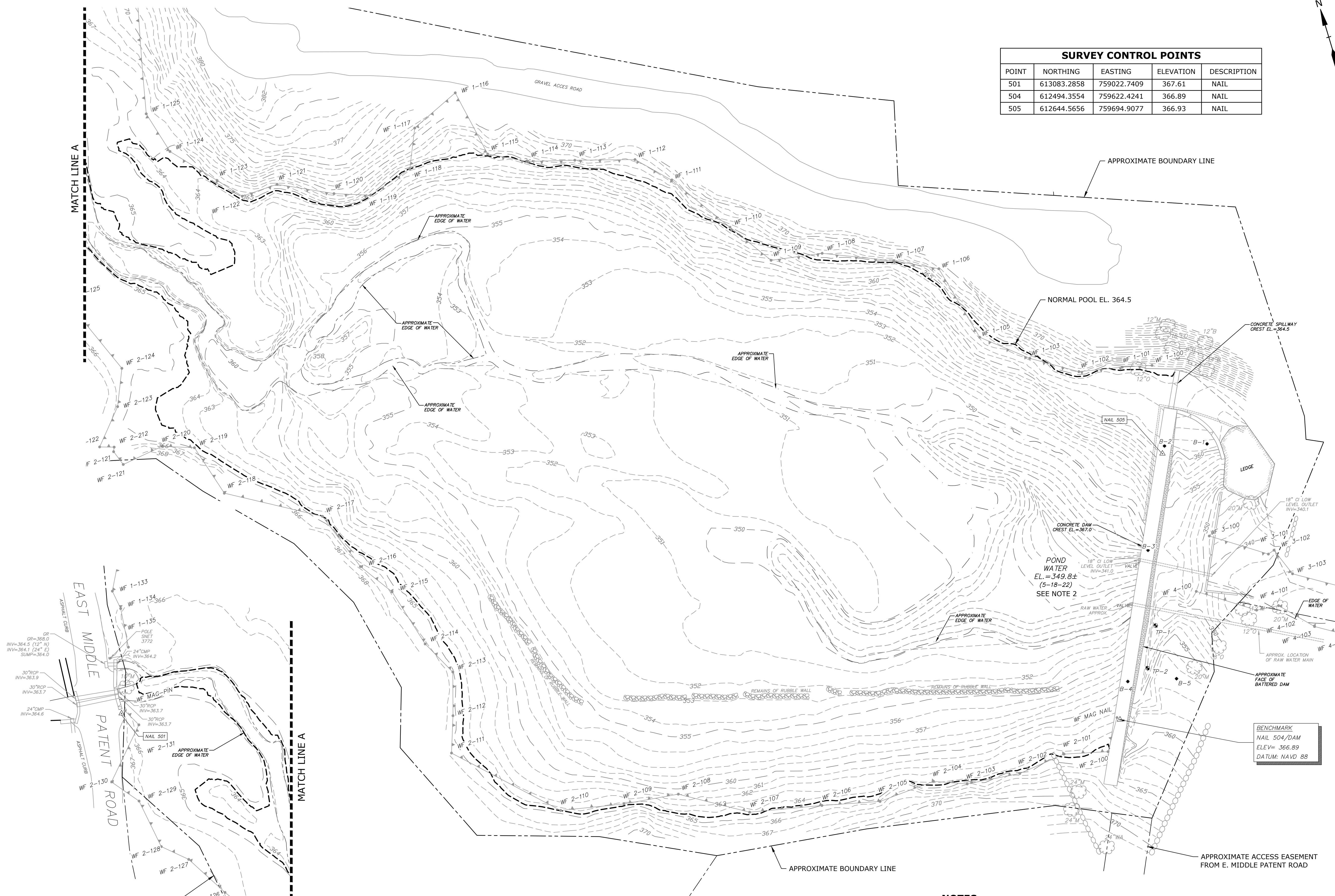
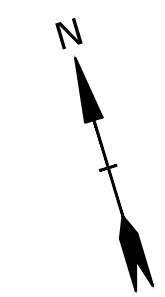
MARK	DATE	DESCRIPTION

LEGEND AND GENERAL NOTES

SCALE: NO SCALE

G-002

SURVEY CONTROL POINTS				
POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	613083.2858	759022.7409	367.61	NAIL
504	612494.3554	759622.4241	366.89	NAIL
505	612644.5656	759694.9077	366.93	NAIL



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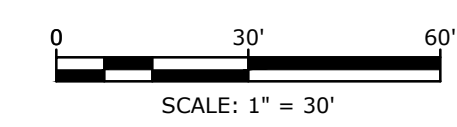
Brush Reservoir Dam Improvements

Aquarian Water Company

Stamford, Connecticut

NOTES

- BOUNDARY LINE SURVEYED BY OTHERS. THIS DRAWING MAKES NO CLAIM TO THE ACCURACY OF THE BOUNDARY SHOWN. BOUNDARY LINES ARE APPROXIMATE AND ARE SHOWN FOR SCHEMATIC PURPOSES ONLY.
- CONTOURS SHOWN BELOW THE POND WATER LINE ON THE DAY OF THE TOPOGRAPHIC SURVEY ON 5-8-22 ARE APPROXIMATE IN NATURE BASED ON AVAILABLE DATA AND SHOULD BE FIELD VERIFIED



MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195	
DATE:	02/2023	
FILE:	A1000-195-G-003.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

EXISTING CONDITIONS SITE PLAN

SCALE: 1" = 30'

G-003

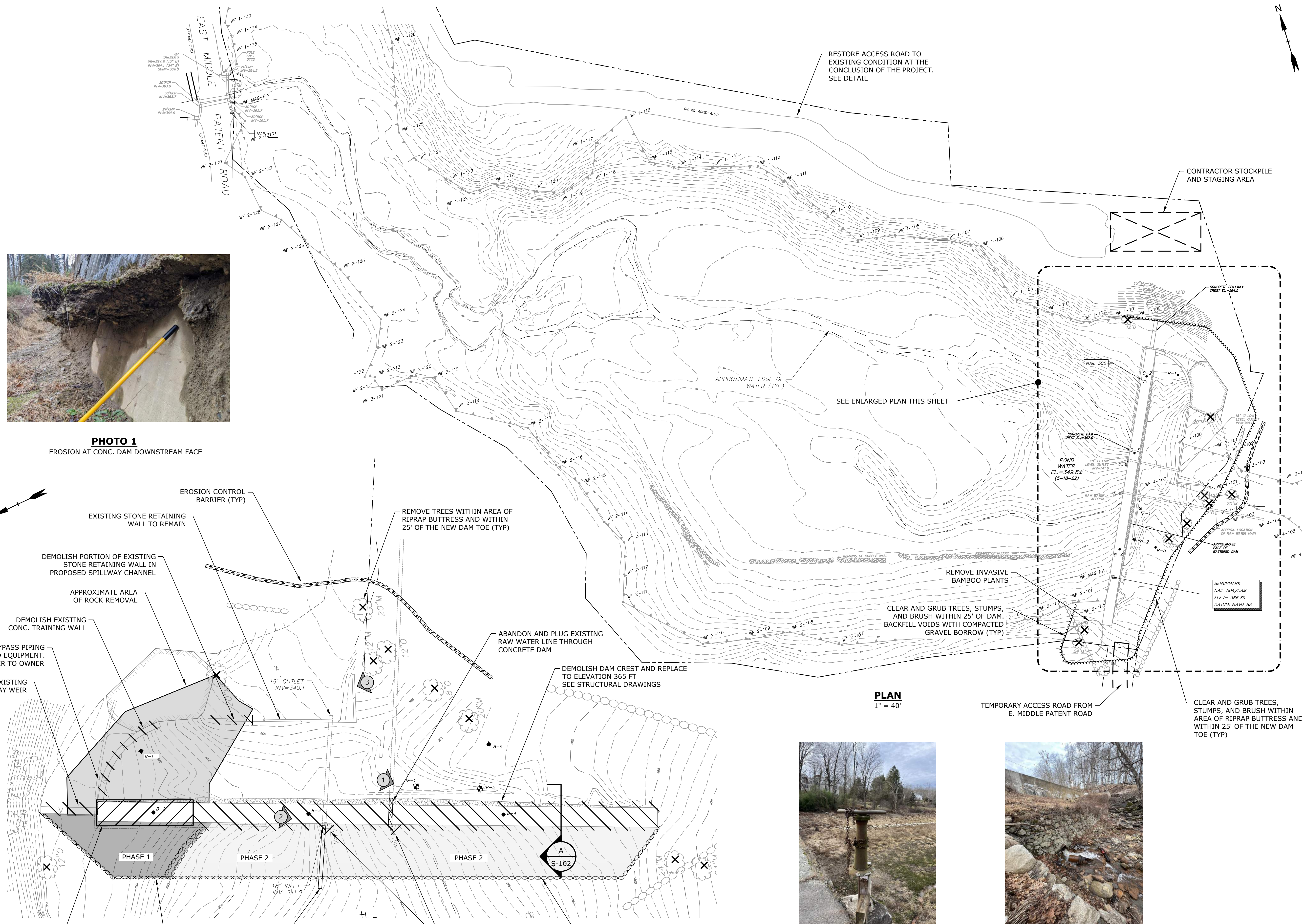
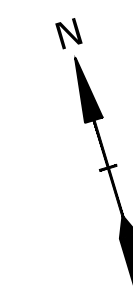


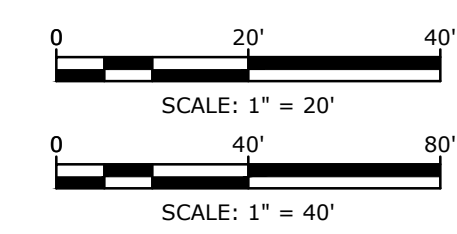
PHOTO 1
EROSION AT CONC. DAM DOWNSTREAM FACE



PHOTO 2
LOW-LEVEL OUTLET GATE OPERATOR



PHOTO 3
LOW-LEVEL OUTLET PIPE



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Brush Reservoir Dam Improvements

Aquarian Water Company

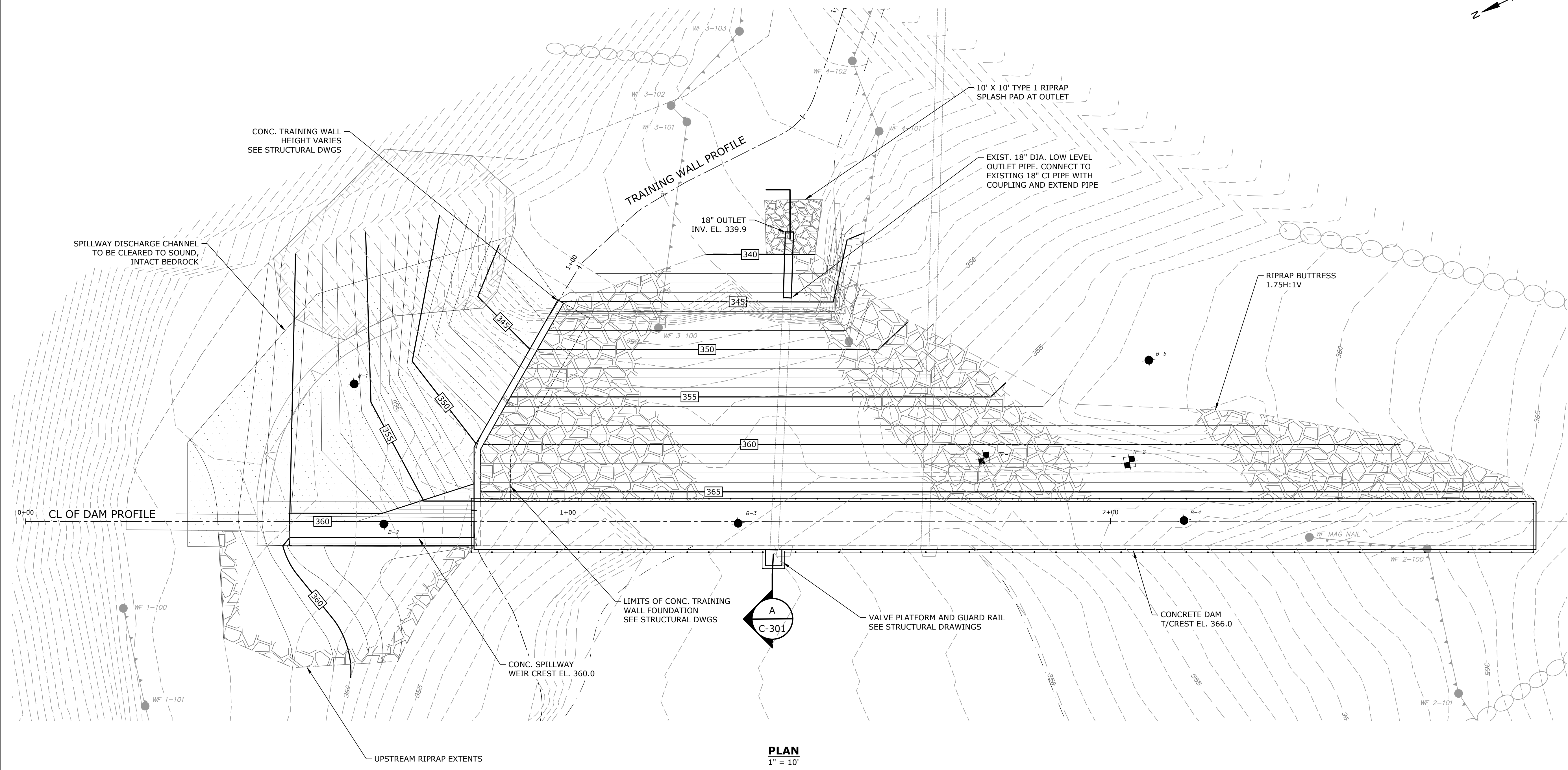
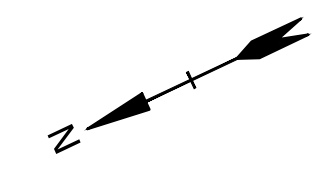
Stamford, Connecticut

MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195	
DATE:	02/2023	
FILE:	A1000-195-D-101.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

SITE DEMOLITION AND EROSION CONTROL

SCALE: AS SHOWN

LAST Saved: 2/22/2023
 Plotted On: Feb 22, 2023 2:21:11pm By: RStanford
 Tighe & Bond\3\A1000 ANCL\195 - Brush Reservoir Dam\Drawings - Figures\AutoCAD\Sheet\A1000-195-D-101.dwg



PLAN
1" = 10'

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Brush Reservoir Dam Improvements

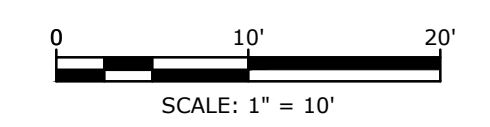
Aquarian Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195	
DATE:	02/2023	
FILE:	A1000-195-C-101.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	CDH	

NOTES:

- 1. SEE SHEET C-201 FOR PROFILE VIEWS.

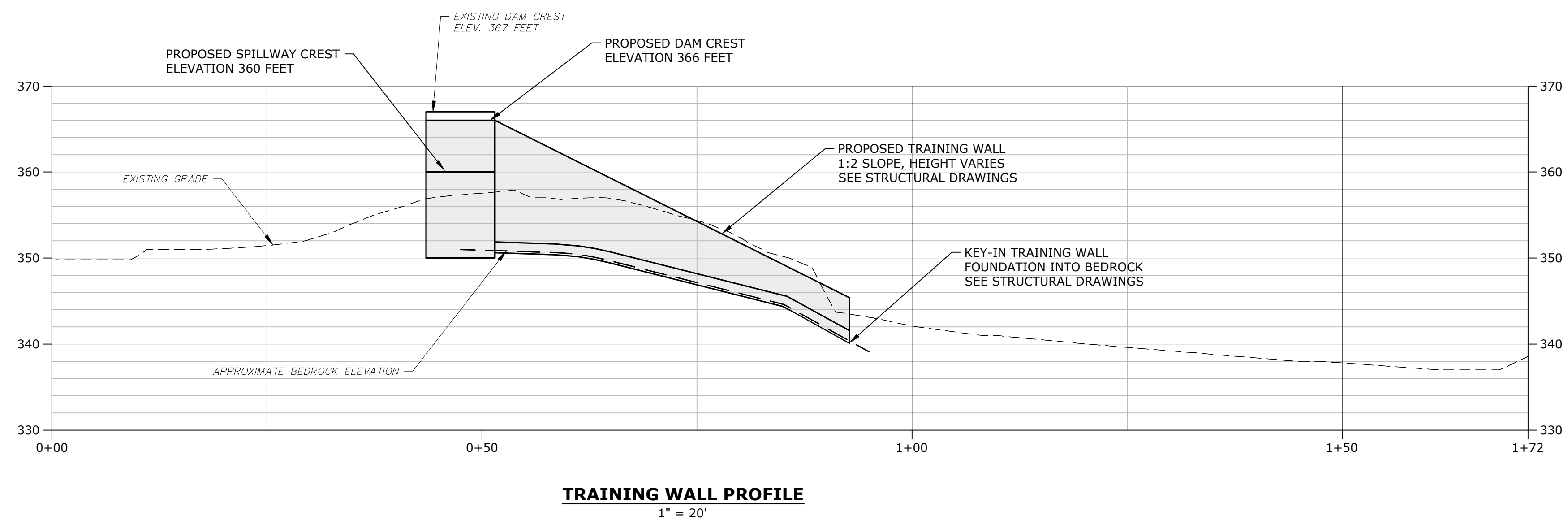
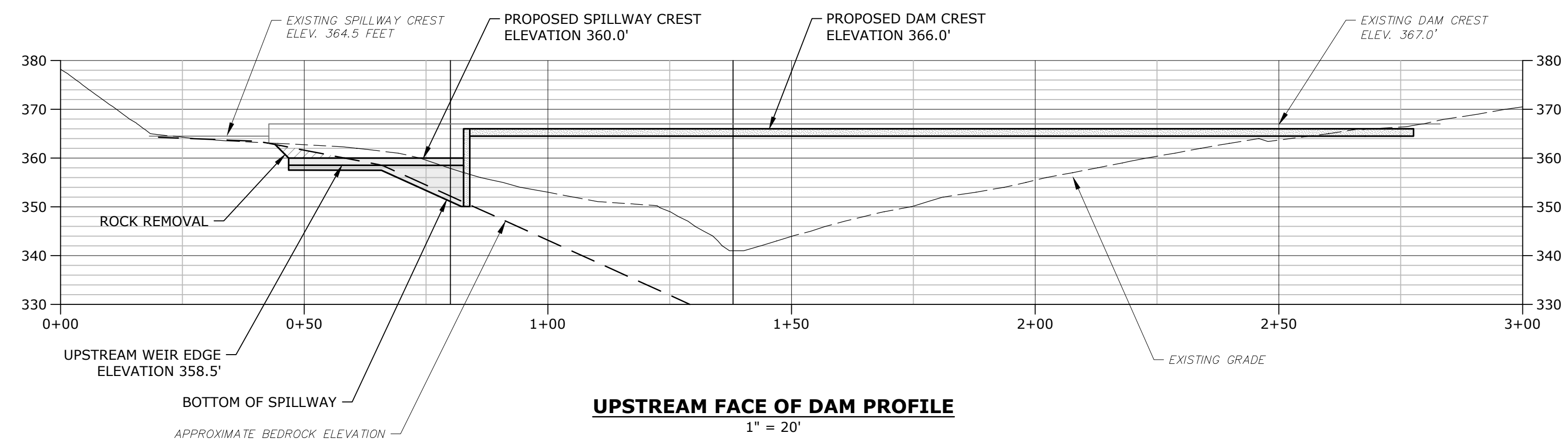


SITE PLAN

SCALE: 1" = 10'

C-101

Last Saved: 2/22/2023
 Plotted On: Feb 22, 2023 5:28pm By: RStanford
 Tighe & Bond C:\A1000-195 - Brush Reservoir Dam Drawings - Figures\AutoCAD\Sheet\A1000-195-C-101.dwg



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Brush Reservoir Dam Improvements

Aquarian Water Company

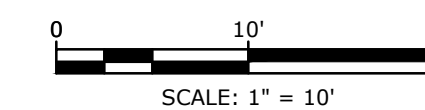
Stamford, Connecticut

MARK	DATE	DESCRIPTION

DAM PROFILES

SCALE: 1" = 10'

C-201



GENERAL

- STRUCTURAL WORK SHALL CONFORM TO STATE BUILDING CODE (IBC 2015), LATEST EDITION, INCLUDING MOST RECENT ADDENDA, AND CONTRACT DOCUMENTS. IN CASE OF CONFLICT, MOST STRINGENT REQUIREMENT SHALL GOVERN.
- CONTRACTOR SHALL VERIFY AND COORDINATE DIMENSIONS RELATED TO THIS PROJECT.
- THE CONTRACTOR SHALL RETAIN THE SERVICES OF AN INDEPENDENT TESTING LABORATORY FOR CONCRETE AND SOILS TESTING. ALL TESTING COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

REINFORCEMENT

- DETAILING, FABRICATION, AND ERECTION OF REINFORCEMENT, UNLESS OTHERWISE NOTED, SHALL CONFORM TO ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318)" AND ACI "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES (ACI 315)", LATEST EDITION.
- STEEL REINFORCEMENT UNLESS OTHERWISE SHOWN SHALL CONFORM TO ASTM A615 GRADE 60 MINIMUM (YIELD STRENGTH - 60,000 PSI).
- PROVIDE AND SCHEDULE ON SHOP DRAWINGS, ALL NECESSARY ACCESSORIES TO HOLD REINFORCEMENT SECURELY IN POSITION: MINIMUM REQUIREMENTS SHALL BE: HIGH CHAIRS, 4'-0" ON CENTER, #5 SUPPORT BAR FOR HIGH CHAIRS, SLAB BOLSTERS, 3'-6" ON CENTER, ALL WIRE CHAIRS AND BOLSTERS TO BE PLASTIC TIPPED.
- THE CONCRETE PROTECTIVE COVERING FOR REINFORCEMENT SHALL BE 3 INCHES FOR CAST-IN-PLACE CONCRETE CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER AND 2 INCHES IF CAST-IN-PLACE IS NOT CAST AGAINST EARTH, OR EXPOSED TO WATER OR WEATHER, UNLESS OTHERWISE SHOWN.
- WHERE CONTINUOUS BARS ARE CALLED FOR THEY SHALL BE RUN CONTINUOUSLY AROUND CORNERS AND LAPPED AT NECESSARY SPLICES OR HOOKED AT DISCONTINUOUS ENDS. REINFORCEMENT SHALL BE SPLICED IN ACCORDANCE WITH THE REBAR SPLICE LENGTH SCHEDULE.
- WHERE REINFORCEMENT IS NOT SHOWN ON DRAWINGS, PROVIDE REINFORCEMENT IN ACCORDANCE WITH APPLICABLE TYPICAL DETAILS OR SIMILAR TO THAT SHOWN FOR MOST NEARLY SIMILAR SITUATIONS, AS DETERMINED BY THE ENGINEER. IN NO CASE SHALL REINFORCEMENT BE LESS THAN MINIMUM REINFORCEMENT PERMITTED BY THE APPLICABLE CODES.
- WHERE REINFORCEMENT IS CALLED FOR IN SECTION, REINFORCEMENT IS CONSIDERED TYPICAL WHEREVER THE SECTION APPLIES.
- REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
- INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 24 HOURS PRIOR TO SCHEDULED CONCRETE PLACEMENT. NOTIFY ENGINEER OF COMPLETION AT LEAST 24 HOURS PRIOR TO SCHEDULED COMPLETION OF REINFORCEMENT PLACEMENT.
- REINFORCEMENT SHALL BE SET BEFORE PLACING CONCRETE. SETTING ANY REINFORCEMENT INTO WET CONCRETE IS PROHIBITED.

WELDING:

- WELDING OF PARTS SHALL BE IN ACCORDANCE WITH THE STANDARD CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION OF THE AWS AND SHALL ONLY BE DONE WHERE SHOWN, SPECIFIED, OR PERMITTED BY THE ENGINEER.
- A CERTIFIED WELDING INSPECTOR (CWI) SHALL BE RETAINED BY THE FABRICATOR TO VISUALLY INSPECT ALL FABRICATION WELDS IN ACCORDANCE WITH AWS D1.1, SECTION 6 AND TABLE 6.1, VISUAL ACCEPTANCE CRITERIA.
- BASE METALS SHALL BE CHECKED BY CONTRACTOR TO ENSURE ABSENCE OF LAMINATIONS OR OTHER DEFECTS.
- DEFICIENT WELDS SHALL BE CUT OUT TO SOUND MATERIAL AND REWELDED.

MISCELLANEOUS METALS:

- ALL WELDING IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 05050.
- ALL DIMENSIONS SHALL BE VERIFIED AT THE SITE BEFORE FABRICATION IS STARTED.
- DO NOT REMOVE ANY MARKS OR TAGS IDENTIFYING REJECTED WORK.
- NO FABRICATED SECTION SHALL BE CUT IN THE FIELD WITHOUT THE PERMISSION OF THE ENGINEER.
- NO SPLICING OF ANY MEMBER OR PART OF THE WORK WILL BE ALLOWED WHERE FULL-LENGTH MEMBERS ARE COMMERCIALY AVAILABLE. JOINTING SHALL MEET THE APPROVAL OF THE ENGINEER.

CONCRETE

- CONCRETE WORK SHALL CONFORM TO THE LATEST EDITIONS OF THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318), AND SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDING (ACI 301).
- CONCRETE SHALL BE CONTROLLED CONCRETE, PROPORTIONED, MIXED, AND PLACED UNDER THE SUPERVISION OF AN APPROVED CONCRETE TESTING AGENCY OR THE ENGINEER.
- CONCRETE SHALL BE NORMAL WEIGHT CONCRETE AND SHALL HAVE A COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS, UNLESS OTHERWISE NOTED AND SHALL BE AIR ENTRAINED (SEE SPECS).
- THE USE OF CONSTRUCTION JOINTS WHERE SHOWN ON THE DRAWINGS IS MANDATORY. OMISSIONS, ADDITIONS OR CHANGES SHALL NOT BE MADE EXCEPT WITH THE SUBMISSION OF A WRITTEN REQUEST TOGETHER WITH DRAWINGS OF THE PROPOSED JOINT LOCATIONS FOR APPROVAL OF THE STRUCTURAL ENGINEER.
- WHERE CONSTRUCTION JOINTS ARE NOT SHOWN, DRAWINGS SHOWING LOCATION OF CONSTRUCTION JOINTS AND CONCRETE PLACING SEQUENCE SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PREPARATION OF THE REINFORCEMENT SHOP DRAWINGS.
- CONCRETE SLABS SHALL BE CAST SO THAT THE THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS.
- CONCRETE SLABS AND WALLS SHALL BE CAST ALTERNATELY OR IN A CHECKERBOARD FASHION SO THAT ADJACENT SECTIONS ARE PLACED NO SOONER THAN THREE DAYS APART. AT LEAST TWO DAYS MUST ELAPSE AFTER PLACING CONCRETE IN WALLS BEFORE PLACING FLOOR SYSTEM SUPPORTED THEREON.
- CONCRETE SHALL BE PLACED WITHOUT HORIZONTAL CONSTRUCTION JOINTS EXCEPT WHERE SHOWN OR NOTED.
- EXPOSED EDGES OF CONCRETE ELEMENTS SHALL HAVE CHAMFERED CORNERS
- ONLY CRITICAL CONSTRUCTION JOINTS ARE SHOWN. SEE SPECIFICATIONS FOR REQUIRED MAXIMUM SPACING OF CONSTRUCTION JOINTS.

FORMWORK AND ACCESSORIES

- FORM TIES:
 - FORMS AND FORM SHORING SHALL NOT BE REMOVED UNTIL CONCRETE HAS ACHIEVED COMPRESSIVE STRENGTH OF 4000PSI.
 - TIES SHALL BE METAL AND DESIGNED WITH REMOVABLE SETBACK CONES SO THAT AFTER REMOVAL OF THE PROJECTING PART, NO METAL SHALL REMAIN WITHIN 1 1/2 INCHES OF THE FACE OF CONCRETE.
 - SETBACK CONES SHALL BE WOOD OR PLASTIC TAPERED CONES 1 INCH DIAMETER AND 1 1/2 INCHES DEEP TO ALLOW FILLING AND PATCHING OF THE CONCRETE SURFACE AFTER REMOVAL.
 - COMMON WIRE TIES SHALL NOT BE USED.
- FORM RELEASE AGENT:
 - NON-STAINING AND NON-EMULSIFIABLE TYPE WHICH WILL NOT STAIN CONCRETE OR ABSORB MOISTURE NOR INTERFERE WITH ADHERENCE OF ANY MATERIAL TO BE APPLIED TO CONCRETE SURFACES. FORM RELEASE AGENT FOR POTABLE WATER TANKS AND STRUCTURES SHALL BE VEGETABLE OIL BASED AND NSF APPROVED.
- CORNERS:
 - CHAMFERED NO. 1 POPLAR WOOD STRIPS; 3/4 INCH BY 3/4 INCH; MAXIMUM POSSIBLE LENGTHS.

GROUT:

- ALL GROUT SHALL BE NON-SHRINK WITH A COMPRESS STRENGTH NOT LESS THAN 5000 PSI AT 7 DAYS, AND 7500 PSI AT 28 DAYS.
- PROVIDE NOTIFICATION PRIOR TO THE START OF ANY PHASE OF GROUT PLACEMENT WORK SO AS TO PROVIDE THE OPPORTUNITY TO INSPECT THE WORK. SUCH NOTIFICATION SHALL BE MADE AT LEAST 24 HOURS IN ADVANCE OF GROUT PLACEMENTS AND AT LEAST 36 HOURS IN ADVANCE.

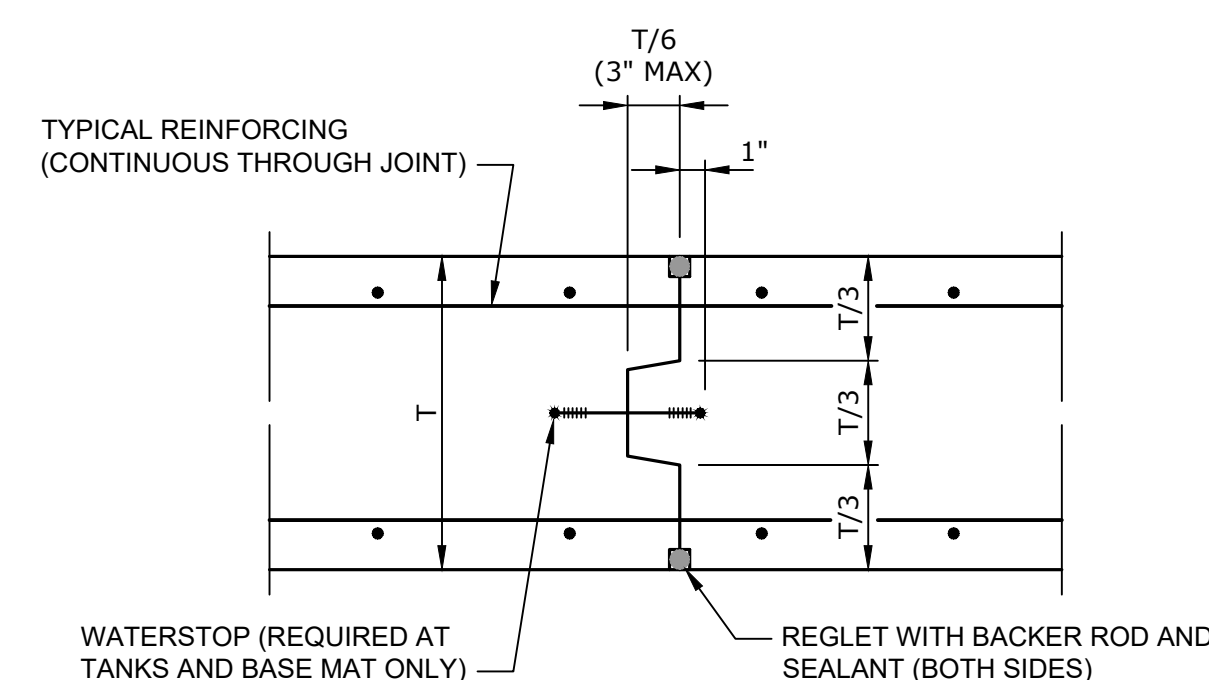
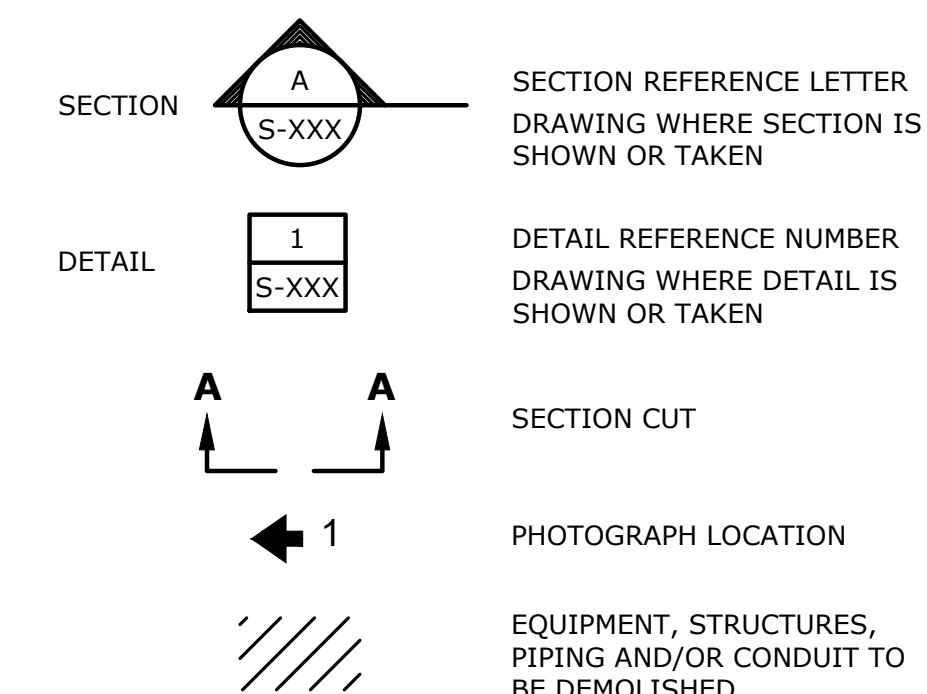
BAR SIZE DESIGNATION		DEVELOPMENT LENGTH (INCHES)	SPLICE LENGTH (INCHES)	
ENGLISH	METRIC	Ld	CLASS B	CLASS B TOP BARS
#3	#10	15	19	25
#4	#13	19	25	33
#5	#16	24	31	40
#6	#19	29	37	48
#7	#22	42	54	70
#8	#25	48	62	81
#9	#29	54	70	91
#10	#32	61	79	103

REBAR SPLICE LENGTH SCHEDULE

NOTES:

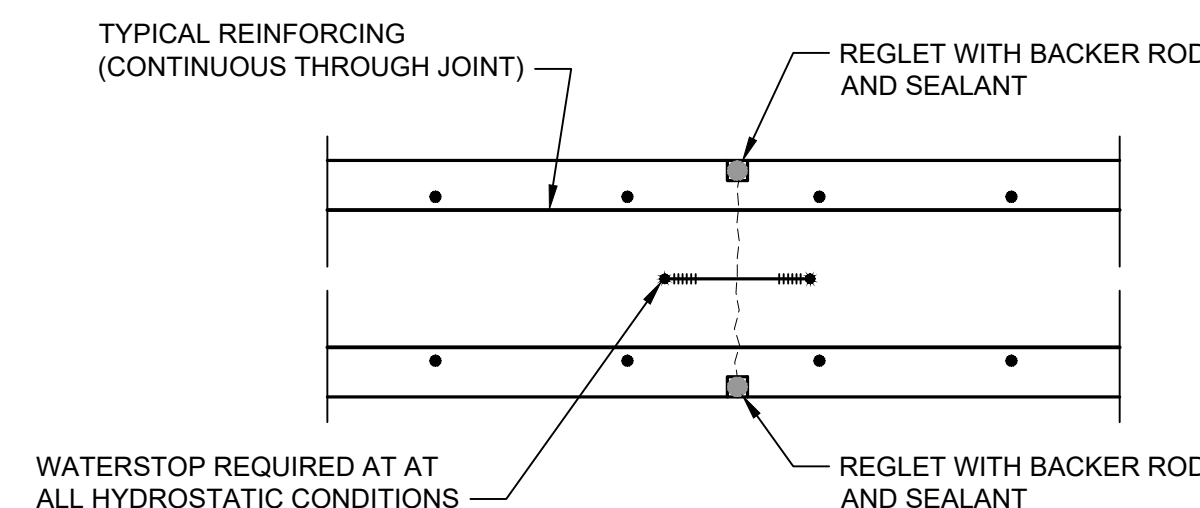
- IF CLEAR SPACING BETWEEN THE REBARS IS LESS THAN THREE BAR DIAMETERS, OR IF COVER IS LESS THAN TWO BAR DIAMETERS, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF EPOXY COATED REBAR IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 50%.
- IF LIGHTWEIGHT CONCRETE IS USED, INCREASE THE SPLICE LENGTH BY AN ADDITIONAL 30%.
- THE MINIMUM REBAR SPLICE LENGTH SCHEDULE IS BASED ON $F_c= 4,000$ PSI AND $F_y= 60,000$ PSI. ADJUST FOR OTHER STRENGTHS USING ACI-318.
- FOR HORIZONTAL REINFORCEMENT SO PLACED THAT MORE THAN 12 INCHES OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW, INCREASE THE DEVELOPMENT LENGTH BY AN ADDITIONAL 30%.
- WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, THE SPLICE LENGTH SHALL BE THE LARGER OF EITHER THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE SPLICE LENGTH OF THE SMALLER BAR.

GENERAL SYMBOLS



CONSTRUCTION JOINT

DETAIL	-
NO SCALE	-

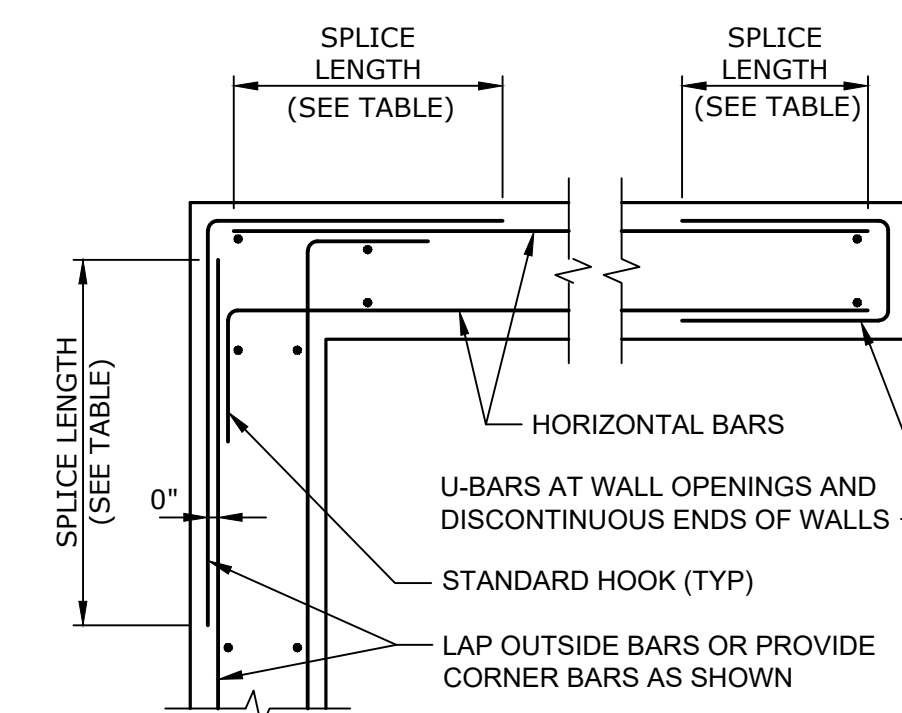


NOTE:

- CONCRETE IS PLACED MONOLITHICALLY ON BOTH SIDES OF ALL CONTRACTION JOINTS.

CONCRETE WALL CONTRACTION JOINT

DETAIL	-
NO SCALE	-



PLAN OF HORIZONTAL REINFORCING AT CORNERS OF CONCRETE WALLS

DETAIL	-
NO SCALE	-

50% DESIGN

NOT FOR CONSTRUCTION

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Brush Reservoir Dam Improvements

Aquarian Water Company

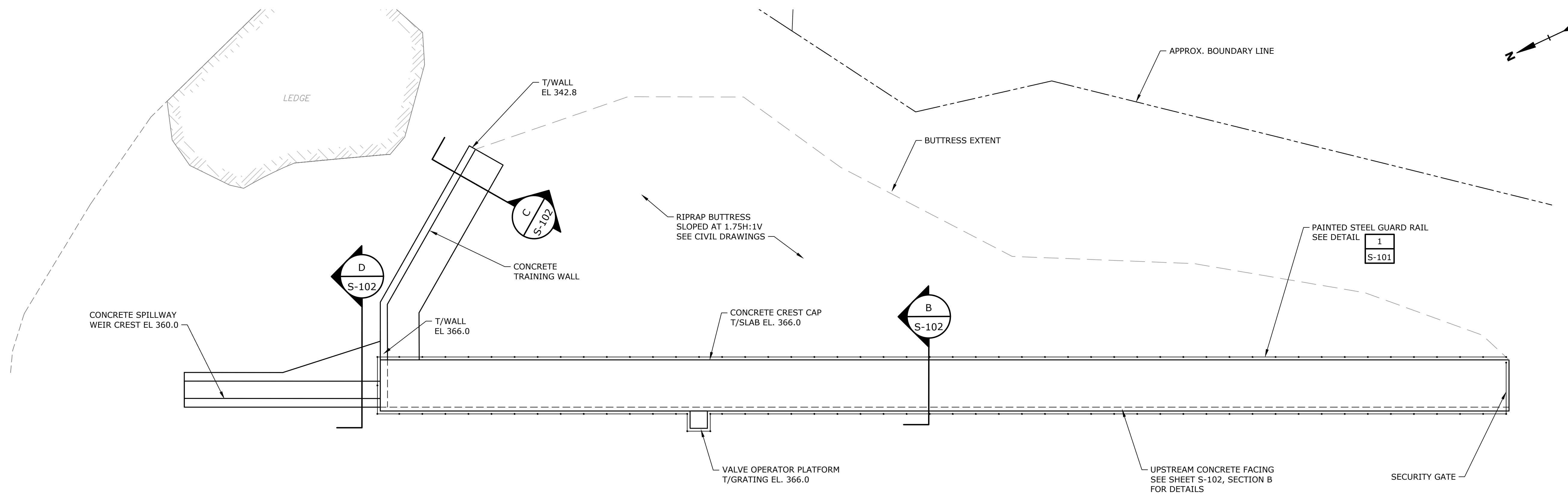
Stamford, Connecticut

MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195	
DATE:	02/2023	
FILE:	A1000-195-S-001.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	JC/DFV	
APPROVED BY:	CDH	

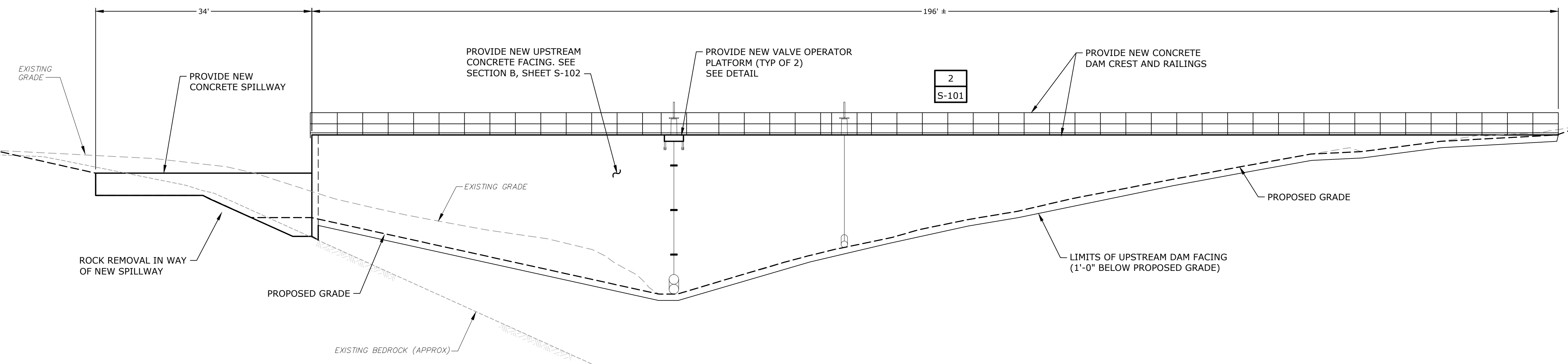
STRUCTURAL NOTES

SCALE: NO SCALE

S-001



PLAN
1" = 10'



ELEVATION-UPSTREAM FACE
1" = 10'

50% DESIGN

NOT FOR CONSTRUCTION

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Brush Reservoir Dam Improvements

Aquarian Water Company

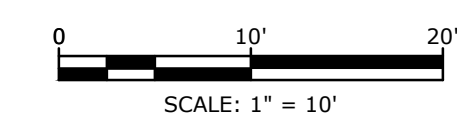
Stamford, Connecticut

MARK	DATE	DESCRIPTION

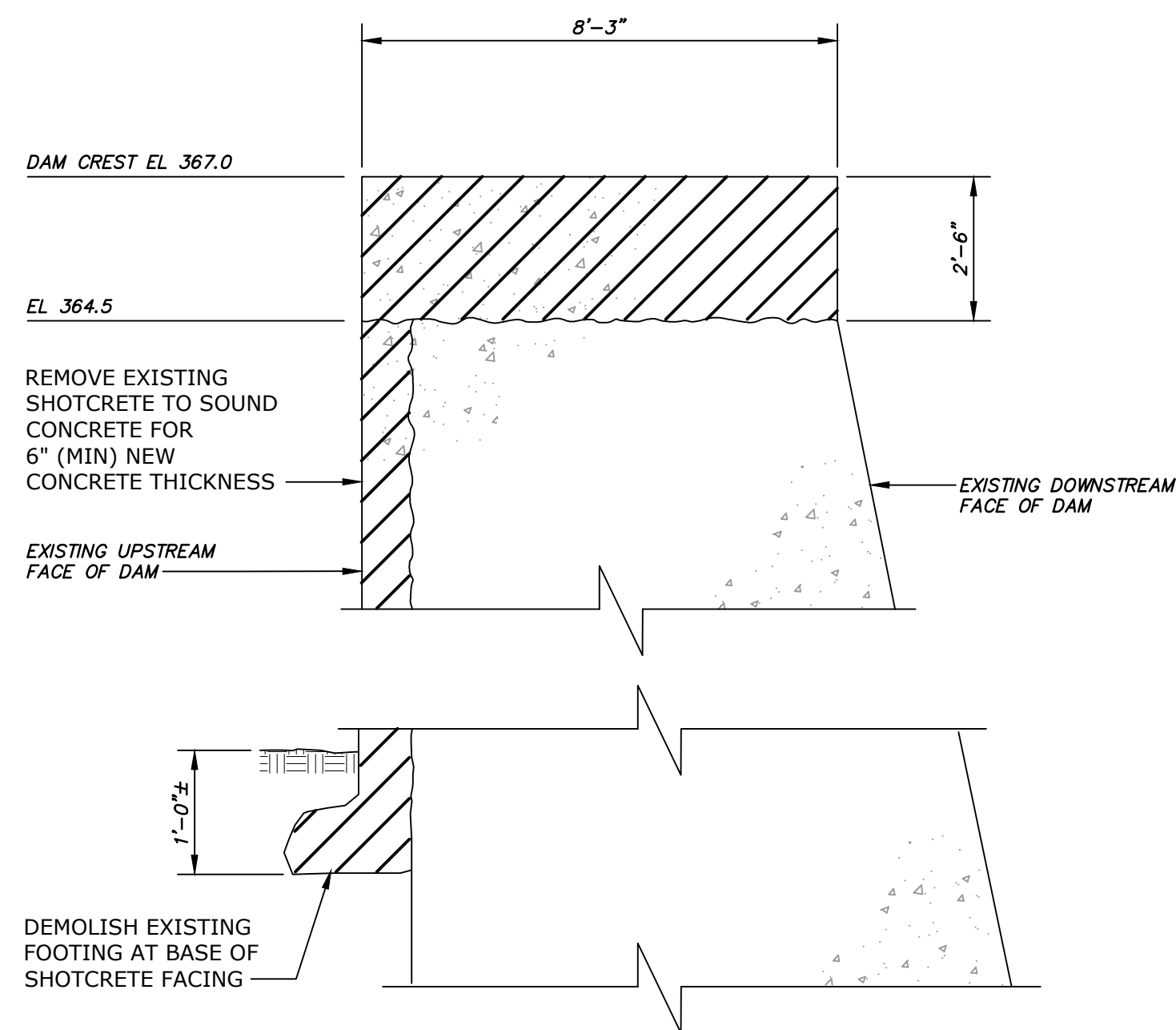
PROJECT NO:	A-1000-195
DATE:	02/2023
FILE:	A1000-195-S-101.dwg
DRAWN BY:	MJC
DESIGNED/CHECKED BY:	RS/DFV
APPROVED BY:	EBG

STRUCTURAL PLAN AND UPSTREAM ELEVATION

SCALE: AS SHOWN

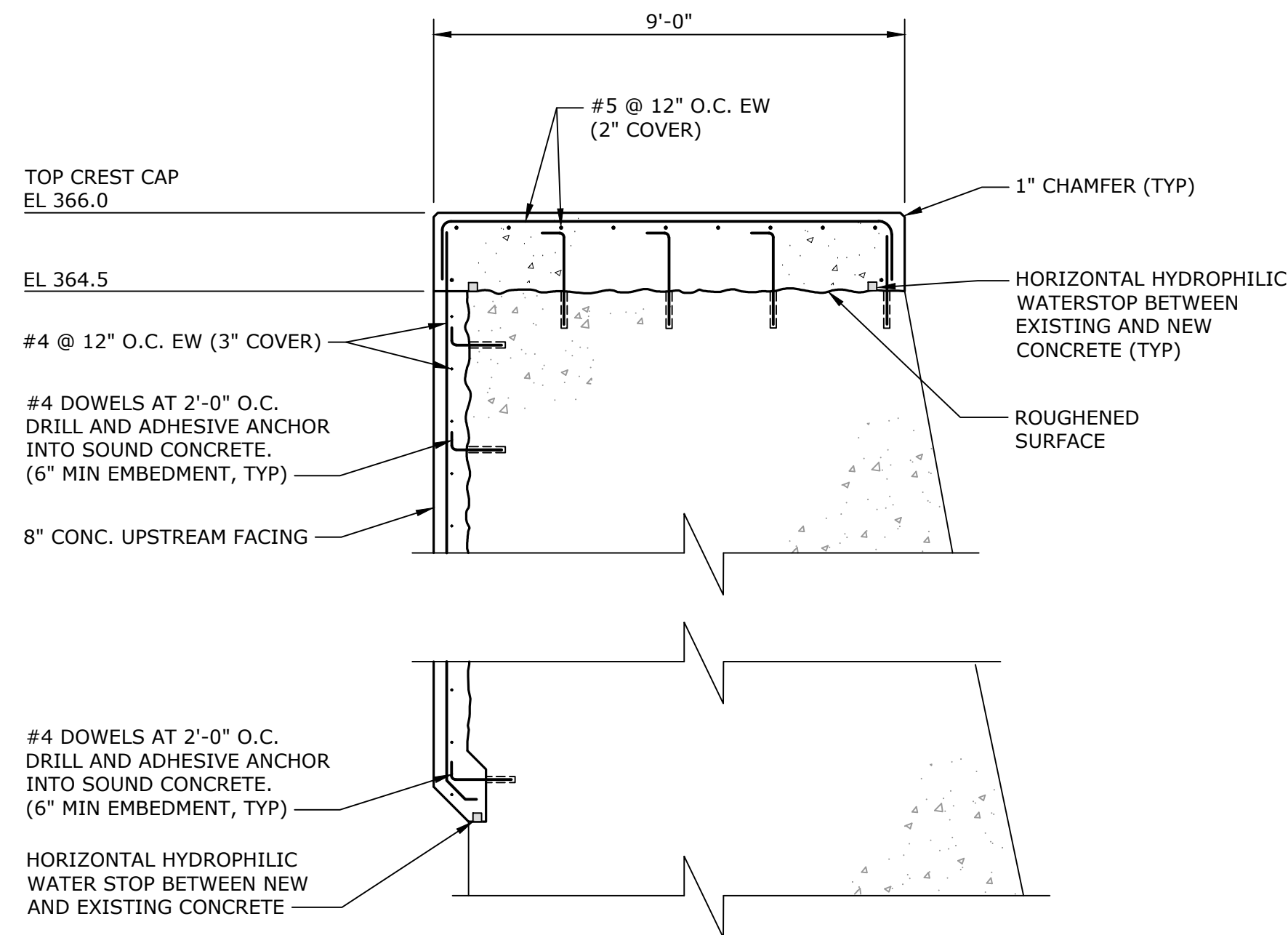


Last Saved: 2/22/2023 5:05pm By: RStanford
 Plotted On: Feb 22, 2023 5:05pm
 Tighe & Bond: A:\1000 ANCL195 - Brush Reservoir Dam Drawings - Figures\AutoCAD\Sheet\A1000-195-S-101.dwg



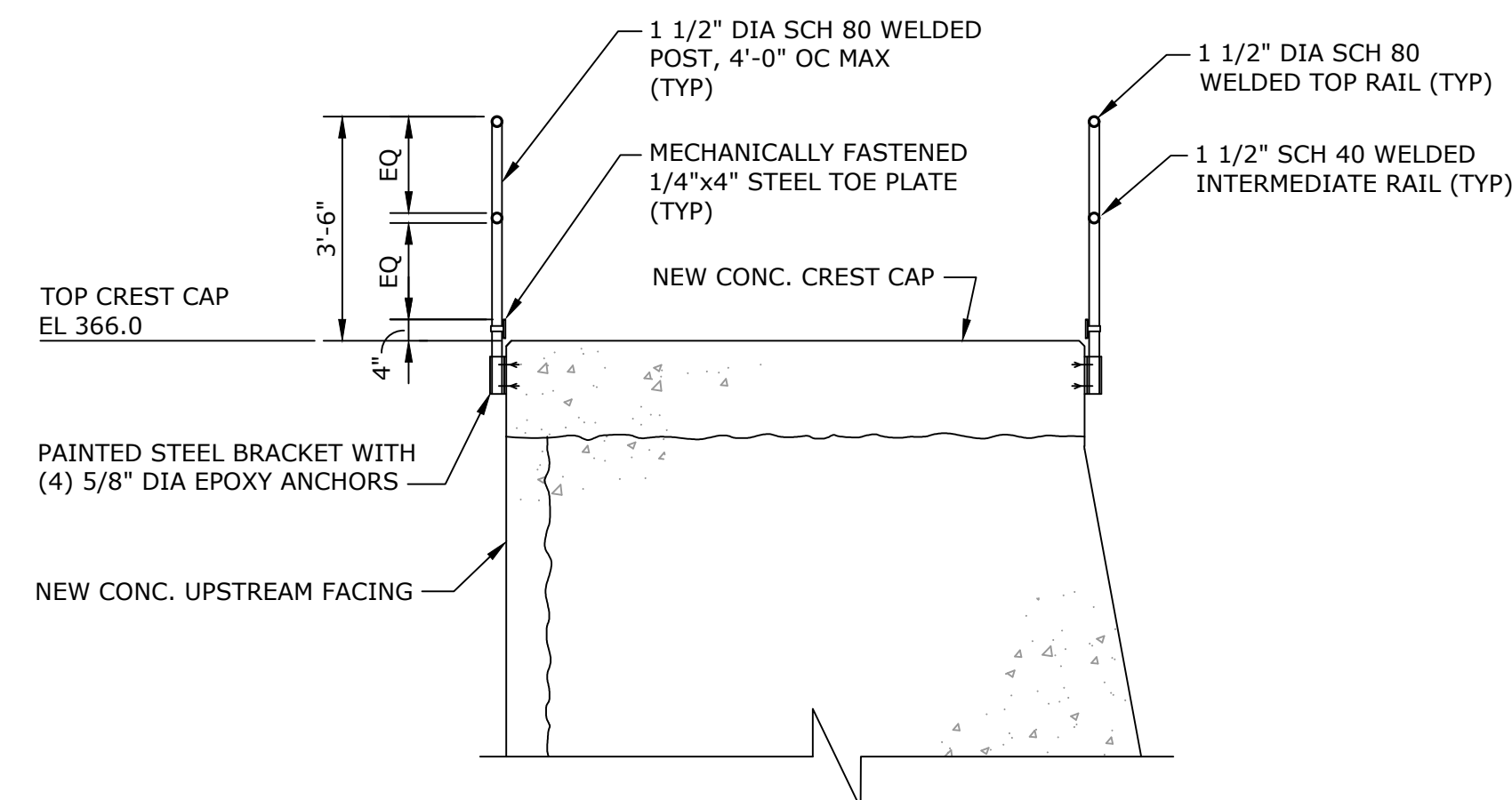
DAM CREST DEMO SECTION

SECTION A
3/8" = 1'-0" D-101



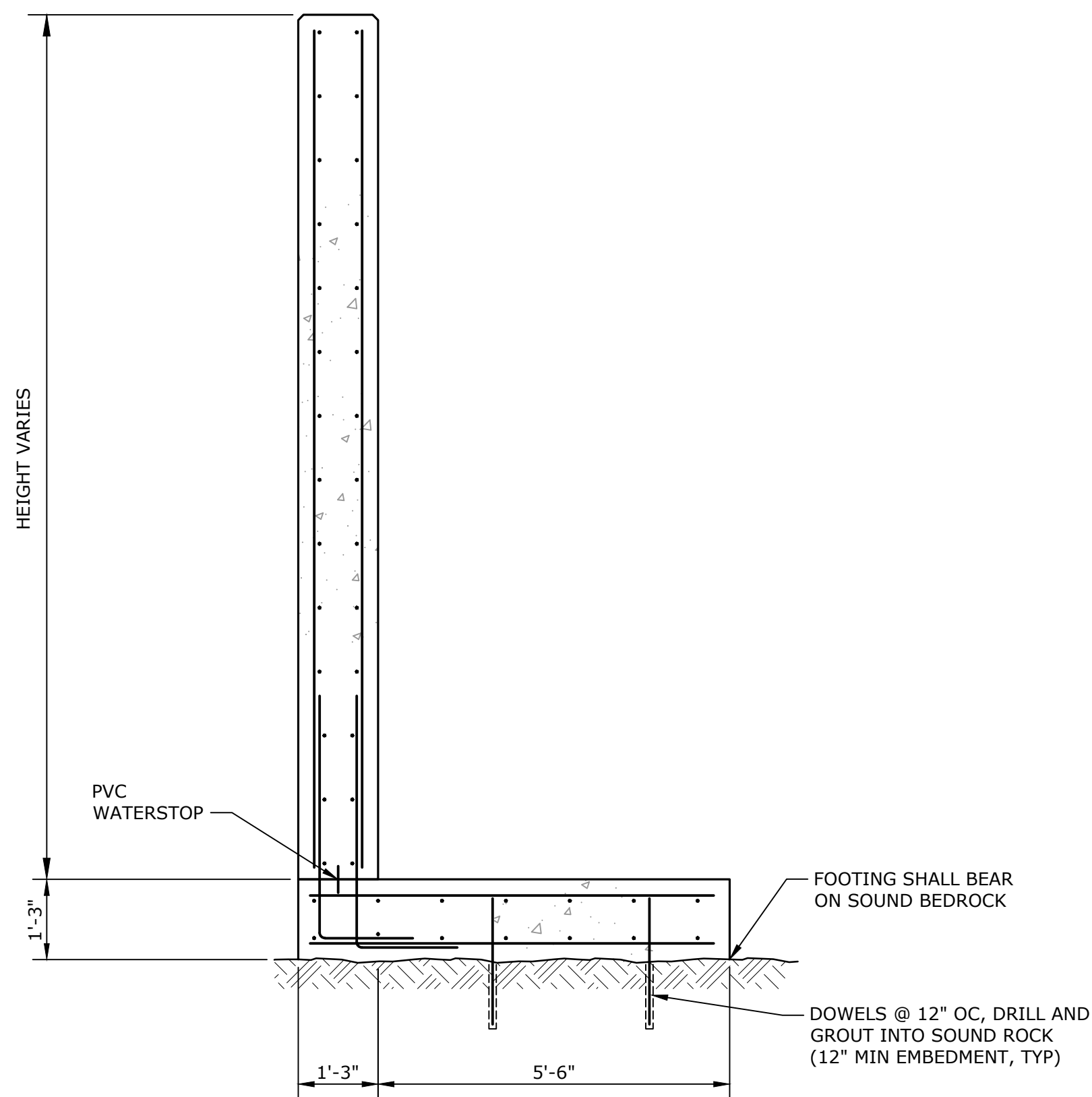
REINFORCED CONCRETE DAM CAP AND UPSTREAM FACING

SECTION B
3/8" = 1'-0" S-101



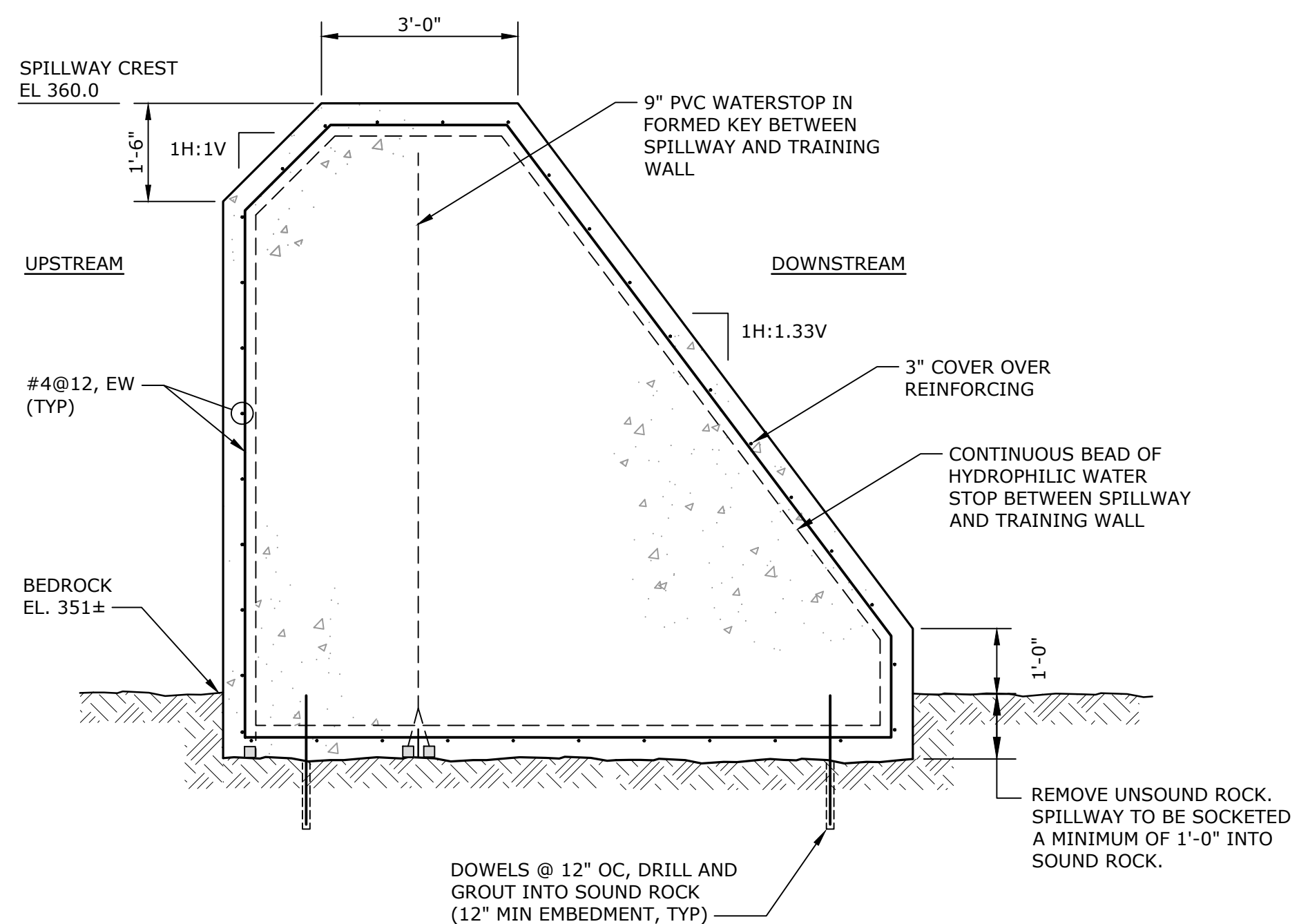
PAINTED STEEL GUARDRAILS AT DAM CREST

DETAIL 1
NO SCALE S-101



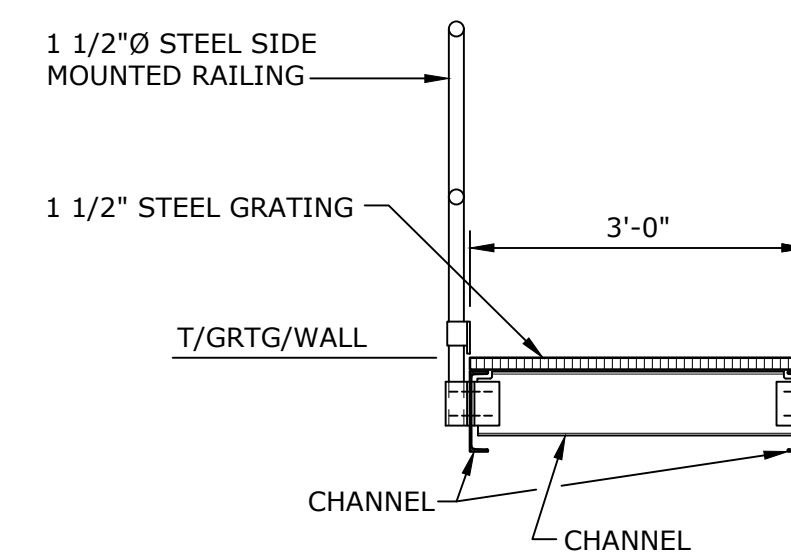
TRAINING WALL

SECTION C
1/2" = 1'-0" S-101

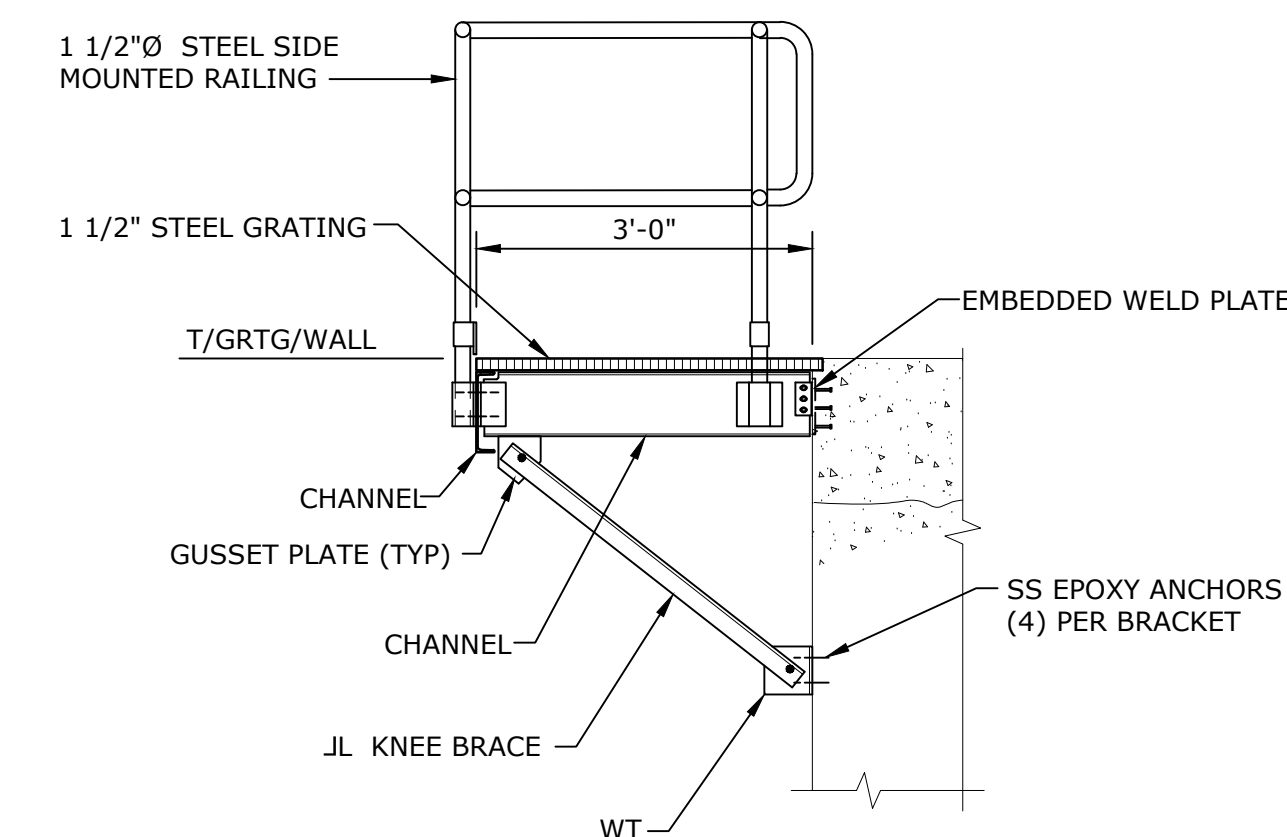


SPILLWAY

SECTION D
1/2" = 1'-0" S-101



FRONT VIEW



SIDE VIEW

VALVE OPERATOR PLATFORM AT DAM CREST

DETAIL 2
1/2"=1'-0" S-101

0 1' 2' 4'
SCALE: 1/2"=1'-0"

0 2' 4' 6'
SCALE: 3/8"=1'-0"

50% DESIGN

NOT FOR CONSTRUCTION

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Brush Reservoir Dam Improvements

Aquarian Water Company

Stamford, Connecticut

MARK	DATE	DESCRIPTION
PROJECT NO:	A-1000-195	
DATE:	02/2023	
FILE:	A1000-195-S-102.dwg	
DRAWN BY:	MJC	
DESIGNED/CHECKED BY:	RS/DFV	
APPROVED BY:	EBG	

STRUCTURAL SECTIONS AND DETAILS

SCALE: AS SHOWN

S-102

April 4, 2023

Mr. Matthew Regan
Tighe & Bond
213 Court Street, Suite 1100
Middletown, CT 06457
(sent via email only to mregan@tighebond.com)

Subject: Brush Reservoir (Gray's Pond) Dam Improvements
East Middle Patent Road
Stamford, Connecticut

Dear Mr. Regan:

The State Historic Preservation Office (SHPO) has reviewed the referenced project in response to your request for our comments regarding the potential effects to historic properties. SHPO understands that you are assisting the Aquarion Water Company with proposed improvements to the Brush Reservoir (Gray's Pond) Dam. The proposed activities include:

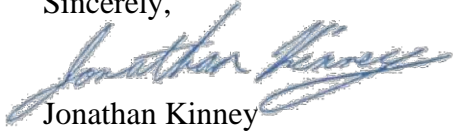
- Lowering and widening of the spillway,
- Installation of a downstream riprap buttress,
- Installation of seepage cutoff at the upstream face,
- Demolition and replacement of the concrete dam crest,
- Extension of the low-level outlet pipe
- Replacement of the upstream low-level outlet control valve
- Lowering the normal pool elevation
- Placement of water tolerant plantings

Because the proposed undertaking is subject to permitting from the United States Army Corps of Engineers and the Connecticut Department of Energy and Environmental Protection, it is subject to review by this office pursuant to the provisions of Section 106 of the National Historic Preservation Act and the Connecticut Environmental Policy Act.

There are no archeological sites or properties listed on the National Register of Historic Places (NRHP) recorded within or immediately adjacent to the identified project areas. Project plans indicate that the proposed improvements, staging, and access, will be confined to existing disturbed deposits with minimal ground disturbance of the surrounding areas. As a result, it is unlikely that significant archeological deposits would be impacted. The dam at Gray's Pond was constructed in 1925 and consists of a concrete dam with spillway. In addition, the low-level output pipe extends from a fieldstone retaining wall on the downstream side of the extant dam. Project plans indicate that much of the fieldstone retaining wall will be preserved in place. SHPO does not consider this dam eligible for listing on the National Register of Historic Places applying the criteria for evaluation (36 CFR 60.4 [a-d]). Based on the information provided to our office, it is SHPO's opinion that no historic properties will be affected by this undertaking.

This office appreciates the opportunity to review and comment upon this project. Do not hesitate to contact Cory Atkinson, Staff Archaeologist and Environmental Reviewer, for additional information at (860) 500-2458 or cory.atkinson@ct.gov.

Sincerely,



Jonathan Kinney
State Historic Preservation Officer

A1000-195
March 23, 2023

Tribal Historic Preservation Office
Mashantucket Western Pequot Tribal Nation
Marissa Turnbull, THPO
110 Pequot Trail
Mashantucket, CT 06338

Re: **Project Review Request
Brush Reservoir (Gray's Pond) Dam Improvements**

Dear Ms. Turnbull:

On behalf of Aquarion Water Company (AWC), Tighe & Bond, Inc. is submitting a project review request for information regarding the potential presence of significant historic and/or archeological resources at or near a proposed modifications to an existing dam in Stamford, Connecticut. This project is seeking state and federal permits that require compliance with state and federal historic preservation regulations. This project review request submittal includes a project description in this cover letter and the following attachments:

- Soil survey
- Maps depicting the project area
- Photographs of the project area
- Project plans depicting the proposed work area

Project Description

The AWC is proposing improvements to the existing Brush Reservoir Dam (CT Dam ID #13504). The Dam has been classified as a Class BB (moderate) hazard potential by the Connecticut Department of Energy & Environmental Protection (DEEP) Dam Safety Program in accordance with the classification procedures contained in CGS Section 22a-401 through 22a-411 and RCSA Sections 22a-409-1 through 22a-409-2.

The proposed work includes the following improvements at the Brush Reservoir Dam:

- Lowering the dam spillway elevation from 364.5 feet to 360 feet
- Widening the spillway
- Installing a downstream riprap buttress
- Installing seepage cutoff at the upstream face
- Demolishing and replacing the upper portion of the concrete dam crest
- Extending the low-level outlet pipe downstream past the proposed riprap buttress
- Replacing the upstream low-level outlet control valve
- Lowering the normal pool elevation
- Water tolerant plantings in the formerly inundated area



Historic Property Review

A desktop review of publicly available data from The Connecticut State Historic Preservation Office (SHPO), Historic Property Database and the National Register of Historic Places was completed for the presence of properties near the Project Site in Stamford. No historical landmarks were identified within or near the proposed project or construction areas.

If you have any questions or require additional information, please contact me at 716-949-9131 or MRegan@tighebond.com.

Very truly yours,

TIGHE & BOND, INC.



Matthew Regan, PWS
Project Environmental Scientist

Enclosures

Copy: Mr. James Quinn, THPO, The Mohegan Tribe
Ms. Bettina Washington, THPO, Wampanoag Tribe of Gay Head
Connecticut State Historic Preservation Office

A1000-195
March 23, 2023

Tribal Historic Preservation Office
Mohegan Tribe of Indians of Connecticut
James Quinn, THPO
13 Crow Hill Road
Uncasville, CT 06382

Re: **Project Review Request
Brush Reservoir (Gray's Pond) Dam Improvements**

Dear Mr. Quinn:

On behalf of Aquarion Water Company (AWC), Tighe & Bond, Inc. is submitting a project review request for information regarding the potential presence of significant historic and/or archeological resources at or near a proposed modifications to an existing dam in Stamford, Connecticut. This project is seeking state and federal permits that require compliance with state and federal historic preservation regulations. This project review request submittal includes a project description in this cover letter and the following attachments:

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Very truly yours,

TIGHE & BOND, INC.



Matthew Regan, PWS
Project Environmental Scientist

Enclosures

Copy: Ms. Marissa Turnbull, THPO, Mashantucket Western Pequot Tribal Nation
Ms. Bettina Washington, THPO, Wampanoag Tribe of Gay Head
Connecticut State Historic Preservation Office

A1000-195
March 23, 2023

Tribal Historic Preservation Office
Wampanoag Tribe of Gay Head-Aquinnah
Bettina Washington, THPO
20 Black Brook Road
Aquinnah, MA 02535

Re: **Project Review Request
Brush Reservoir (Gray's Pond) Dam Improvements**

Dear Ms. Washington:

On behalf of Aquarion Water Company (AWC), Tighe & Bond, Inc. is submitting a project review request for information regarding the potential presence of significant historic and/or archeological resources at or near a proposed modifications to an existing dam in Stamford, Connecticut. This project is seeking state and federal permits that require compliance with state and federal historic preservation regulations. This project review request submittal includes a project description in this cover letter and the following attachments:

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Very truly yours,

TIGHE & BOND, INC.



Matthew Regan, PWS
Project Environmental Scientist

Enclosures

Copy: Ms. Marissa Turnbull, Mashantucket Western Pequot Tribal Nation
Mr. James Quinn, THPO, The Mohegan Tribe
Connecticut State Historic Preservation Office

Appendix F

List of Abutters

Abutters List

000-9678
45 BARD HILL RD
WATER E WAIDE JR ET AL
45 BARN HILL RD, STAMFORD, CT 06903

002-5052
0 BARN HILL ROAD
LAUTER DANIEL M ET AL
16 BARN HILL ROAD, STAMFORD CT 06901

000-4363
107 EAST MIDDLE PATENT ROAD
LEVYS ALLAN P
107 E MIDDLE PATENT RD, GREENWICH CT 06831-2807

001-0099
121 EAST MIDDLE PATENT ROAD
ARGUIMBAU PETER LAYNE
121 EAST MIDDLE PATENT ROAD, GREENWICH, CT 06831-0000

Appendix G

Engineering Report

Section 1

Hydrologic and Hydraulic Analysis

Tighe & Bond performed a hydrologic and hydraulic analysis at Brush Reservoir Dam to evaluate whether the existing spillway has capacity to safely pass the spillway design flood (SDF), evaluate options to increase spillway capacity, and evaluate whether changes to the dam would increase downstream flow rates. The methodology and results of the hydrologic and hydraulic analysis are described in this section.

In accordance with the U.S. Army Corps of Engineers (USACE) Recommended Guidelines for Safety Inspection of Dams¹, Brush Reservoir Dam is a small size dam (storage less than 1,000 acre-feet and height less than 40 feet). Connecticut Department of Energy & Environmental Protection (CT DEEP) classifies Brush Reservoir Dam as having BB Moderate hazard potential, and it is our understanding that CT DEEP considers the SDF for a small size BB moderate hazard dam to be the 1-percent annual exceedance probability (AEP) flood event (also known as the 100-year frequency storm event) based on USACE guidelines. We recommend the SDF be confirmed with CT DEEP prior to final design.

1.1 Hydrologic Modeling Methodology

The hydrologic analysis for Brush Reservoir Dam was performed using the USACE HEC-HMS 4.9 hydrologic modeling program. HEC-HMS allows for flexibility in selecting hydrologic techniques for infiltration (e.g., Curve Number, Green-Ampt, and Initial & Constant), and transform unit hydrographs (e.g., Snyder, SCS Unit Hydrograph, or Kinematic Wave). The model was developed using information from GIS mapping, soil characteristics, land cover and watershed characteristics within the watershed. The impoundment and dam were evaluated for flow rates generated by the 50%, 10%, 2%, 1%, and 0.2% AEP storm events.

Principal hydrology input values for the modeling program include rainfall depth, the total contributing watershed area, land use, impervious area, soil properties, and the time of concentration (t_c). The Brush Reservoir Dam watershed has a drainage area of approximately 1.6 square mile (1,020 acres). The drainage area primarily consists of forested areas with some developed areas. The drainage areas are located in Stamford and Greenwich, Connecticut and North Castle, New York. Figure B-1 of Appendix A shows the watershed delineations. Flow from Piping Brook discharges through a culvert beneath East Middle Patent Road and then flows into Gray's Pond. Gray's Pond Brook located downstream of Gray's Pond, flows into the Bargh Reservoir.

The 24-hour precipitation for the 50%, 10%, 2%, 1%, and 0.2% AEP storm events were estimated using the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 precipitation frequency tool. Data downloaded from NOAA was used to develop a site-specific storm distribution curve to distribute the precipitation total across the 24-hour storm duration. Table 1-1 provides the precipitation amounts used for the various storms analyzed.

¹ US Army Corps of Engineers, ER 110-2-106 "Recommended guidelines for safety inspection of Dams", September 26, 1979.

TABLE 1-1
24-Hour Precipitation Values used in HEC-HMS Analysis

Annual Exceedance Probability (AEP)	Precipitation Values (inches)
50% (2-year)	3.62
10% (10-year)	5.47
2% (50-year)	7.50
1% (100-year)	8.42
0.2% (500-year)	11.10

The Curve Number methodology was used to model infiltration for this study and was based on the hydrologic soil classification of the watershed from the U.S. Department of Agriculture (USDA) and the 2019 National Land Cover Dataset (NLCD). None of the soils within the watershed have hydrologic soil group rating of A and 33% have a hydrologic soil group rating of B, both of which have moderate to high infiltration rates. Of the remaining soils, approximately 40% of the soils within the watershed have a hydrologic soil group rating of C and 27% of the soils have a hydrologic soil group rating of D, both of which have low infiltration rates. The Curve Numbers were computed by intersecting the NLCD land cover data with the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database and computing a unique Curve Number for each land cover soil type combination.

The time of concentration was calculated using the Velocity Method outlined in the USDA NRCS Part 630 Hydrology National Engineering Handbook (HNEH) Chapter 15. The Velocity Method is a function of the surface type, flow path length, and slope of the land surface. Table 1-2 shows a summary of the hydrologic parameters.

TABLE 1-2
Summary of Brush Reservoir Dam Study Hydrologic Parameters

Sub-Drainage Area	Area, square miles	Curve Number	Lag Time, minutes
Basin_01 (Areas draining to East Middle Patent Road)	1.5	69.0	93.8
Basin_02 (Areas draining to Brush Reservoir)	0.1	68.6	51

The Soil Conservation Service (SCS) standard Unit Hydrograph methodology was used in the HEC-HMS model to approximate the timing and magnitude of runoff caused by large rainfall events.

1.2 Hydraulic Analysis Methodology

Tighe & Bond performed a hydraulic analysis for Gray's Pond Brook using HEC-RAS (v. 5.0.7), a hydraulic modeling program available from the U.S. Army Corps of Engineers. A steady state model was developed from approximately 100 feet upstream of East Middle Patent Road to Bargh Reservoir. The geometry of East Middle Patent Road, Brush

Reservoir Dam, and an abandoned wood road stone culvert crossing located approximately 700 feet downstream of Brush Reservoir Dam were included in the HEC-RAS model.

To create the model, Tighe & Bond first created a Digital Elevation Map (DEM) using the March and May 2022 survey performed by D'Andrea Surveying & Engineering, P.C. and Connecticut Environmental Conditions Online (CTECO) LiDAR elevation data. A geometric representation of the channel, banks, and cross-sections was created using the GeoHECRAS software to create and extract cross sections from the DEM. The hydraulic model of Gray's Pond Brook was modeled using 28 cross sections. The channel Manning's roughness coefficients (Manning's n) were estimated to range from 0.035 to 0.045 based on site visit observations and orthographic imagery. The overbank area Manning's n varied from 0.05 (maintained grass) to 0.1 (forest cover). The overbank Manning's n were set constant horizontally along the cross sections and were estimated using orthographic imagery.

A normal depth upstream boundary condition and known water surface elevation downstream boundary condition (elevation 253.9 feet NAVD88 for Bargh Reservoir) were used for the hydraulic model.

Following the development of the geometric parameterization of the cross-sections along Gray's Pond Brook, flows from the HEC-HMS model were assigned by cross-section for both existing and proposed conditions. Water surface elevations and channel velocities were evaluated for the 50%, 10%, 2%, 1%, and 0.2% AEP.

1.3 Results

The hydrologic and hydraulic models were developed using the above-described methodologies and the results are summarized below.

1.3.1 Hydrologic Validation

Table 1-3 and Figure B-2, of Appendix A show the peak inflow results from the HEC-HMS model as well as the predicted peak flows from the StreamStats regression analysis² for the 50%, 10%, 2%, 1%, and 0.2% AEP storm events and prior studies by GZA GeoEnvironmental, Inc. in 2009³. Outflows and reservoir water surface elevation are provided in Section 1.3.2.

² Ahearn, E.A., 2004, Regression Equations for Estimating Flood Flows for the 2-, 10-, 25-, 50-, 100-, and 500-Year Recurrence Intervals in Connecticut: U.S. Geological Survey SRI 2004-5160, 62 p. (<http://water.usgs.gov/pubs/sir/2004/5160/>)

³ GZA GeoEnvironmental, Inc., April 9, 2009 "Preliminary Hydrologic and Hydraulic Evaluation Twelve Aquarion Water Company Dams"

TABLE 1-3
HEC-HMS Inflow Results and Validation for Brush Reservoir Dam

Annual Exceedance Probability (AEP)	HEC-HMS Peak Inflow, cfs	StreamStats Regression Analysis			Prior Dam Study (2009)
		Lower 95% Confidence Interval, cfs	Prediction, cfs	Upper 95% Confidence Interval, cfs	
50% (2-year)	422	57	117	238	-
10% (10-year)	763	116	246	521	-
2% (50-year)	1,148	163	397	964	-
1% (100-year)	1,316	183	476	1,240	860
0.2% (500-year)	1,758	201	631	1,980	-

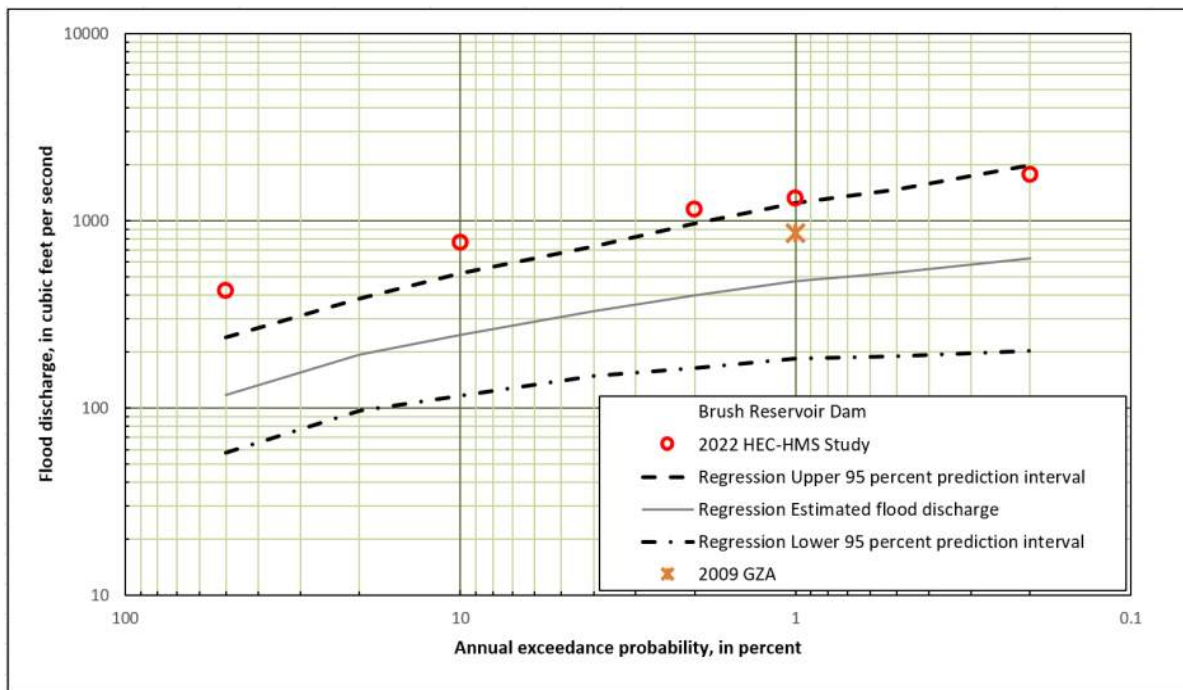


FIGURE 1-2

Comparison of HEC-HMS results with prior studies and regression estimates

The peak flows estimated using HEC-HMS generally fell slightly above the regression analysis upper 95% percent prediction interval values. The regression equations do not take urbanization into account, so computed values above the regression equations are anticipated. The computed 1% AEP storm event is approximately 40-percent larger than that computed as part of the 2009 preliminary study by GZA. Based on this comparison, the HEC-HMS model results are considered to provide a reasonable estimate of flow rates generated by the modeled rainfall events.

Appendix B contains the basin input summary sheet for the HEC-HMS hydrologic model as well as inflow hydrograph for Brush Reservoir Dam as well as HEC-RAS model output for existing conditions and the evaluated alternatives.

1.3.2 Existing Conditions Results

From the topographic survey conducted on May 26, 2022, the spillway crest elevation was determined to be 364.5 feet in the North American Vertical Datum of 1988 (NAVD88) and the spillway length was measured to be 25 feet. Table 1-4 shows the existing conditions hydrologic and hydraulic analysis results. Brush Reservoir Dam is anticipated to overtop by 1.2 feet during the SDF of the 1% AEP storm event.

TABLE 1-4

Hydrologic Analysis Results for Existing Conditions – No Changes Hydraulically

Annual Exceedance Probability (AEP)	Peak Inflow, cfs	Peak Outflow, cfs	Peak Water Surface Elevation, ft	Freeboard, ft
50% (2-year)	422	420	367.3	-0.3
10% (10-year)	763	761	367.7	-0.7
2% (50-year)	1,148	1,147	368.1	-1.1
1% (100-year)	1,316	1,316	368.2	-1.2
0.2% (500-year)	1,758	1,757	368.5	-1.5

1.3.3 Alternatives

Tighe & Bond evaluated four alternatives for Brush Reservoir Dam to safely pass its SDF or to be deregulated as a dam (i.e., dam removal):

1. No Changes Hydraulically (with overtopping protection)
2. Dam Removal
3. Run-of-the-River Alternative
4. New Spillway Elevation at 360' Alternative
5. New Spillway Elevation at 354' Alternative

No Changes Hydraulically Alternative

Table 3-4 shows a summary of the hydrologic and hydraulic analysis results for this alternative. Overtopping protection is required so the downstream soils that buttress the dam can withstand the anticipated overtopping depths without eroding.

Dam Removal Alternative

Tighe & Bond developed a dam removal alternative so that the dam is no longer a "Regulated dam" subject to CT DEEP jurisdiction. Section 22a-401 of the Connecticut General Statutes states that:

"All dams, dikes, reservoirs and other similar structures, with their appurtenances, without exception and without further definition or enumeration herein, which, by breaking away or otherwise, might endanger life or property, shall be subject to the jurisdiction conferred by this chapter".

For the purposes of this study, we assume that if the reservoir stores less than 15-acre feet of volume (regardless of height) during a 1% AEP (100-year) storm event the

structure would no longer meet the definition of a dam regardless of storage capacity based on guidance by the U.S. Army Corps of Engineers⁴.

Tighe & Bond performed bankfull measurements at five locations along Gray's Pond Brook and measured bankfull widths ranging from 26.5 feet to 32 feet, with an average width of approximately 28 feet. Tighe & Bond also measured an average low flow channel depth of 0.6 feet. Tighe & Bond acquired the approximate bankfull stream characteristics for Gray's Pond Brook based on regression equations available from StreamStats⁵ using the "New England" approach and computed a width of 29 feet and a depth of 1.5 feet. Based on field measurements and regression estimates the following parameters were assumed:

- Bankfull Width: ~28 feet
- Bankfull Depth: ~1.5 feet
- Low Flow Channel Depth: ~0.6 feet

Tighe & Bond performed a simplified hydraulic analysis using Manning's equation to evaluate an appropriate low flow channel that could pass the seasonal flow statistics flows computed using StreamStats.

Tighe & Bond evaluated a dam removal with the characteristics below:

- A "lower flow" channel with a depth of 0.6 feet, a bottom width of 3 feet, and 1.5H:1V side slopes.
- A "bankfull channel" with a width of 28 feet, a depth of 1.5 feet.
- 3H:1V side slopes extending from the proposed channel to the top of the dam embankment.

Table 1-5 shows a summary of the hydrologic and hydraulic analysis results for the dam removal alternative.

TABLE 1-5
Hydrologic Analysis Results for Dam Removal Alternative

Annual Exceedance Probability (AEP)	Peak Inflow, cfs	Peak Outflow, cfs	Peak Water Surface Elevation, ft
50% (2-year)	424	424	345.6
10% (10-year)	764	764	347.2
2% (50-year)	1,152	1,152	348.6
1% (100-year)	1,316	1,316	349.1
0.2% (500-year)	1,763	1,763	350.3

⁴ U.S. Army Corps of Engineers "Engineering and Design Safety of Dams – Policy and Procedures", ER 110-2-1156, March 31, 2014.

⁵ Bieger, Katrin; Rathjens, Hendrik; Allen, Peter M.; and Arnold, Jeffrey G., 2015, Development and Evaluation of Bankfull Hydraulic Geometry Relationships for the Physiographic Regions of the United States, Publications from USDA-ARS / UNL Faculty, 17p.

With the dam removal alternative, the 100-year water surface elevation is 8.1 feet above the proposed channel bottom elevation, with an estimated storage volume of approximately 1 acre-foot. Since this is less than 15 acre-feet, we recommend this geometry be presented to CT DEEP to de-regulate the dam, if dam removal is desired.

Run-of-the-River Dam Alternative

There are several potential approaches to increase the spillway capacity at Brush Reservoir Dam that can include lowering and/or widening the spillway. This alternative evaluated the potential to maintain the existing spillway crest, and normal pool elevation, while widening the spillway to safely pass the SDF. Evaluation of this alternative estimated that widening the spillway to nearly the full width of the dam still did not yield adequate freeboard during the SDF. Therefore, Tighe & Bond developed a rehabilitation alternative for lowering the concrete dam crest to the spillway crest elevation of 364.5 feet NAVD88. This will transform the dam into a run-of-the-river dam and will require overtopping protection of the downstream embankment soils. Table 3-6 below provides a summary of the hydrologic analysis results for this alternative.

TABLE 1-6

Hydrologic Analysis Results for Run-of-the-River Dam Alternative

Annual Exceedance Probability (AEP)	Peak Inflow, cfs	Peak Outflow, cfs	Peak Water Surface Elevation, ft
50% (2-year)	422	422	365.2
10% (10-year)	763	762	365.6
2% (50-year)	1,147	1,147	365.9
1% (100-year)	1,316	1,316	366.0
0.2% (500-year)	1,758	1,758	366.4

This alternative would not provide a benefit over existing conditions and would require armoring the downstream area.

New Spillway at Elevation 360' Alternative

In lieu of only widening the spillway, additional capacity can be achieved by a combination of widening and lowering the spillway.

Tighe & Bond developed an alternative for modifying the spillway understanding that if spillway rehabilitation is selected as a preferred alternative; further evaluation will be required to develop an optimal spillway geometry. The spillway crest elevation was modeled with a minimum spillway crest of 360 feet NAVD88, 4.5 feet below the existing spillway crest elevation. The spillway length was modeled to be approximately 34 feet at elevation 360 feet NAVD88 with a 40-foot section over bedrock varying from 360 feet NAVD88 to 363.3 feet NAVD88. Table 3-7 below provides a summary of the hydrologic analysis results for this alternative.

TABLE 1-7
Hydrologic Analysis Results for Design Spillway at Elevation 360' Alternative

Annual Exceedance Probability (AEP)	Peak Inflow, cfs	Peak Outflow, cfs	Peak Water Surface Elevation, ft	Freeboard*, ft
Annual (1-year)	314	308	361.9	4.1
50% (2-year)	422	417	362.4	3.6
10% (10-year)	763	757	363.5	2.5
2% (50-year)	1,147	1,141	364.4	1.6
1% (100-year)	1,316	1,310	364.8	1.2
0.2% (500-year)	1,758	1,752	365.6	-0.4

*Freeboard calculations assume the dam crest would remain at 367 feet NAVD88; however, 1-foot of freeboard could be provided during the 100-year SDF if the crest was lowered 1.4 feet to 365.6 feet NAVD88

Lowering and widening the spillway will result in a lower normal pool, but will provide adequate freeboard during the SDF. This alternative uses the existing bedrock profile to minimize costly rock removal.

The modeled spillway geometry in HEC-RAS and HEC-HMS is summarized in the figures below.

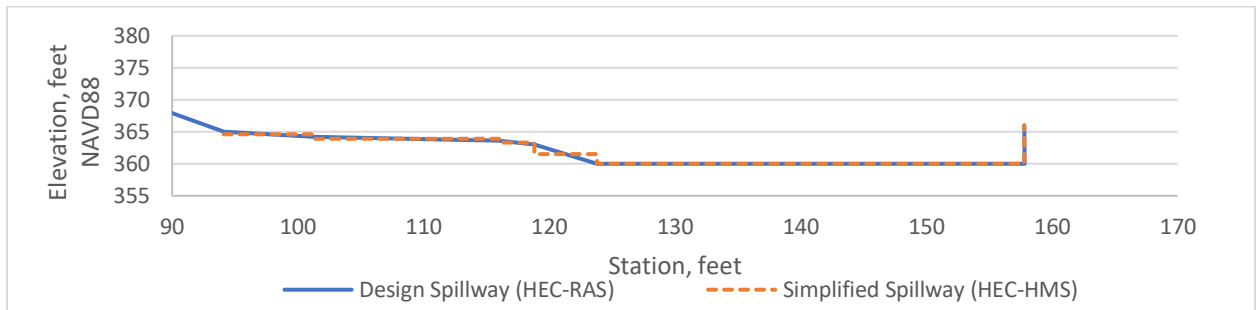


FIGURE 1
Dam Geometry Used for Hydrologic and Hydraulic Modeling

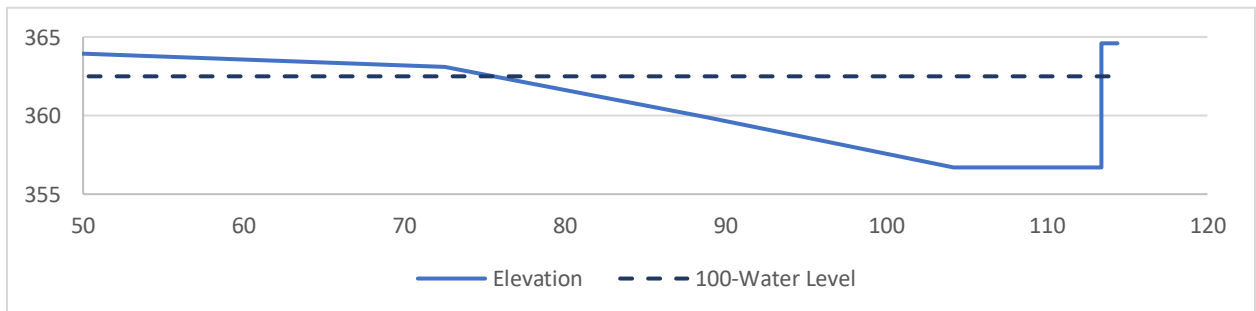


FIGURE 2
Spillway Channel 10 feet downstream of dam upstream face

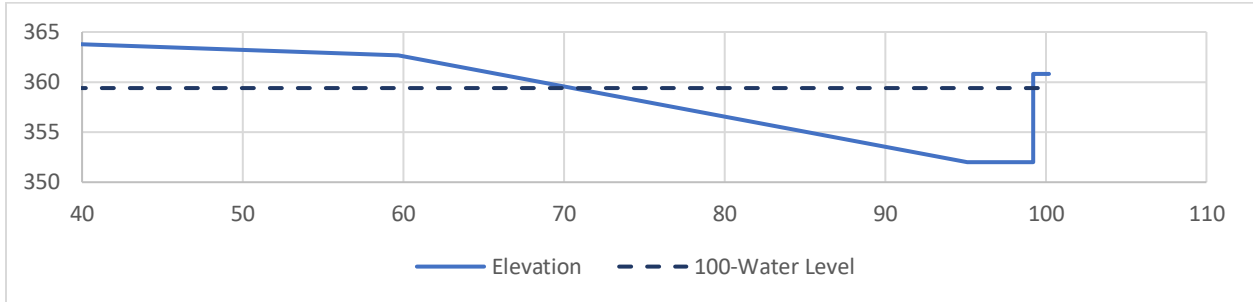


FIGURE 3
Spillway Channel 20 feet downstream of dam upstream face

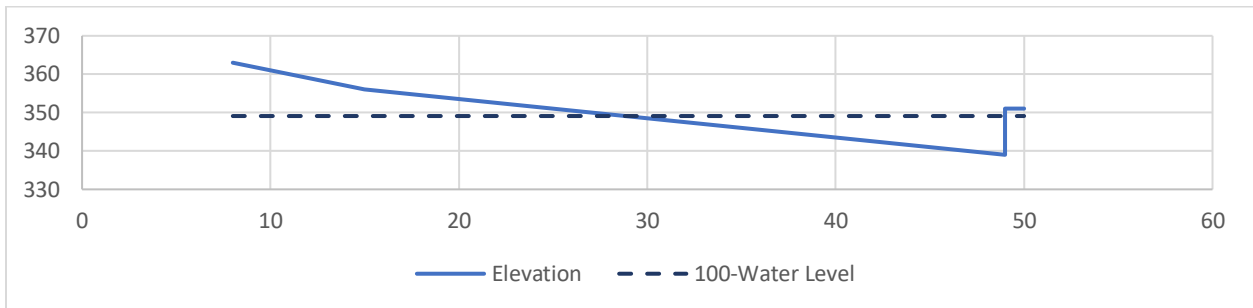


FIGURE 4
Spillway Channel at End of Training Wall (assuming downstream training wall at 351 feet NAVD88)

Summary of 100-year water elevation downstream of the dam crest:

- Immediately downstream of the concrete dam (10 feet downstream of dam upstream face)
 - 362.5 feet NAVD88
- 20 feet downstream of dam upstream face
 - 359.4 feet NAVD88
- At downstream terminus of training wall
 - 349.1 feet NAV88
- Toe of Dam
 - 343.3 feet NAVD88

New Spillway at Elevation 354' Alternative

In lieu of modifying the existing spillway, additional capacity can be achieved by creating a new spillway and leaving the existing spillway in place as an auxiliary spillway.

Tighe & Bond developed an alternative for creating a new 50-foot-wide spillway with a crest elevation of 354 feet NAVD88 (10.5 feet lower than the existing spillway). The remainder of the concrete dam including the existing spillway are assumed to remain in place. The proposed geometry has capacity to pass the SDF with 8.5 feet of freeboard but would also lower the normal pool from 364.5 feet NAVD88 to 354 feet NAVD88. Table 1-8 below provides a summary of the hydrologic analysis results for constructing a new spillway.

TABLE 1-8

Hydrologic Analysis Results for New Spillway at Elevation 354' Alternative

Annual Exceedance Probability (AEP)	Peak Inflow, cfs	Peak Outflow, cfs	Peak Water Surface Elevation, ft	Freeboard*, ft
50% (2-year)	422	420	356.4	10.6
10% (10-year)	763	760	357.2	9.8
2% (50-year)	1,147	1,144	358.1	8.9
1% (100-year)	1,316	1312	358.5	8.5
0.2% (500-year)	1,758	1,753	359.5	7.5

*Freeboard calculations assume the dam crest would remain at 367 feet NAVD88; however, 1-foot of freeboard could be provided during the 100-year SDF if the crest was lowered 7.5 feet to 359.5 feet NAVD88

It is likely most cost effective to leave the dam crest at its current elevation; however, the dam crest could theoretically be lowered approximately 7.5 feet with the proposed spillway geometry and still have capacity to pass the SDF with 1-foot of freeboard.

1.3.4 Evaluation of Potential Downstream Impacts from Design Alternatives

Brush Reservoir Dam currently provides negligible flood attenuation during the 1% AEP storm event with an inflow and outflow of approximately 1,316 cfs. As a result, the proposed removal and repair alternatives are not anticipated to have adverse impacts downstream.

Figure B-2 of Appendix A shows the inundation areas under existing conditions and the evaluated alternatives. Note that the New Spillway at Elevation 354' Alternative was omitted because Aquarion indicated lowering the normal pool to elevation 354 feet was not a feasible alternative following discussion with abutting property owners. Bargh Reservoir is located approximately 2,100 feet downstream of the dam. The only infrastructure located between Brush Reservoir Dam and Bargh Reservoir is the abandoned wood road stone culvert located approximately 700 feet downstream of the dam that is anticipated to overtop by 2.7 feet under existing conditions and with the removal/repair alternatives. Since there currently isn't any usable infrastructure downstream of Brush Reservoir Dam and the outflows are not anticipated to increase for the evaluated alternatives, downstream hydraulic impacts are not anticipated.

1.4 Hydrologic and Hydraulic Conclusions and Recommendations

Tighe & Bond performed a hydrologic and hydraulic analysis for Brush Reservoir Dam using HEC-HMS and HEC-RAS. Tighe & Bond also evaluated potential dam removal and dam repair alternatives. The results of the analysis show:

- The existing Brush Reservoir Dam is anticipated to overtop by approximately 1.2 feet during the SDF of the 1% AEP storm event.
- Tighe & Bond evaluated removing the dam with a bankfull channel approximately 28 feet wide with a maximum depth of 1.5 feet.
- Tighe & Bond evaluated three dam repair alternatives:

- One converting the dam to a run-of-the-river dam but maintaining the normal pool.
- One creating a lower and wider spillway lowering the normal pool by 4.5 feet and providing freeboard during the SDF.
- One creating a new 50-foot-wide spillway lowering the normal pool by 10.5 feet and providing a freeboard during the SDF.
- The dam removal and dam repair alternatives are anticipated to have a negligible impact on peak outflows during the evaluated storm event (no significant increase to outflows).

From a hydraulic standpoint, Tighe & Bond recommends :

- New Spillway at Elevation 360' Alternative if Aquarion decides the reservoir is needed and lowering the normal pool elevation by 4.5 feet is acceptable.
- Dam Removal Alternative if Aquarion decides the water supply is no longer required.
- No Change Hydraulically Alternative if Aquarion decides maintaining the current normal pool elevation is desired.

APPENDIX A
Hydrologic and Hydraulic Analysis

Brush Reservoir Dam

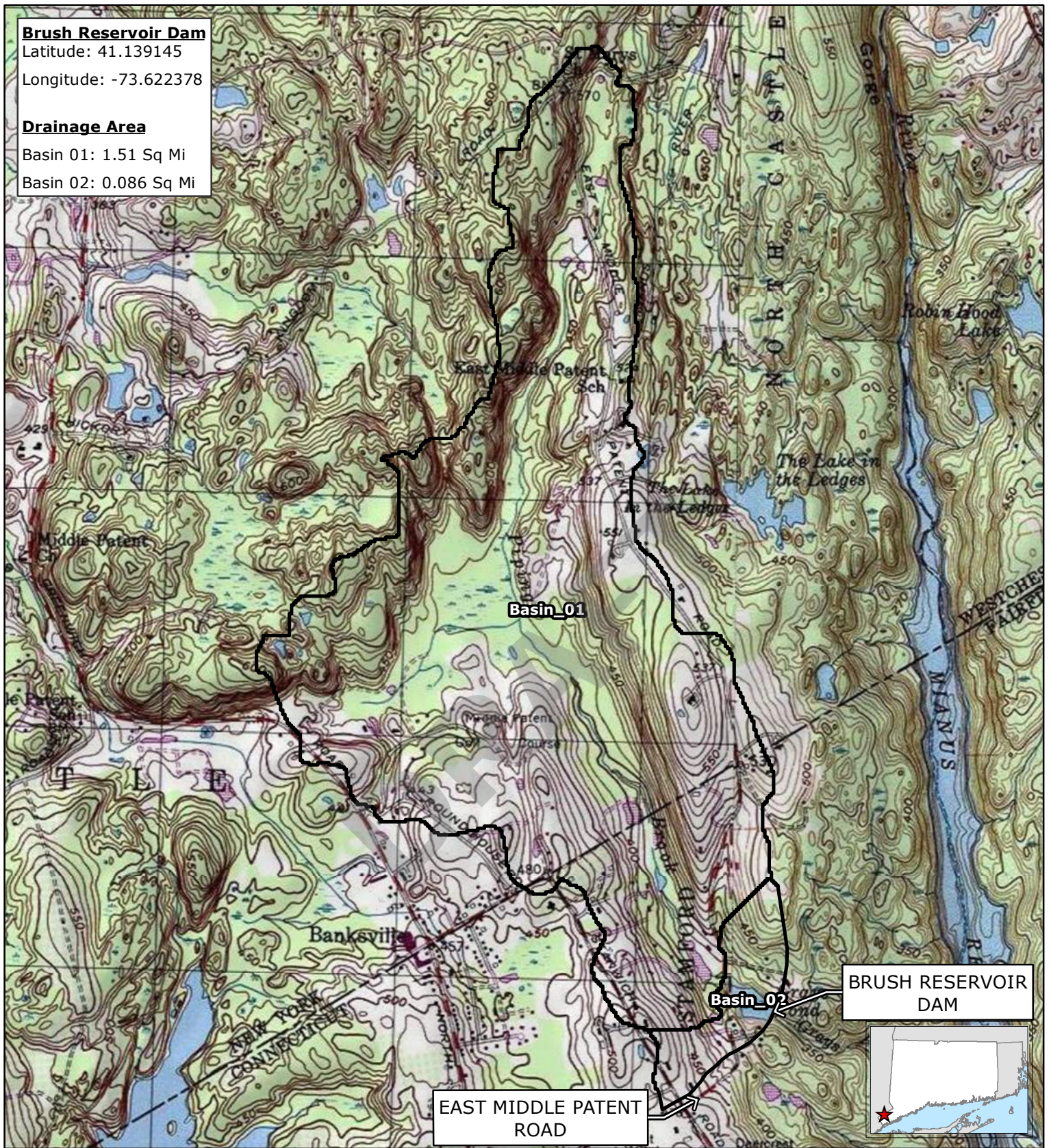
Latitude: 41.139145

Longitude: -73.622378

Drainage Area

Basin 01: 1.51 Sq Mi

Basin 02: 0.086 Sq Mi



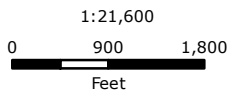
 Drainage Area

**FIGURE 1
DRAINAGE AREA MAP**

Brush Reservoir Dam
Stamford, Connecticut
Dam ID 13504



Based on USGS Topographic Map for Pound Ridge, NY and Mount Kisco, NY



September 2022

Brush Reservoir Dam

Latitude: 41.139145

Longitude: -73.622378

Brush Reservoir Dam

Water Surface Elevation

Existing Conditions / Alternative 1:	368.2 feet
Alternative 2 Dam Removal:	349.1 feet
Alternative 3 Lower Dam:	366.0 feet
Alternative 4 Modify Spillway:	364.6 feet

Inflow

Existing Conditions / Alternative 1:	1316 cfs
Alternative 2 Dam Removal:	1316 cfs
Alternative 3 Lower Dam:	1316 cfs
Alternative 4 Modify Spillway:	1316 cfs

Outflow

Existing Conditions / Alternative 1:	1316 cfs
Alternative 2 Dam Removal:	1316 cfs
Alternative 3 Lower Dam:	1316 cfs
Alternative 4 Modify Spillway:	1311 cfs

Downstream inundation areas are indistinguishable for modeled scenarios, only existing conditions is shown downstream of dam for clarity

Abandoned Stone Culvert Crossing

WSEL = 331.2 feet (all scenarios)
 Overtopping Depth = 2.7 feet (all scenarios)
 Inflow/Outflow = Same as Dam Outflow (all scenarios)



Bargh Reservoir



- Cross Sections (label indicates feet upstream of Bargh Reservoir)
- Alternative 4 Modify Spillway 1% AEP Inundation Area
- Alternative 3 Lower Dam 1% AEP Inundation Area
- Existing Conditions 1% AEP Inundation Area

1. The inundation areas shown are modeled flooding during the 1% Annual Exceedance Probability (AEP)
 2. The elevations are in the North American Vertical Datum of 1988 (NAVD88)
 3. 2019 Statewide Leaf-Off Orthophotography, Courtesy of CTECO.

Tighe & Bond

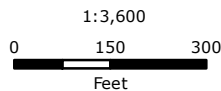
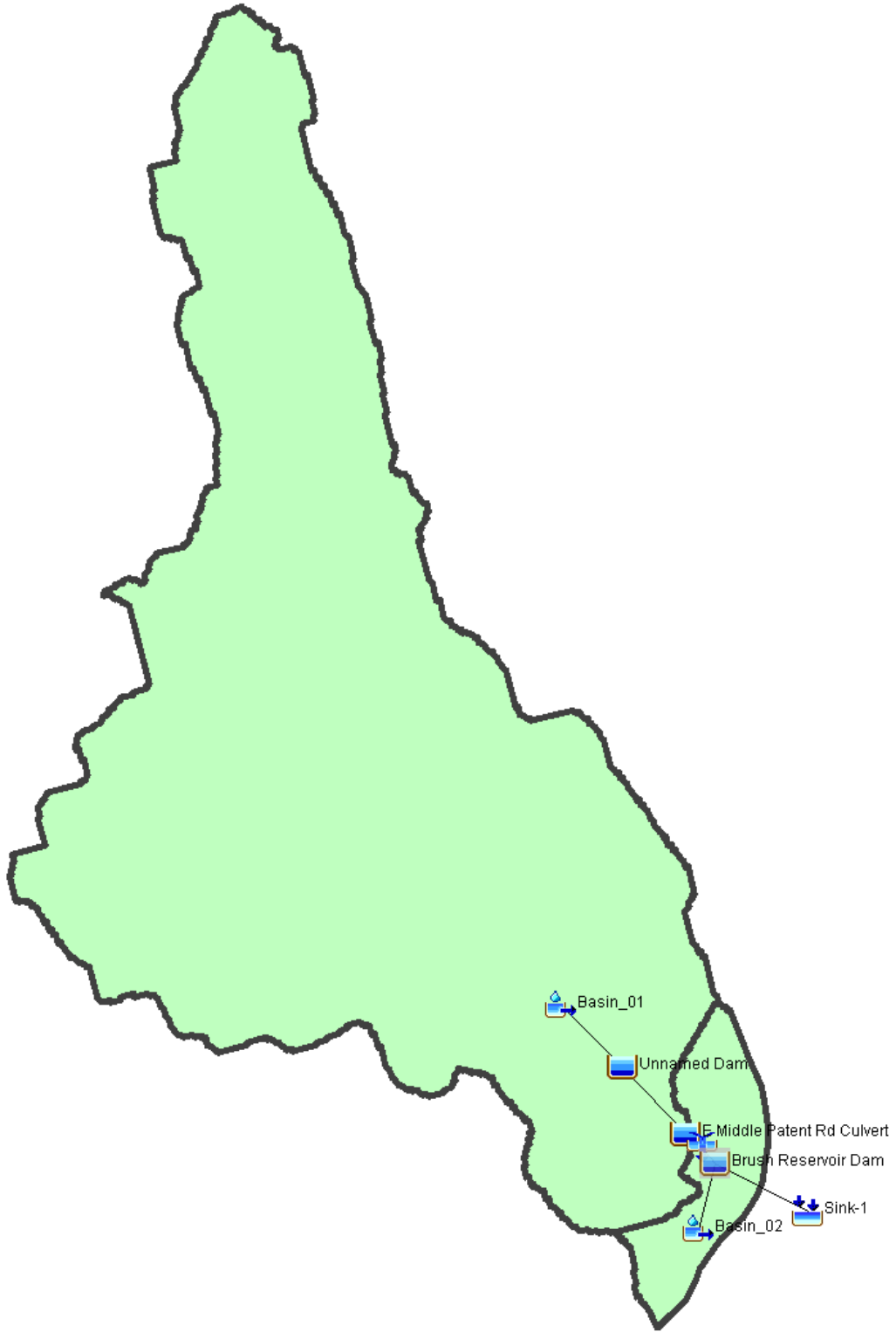


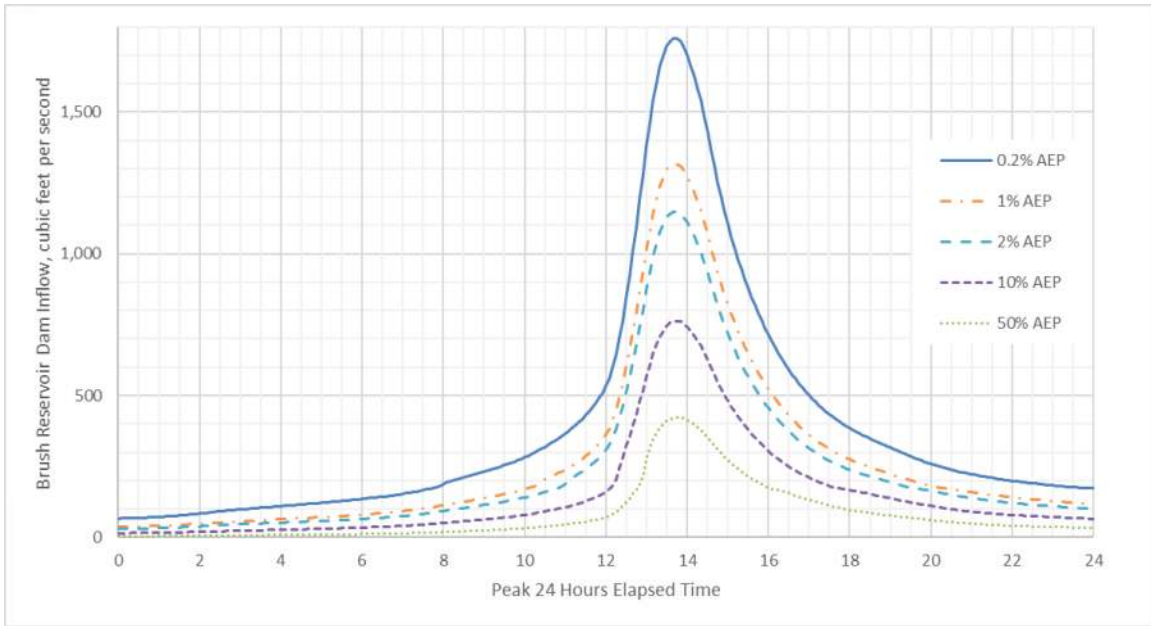
FIGURE 2
DOWNSTREAM IMPACTS FOR
ALTERNATIVES ANALYSIS
 Brush Reservoir Dam
 Stamford, Connecticut
 Dam ID 13504

September 2022

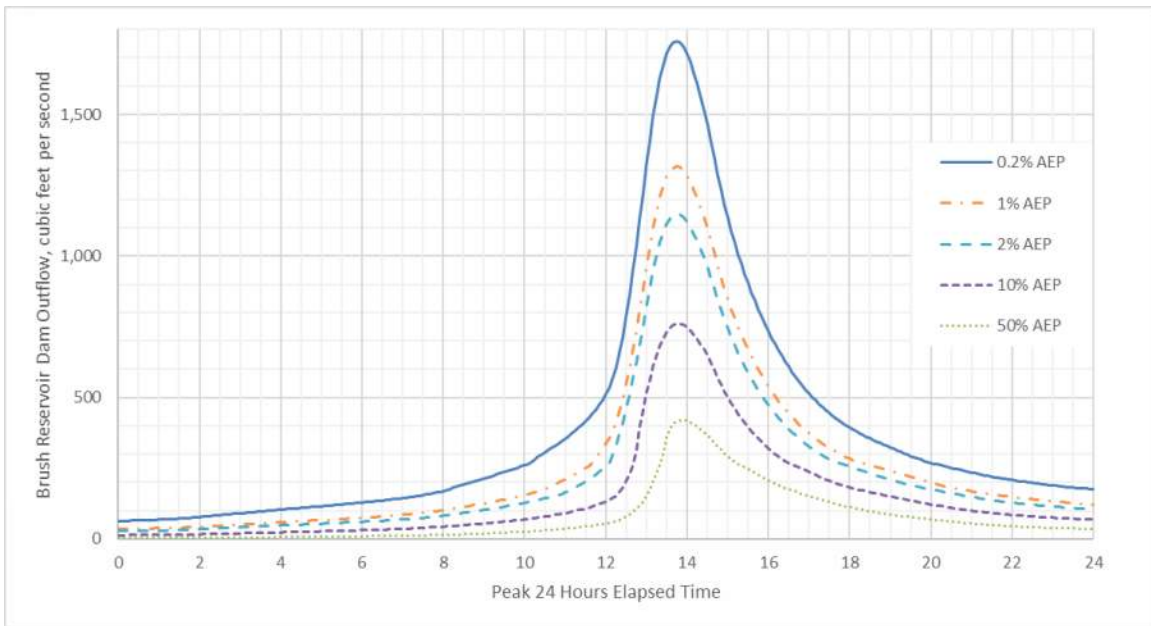
HEC-HMS Layout



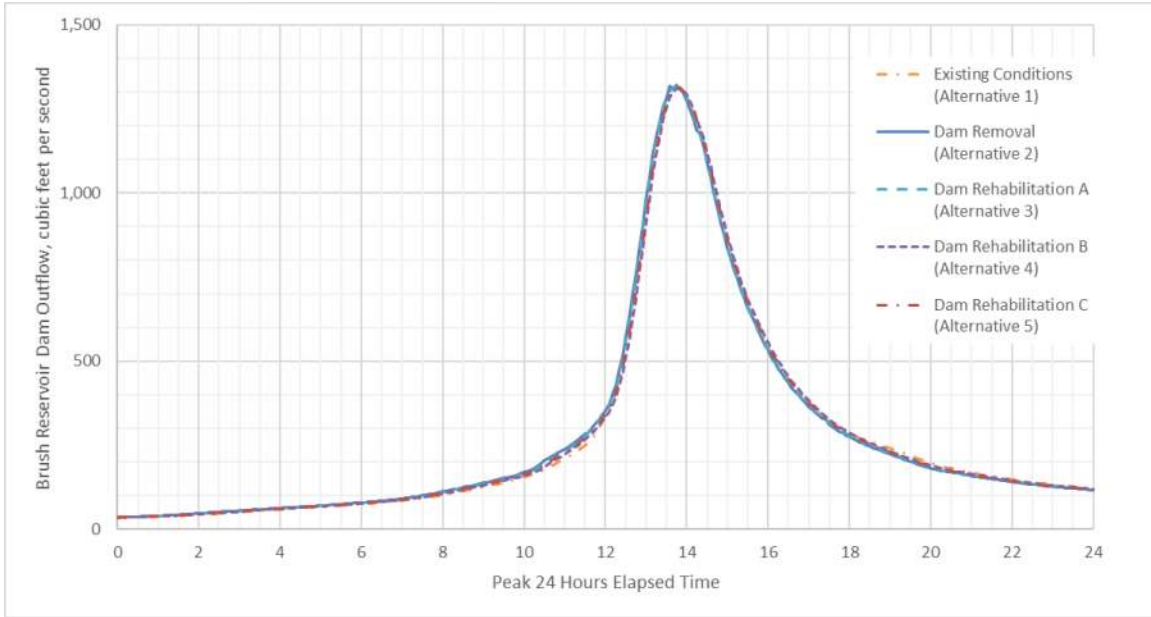
Row Labels	Area (Acres)	Curve Number / Average CN	Fractional Area (Acres)	Fractional CN
Basin_01	965.0	72.7	1.0	69.0
B	306.014414	61.09821429	0.317112127	18.19389037
Developed Open Space	49.467403	61	0.051261355	3.12694263
Pasture/Hay	0.629394	61	0.000652219	0.03978537
Mixed Forest	33.476199	55	0.034690224	1.907962338
Decidious Forest	186.55698	55	0.19332253	10.63273915
Developed, Low Intensity	26.739473	68	0.0277709189	1.884224836
Woody Wetlands	2.577015	60	0.002670471	0.160228278
Grassland/Herbaceous	1.259261	61	0.001304929	0.079600639
Developed, Medium Intensity	3.515081	75	0.003642557	0.273191742
Shrub/scrub	1.793608	48	0.001858654	0.089215382
C	408.511085	74.23891626	0.423325873	30.51515595
Developed Open Space	52.210715	74	0.054104154	4.003707374
Evergreen Forest	2.201206	70	0.002281033	0.159672342
Pasture/Hay	22.68391	74	0.023506549	1.739484658
Mixed Forest	29.14959	70	0.030206709	2.114469661
Decidious Forest	192.902018	70	0.199897673	13.99283711
Developed, Low Intensity	22.32127	79	0.023130758	1.827329896
Woody Wetlands	67.430186	73	0.069875564	5.100916158
Grassland/Herbaceous	10.198205	74	0.010568046	0.782035422
Developed, Medium Intensity	8.322654	83	0.008624478	0.715831655
Developed, High Intensity	0.206998	90	0.000214505	0.019305437
Shrub/scrub	0.884333	65	0.000916404	0.059566236
D	250.478321	80.67710843	0.259561999	20.29825093
Developed Open Space	24.128405	80	0.02500343	2.000274362
Pasture/Hay	3.303752	80	0.003423564	0.273885092
Mixed Forest	17.96589	77	0.018617429	1.433542025
Decidious Forest	160.078424	77	0.165883721	12.77304648
Developed, Low Intensity	17.105563	84	0.017725902	1.488975756
Woody Wetlands	21.622135	79	0.022406269	1.770095237
Grassland/Herbaceous	0.002959	80	3.06631E-06	0.000245305
Developed, Medium Intensity	5.380691	87	0.005575824	0.485096647
Emergent Herbaceous Wetlands	0.393297	83	0.00040756	0.033827484
Developed, High Intensity	0.083818	92	8.68577E-05	0.007990907
Shrub/scrub	0.413387	73	0.000428379	0.031271639
Basin_02	55.1	73.0	1.0	68.6
B	28.250632	62.775	0.512657847	29.3539557
Developed Open Space	5.167596	61	0.093775199	5.720287143
Mixed Forest	1.146922	55	0.020812935	1.144711417
Decidious Forest	20.084639	55	0.364471414	20.04592776
Developed, Low Intensity	1.313715	68	0.02383969	1.621098906
Open Water	0.310155	98	0.005628313	0.551574657
Woody Wetlands	0.144806	60	0.002627762	0.157665709
Developed, Medium Intensity	0.082799	75	0.001502535	0.112690108
C	0.004797	70	8.70501E-05	0.006093505
Decidious Forest	0.004797	70	8.70501E-05	0.006093505
D	26.850783	79.9	0.487255103	39.23141052
Developed Open Space	7.507736	80	0.136241192	10.89929535
Pasture/Hay	0.124199	80	0.002253811	0.180304899
Mixed Forest	3.647891	77	0.066197455	5.09720405
Decidious Forest	9.488217	77	0.172180534	13.25790111
Developed, Low Intensity	1.821454	84	0.033053515	2.776495252
Open Water	2.474649	98	0.044906897	4.40087593
Woody Wetlands	1.386981	79	0.025169231	1.988369279
Developed, Medium Intensity	0.399656	87	0.007252467	0.630964654
Grand Total	1020.110032	72.75516693	2.0	137.598757



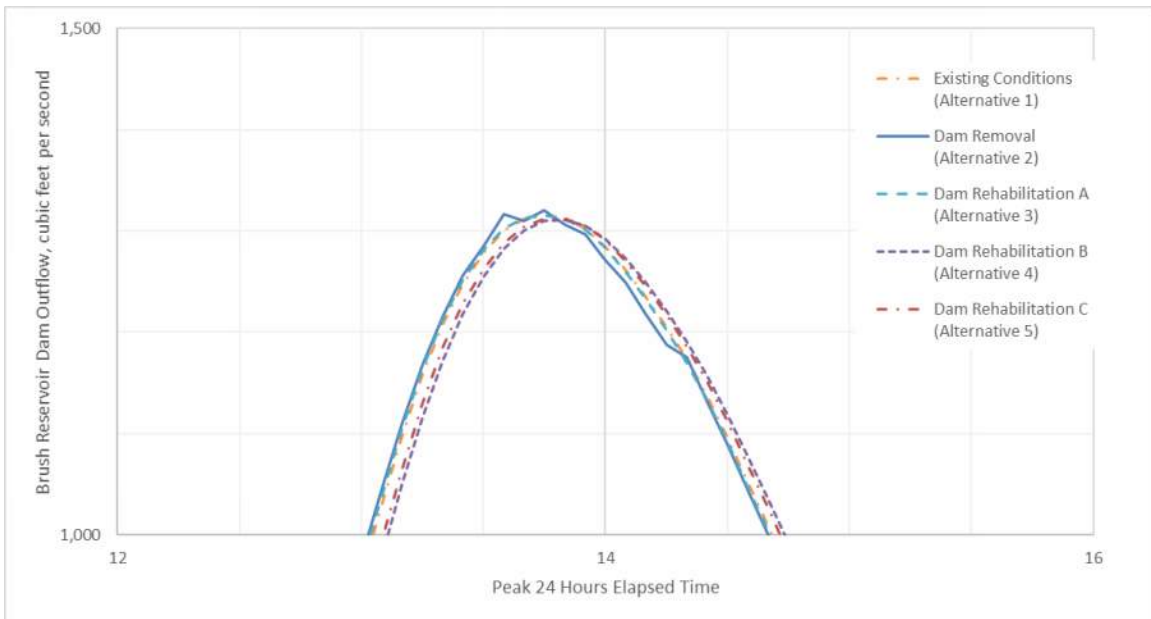
HEC-HMS Inflow to Brush Reservoir Dam Summary



HEC-HMS Outflow from Brush Reservoir Dam Summary



HEC-HMS 1%AEP Outflow for Existing Conditions and Alternatives

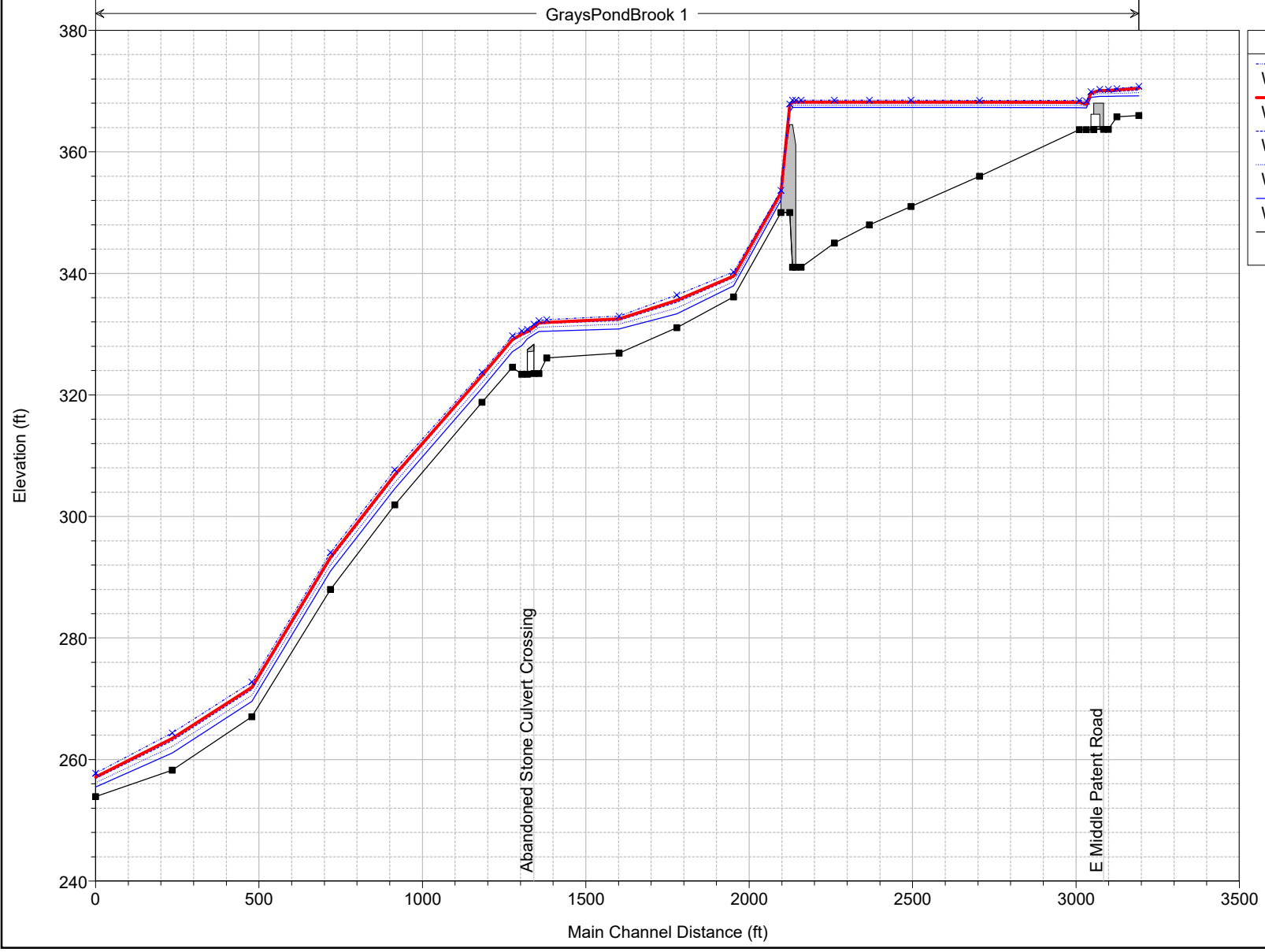


Peak close-up: HEC-HMS 1%AEP Outflow for Existing Conditions and Alternatives

HEC-RAS Layout

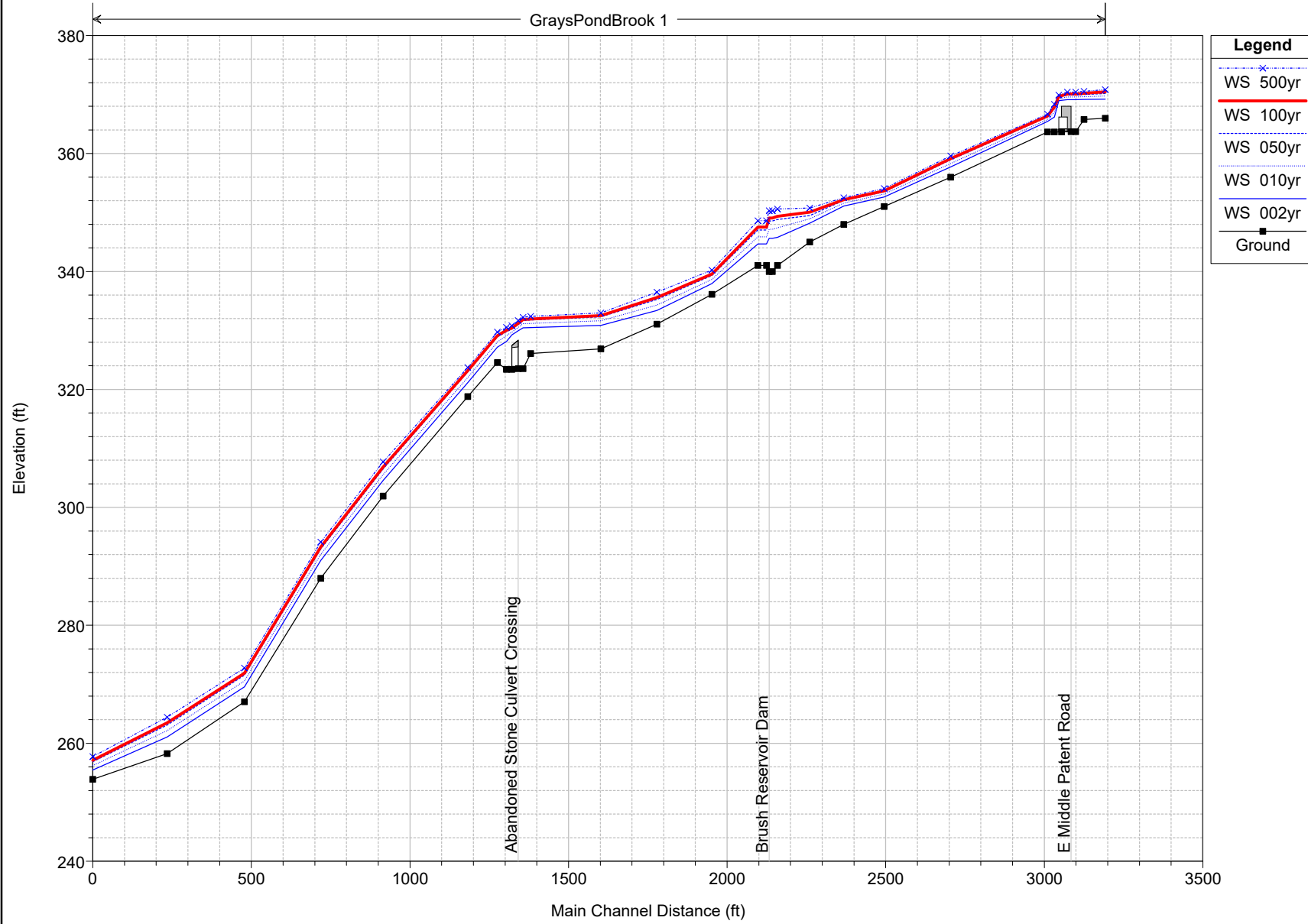


Brush_Reservoir_Dam Plan: Existing Conditions 9/1/2022



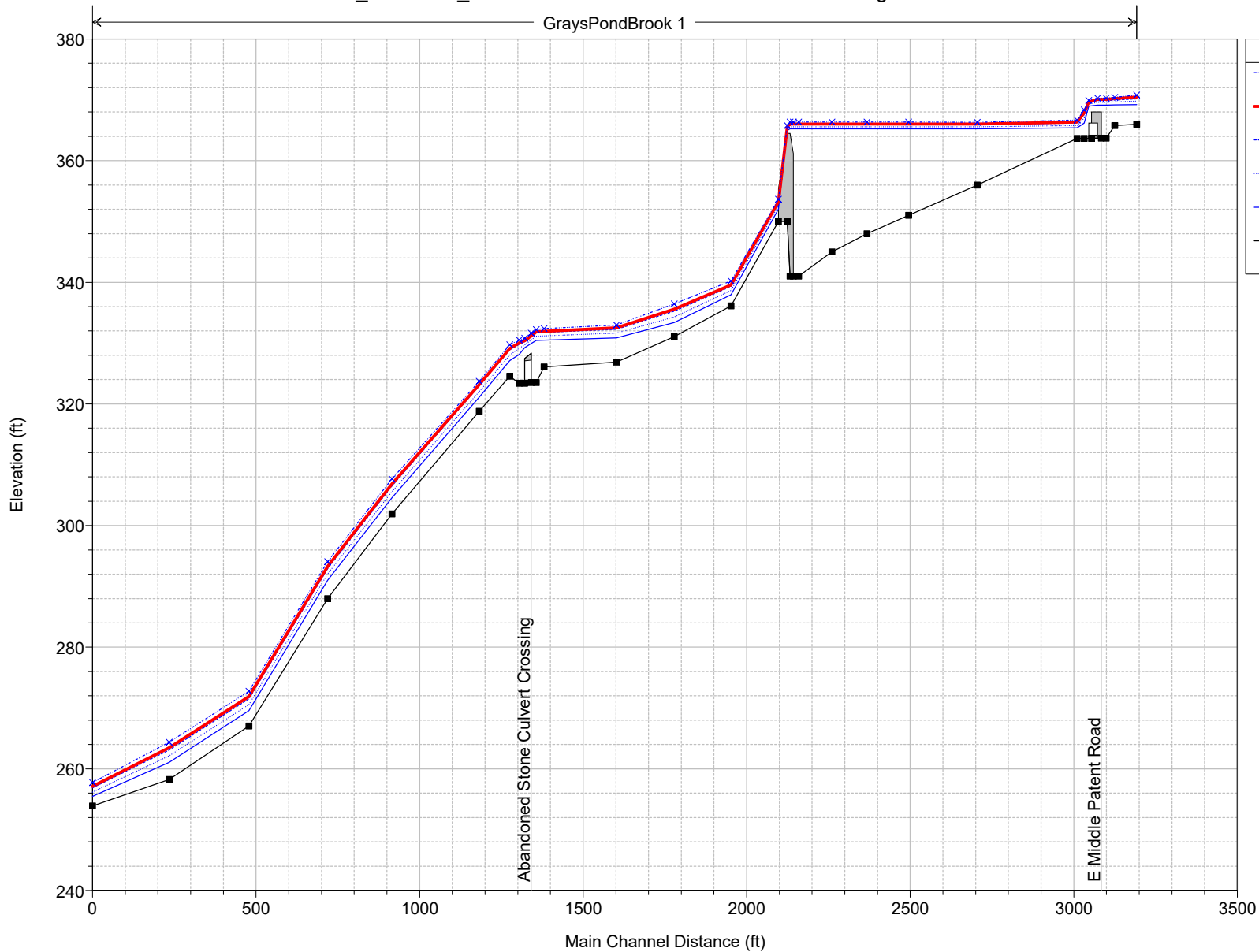
Legend	
WS 500yr	(dotted blue line with 'x' markers)
WS 100yr	(solid red line)
WS 050yr	(dotted blue line)
WS 010yr	(solid blue line)
WS 002yr	(solid black line with square markers)
Ground	(solid black line with square markers)

Brush_Reservoir_Dam Plan: Alt 2 Dam Removal 9/7/2022



Brush_Reservoir_Dam Plan: Alt 3A Rehabilitation Lowering Dam 8/31/2022

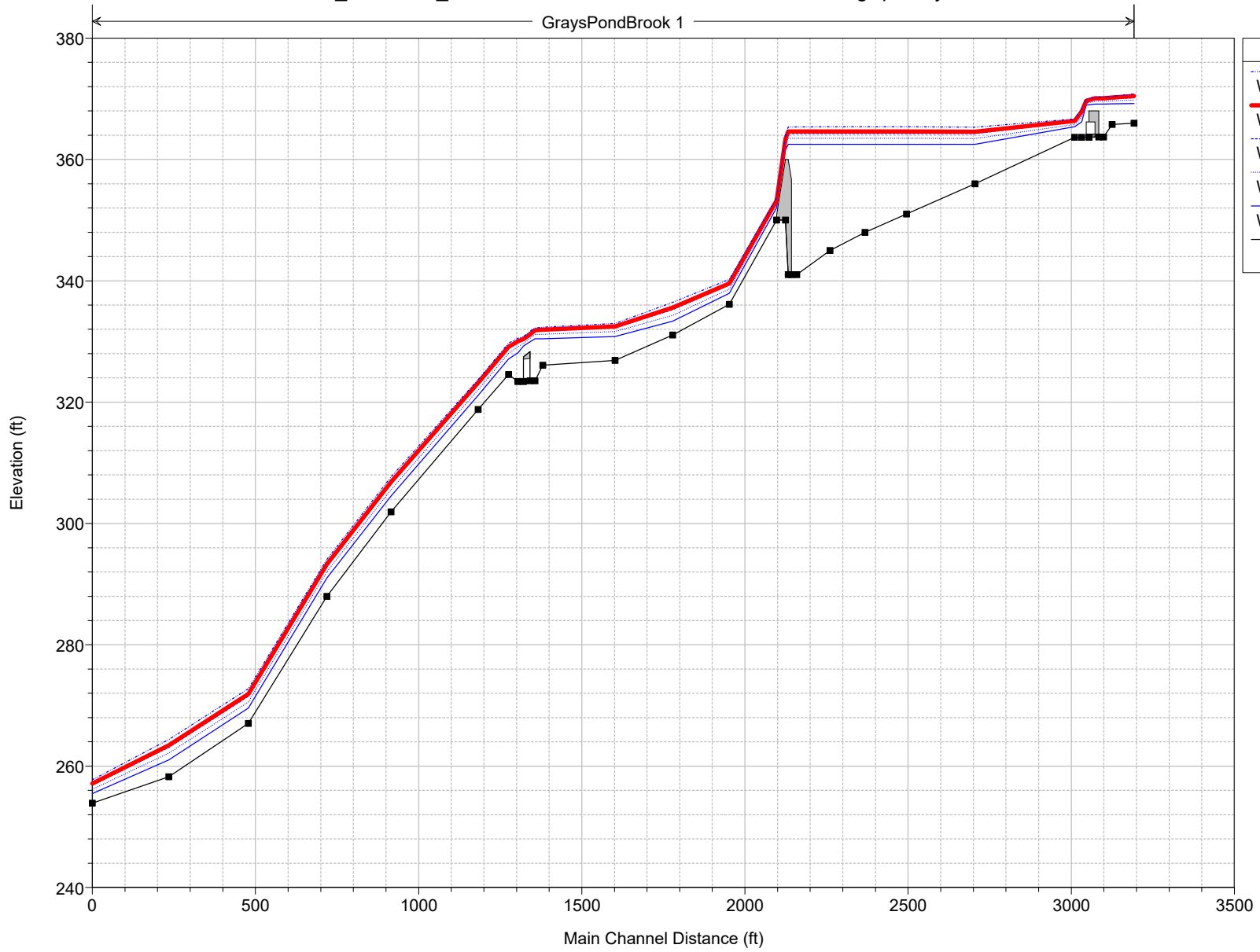
GraysPondBrook 1



Legend	
WS 500yr	(dotted blue line with 'x' markers)
WS 100yr	(solid red line)
WS 050yr	(dotted blue line)
WS 010yr	(dotted blue line)
WS 002yr	(solid black line with square markers)
Ground	(solid black line with square markers)

Brush_Reservoir_Dam Plan: Alt 3B Rehabilitation WideningSpillway 11/14/2022

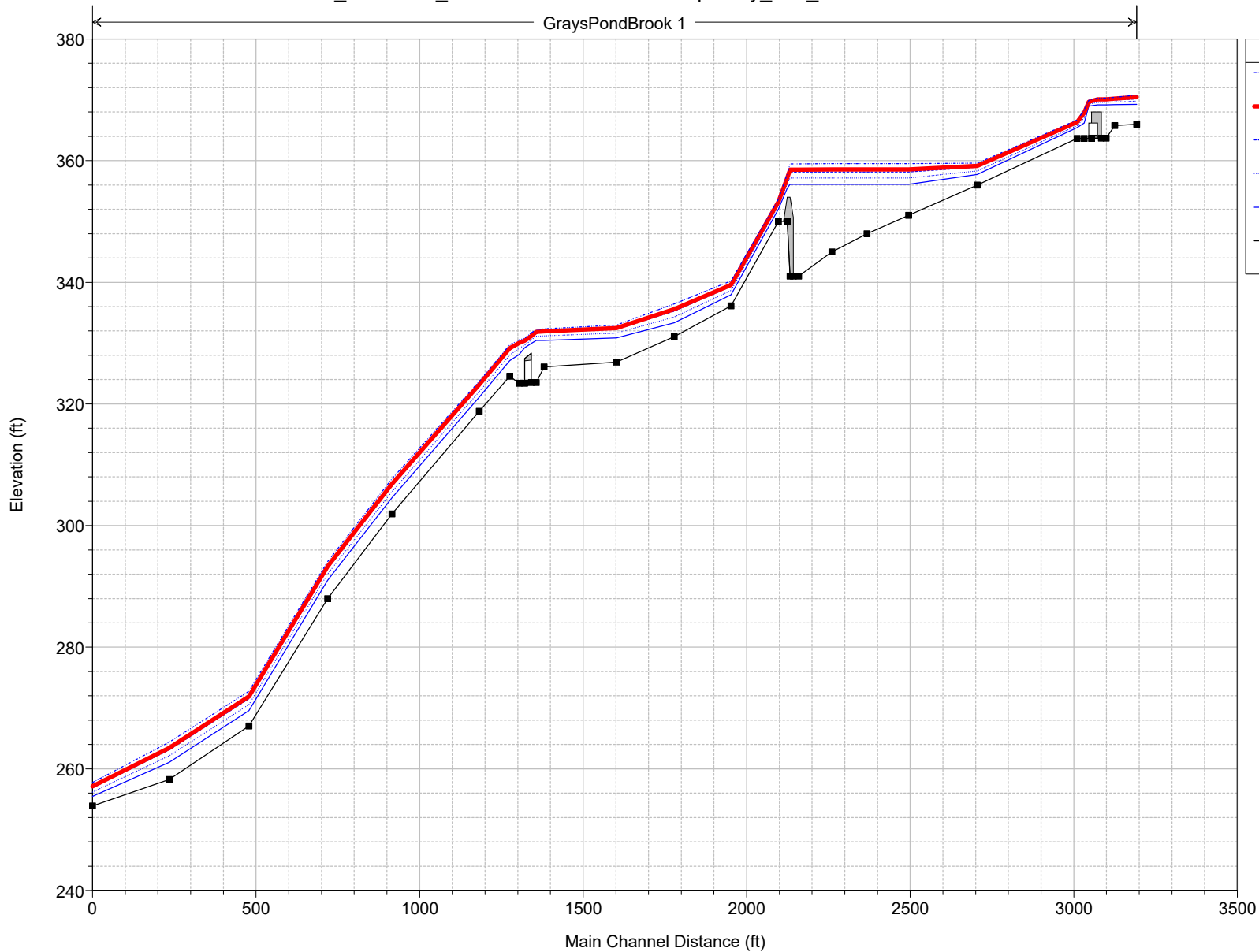
GraysPondBrook 1



Legend	
WS 500yr	(Red dashed line)
WS 100yr	(Red solid line)
WS 050yr	(Blue dashed line)
WS 010yr	(Blue solid line)
WS 002yr	(Black solid line)
Ground	(Black line with square markers)

Brush_Reservoir_Dam Plan: ALt 5 NewSpillway_and_LoweredCrest 11/16/2022

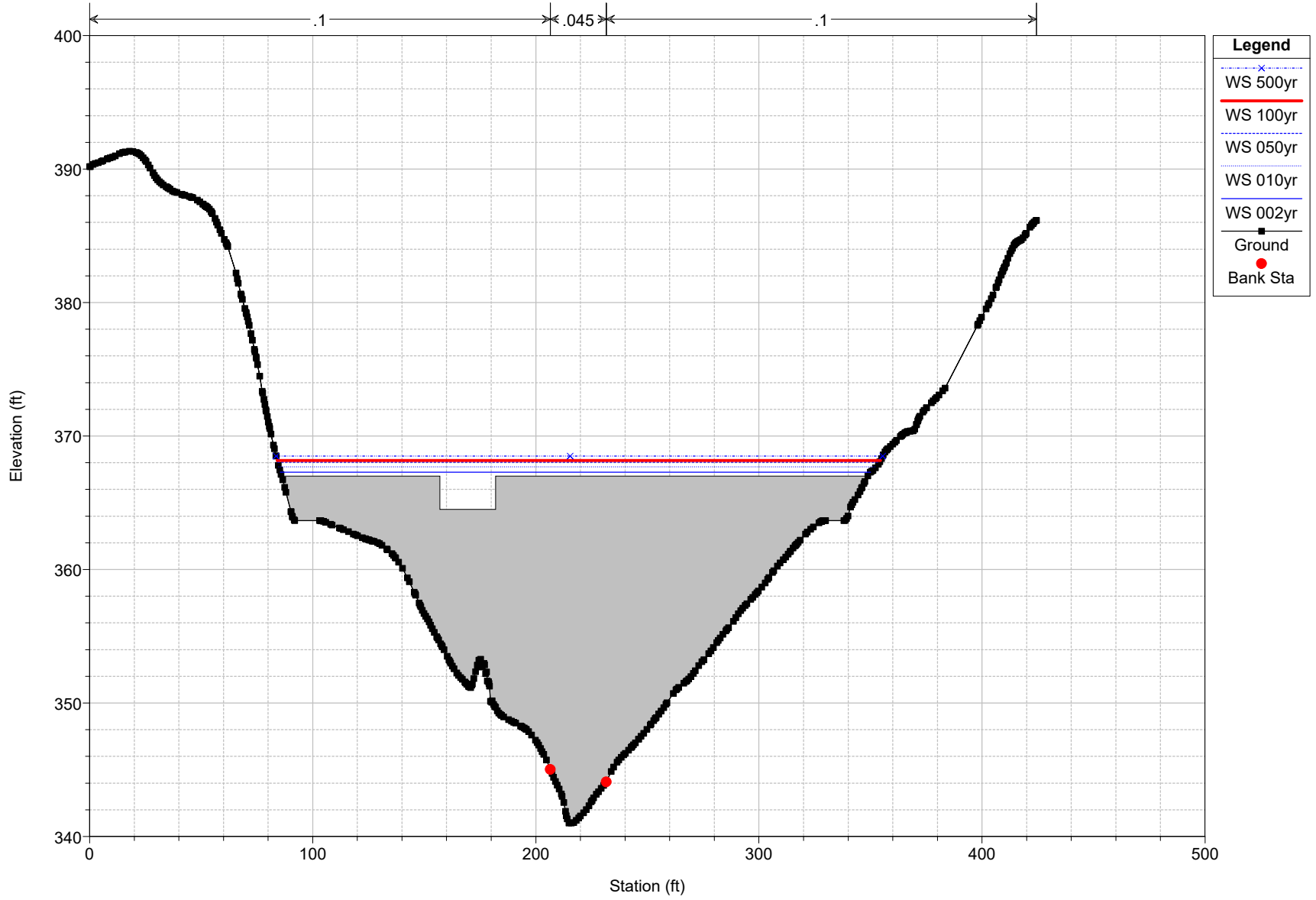
GraysPondBrook 1



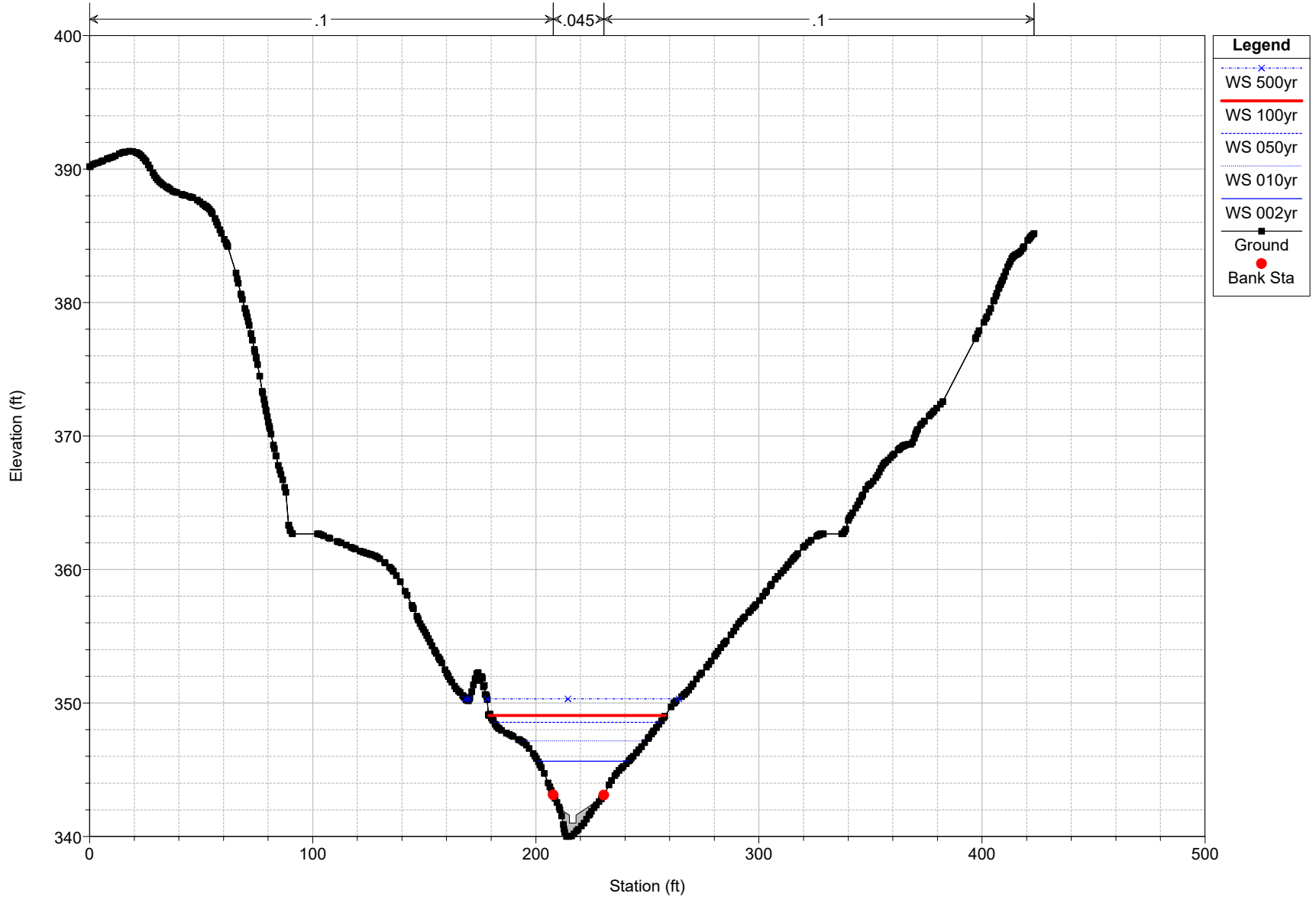
Legend	
WS 500yr	(thick red solid line)
WS 100yr	(thin red solid line)
WS 050yr	(dotted blue line)
WS 010yr	(solid blue line)
WS 002yr	(dashed blue line)
Ground	(solid black line with square markers)

Brush_Reservoir_Dam Plan: Existing Conditions 9/1/2022

River = GraysPondBrook Reach = 1 RS = 2100 IS

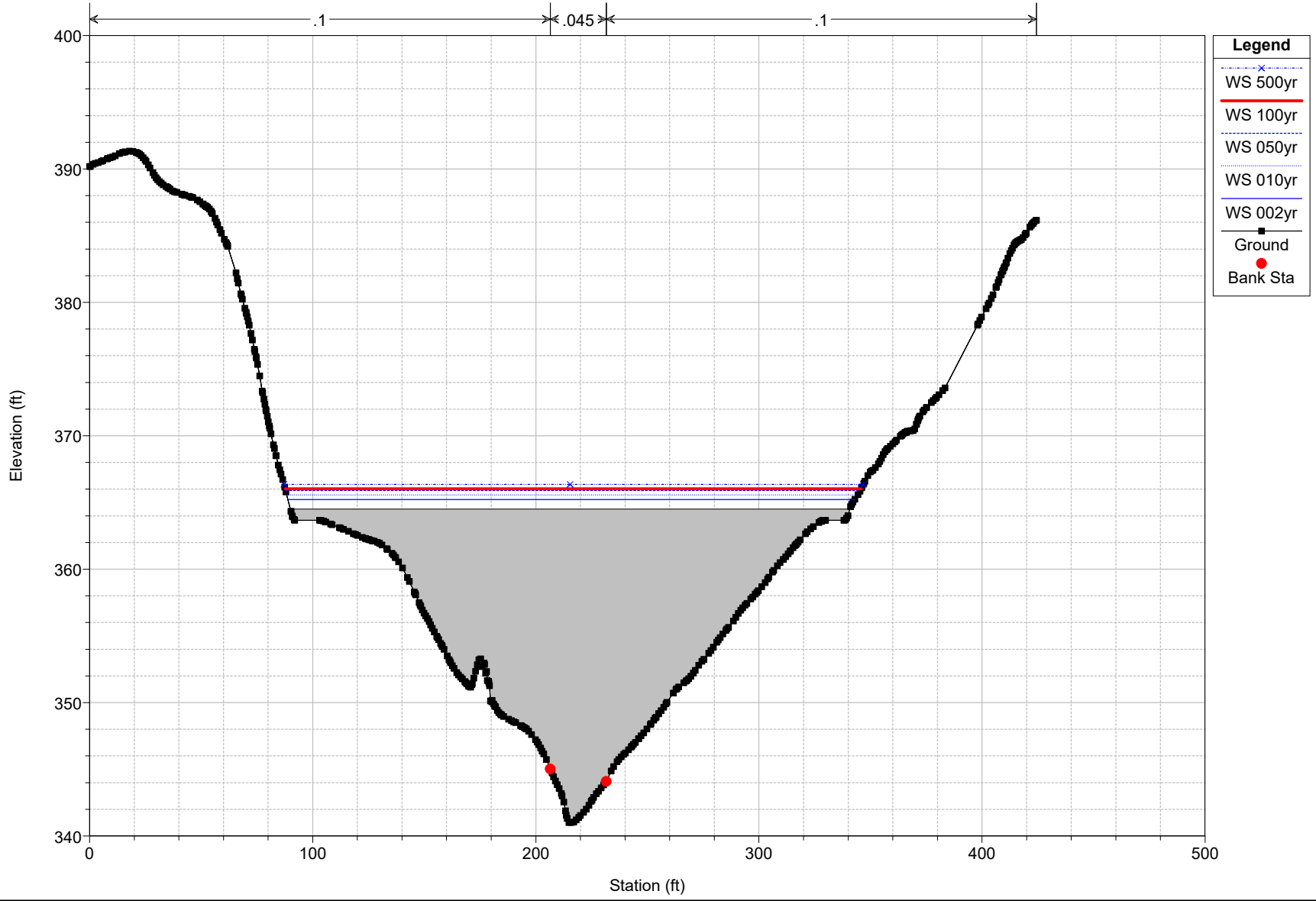


Brush_Reservoir_Dam Plan: Alt 2 Dam Removal 9/7/2022
River = GraysPondBrook Reach = 1 RS = 2100 IS Brush Reservoir Dam



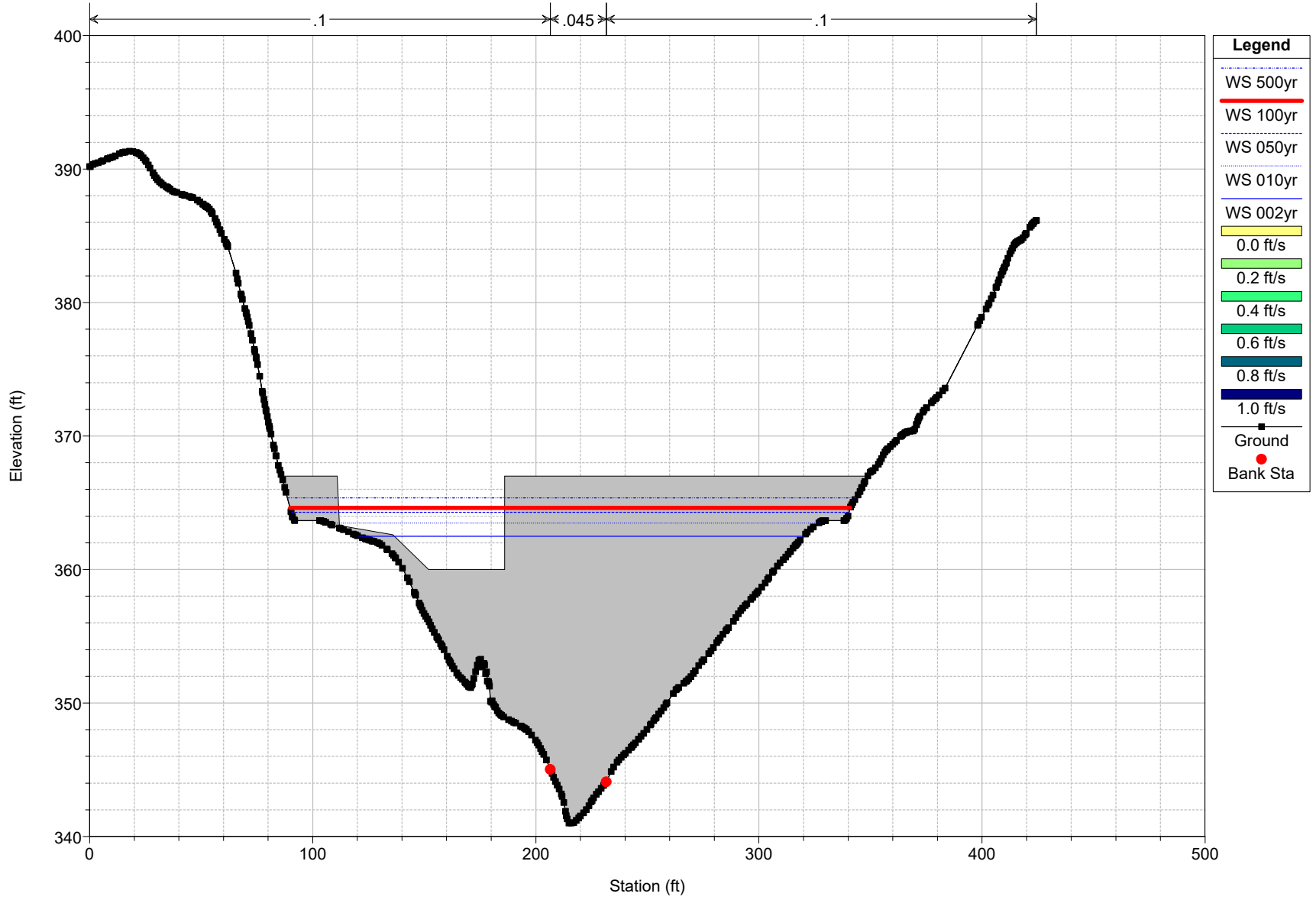
Brush_Reservoir_Dam Plan: Alt 3A Rehabilitation Lowering Dam 8/31/2022

River = GraysPondBrook Reach = 1 RS = 2100 IS



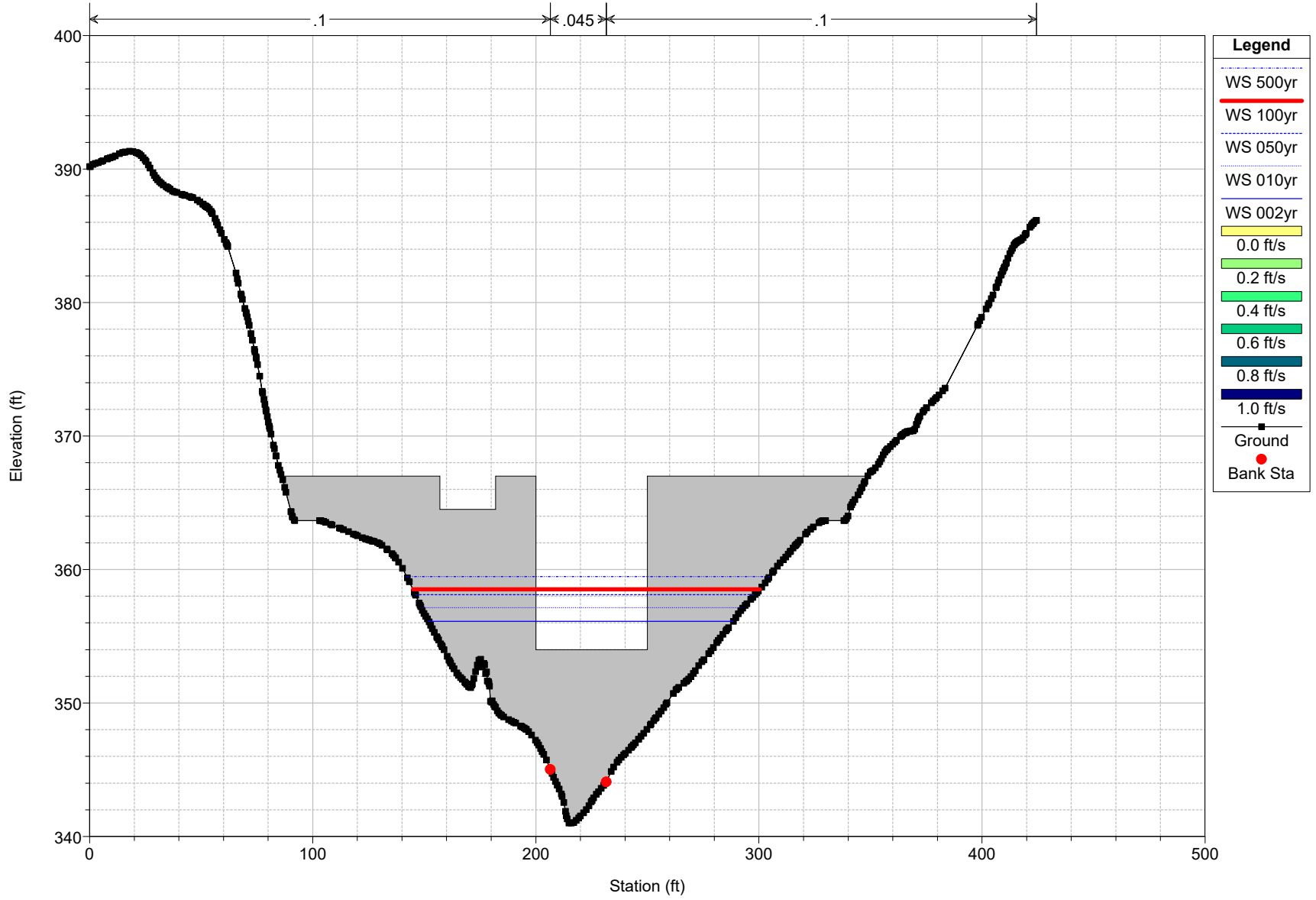
Brush_Reservoir_Dam Plan: Alt 3B Rehabilitation WideningSpillway 11/14/2022

River = GraysPondBrook Reach = 1 RS = 2100 IS



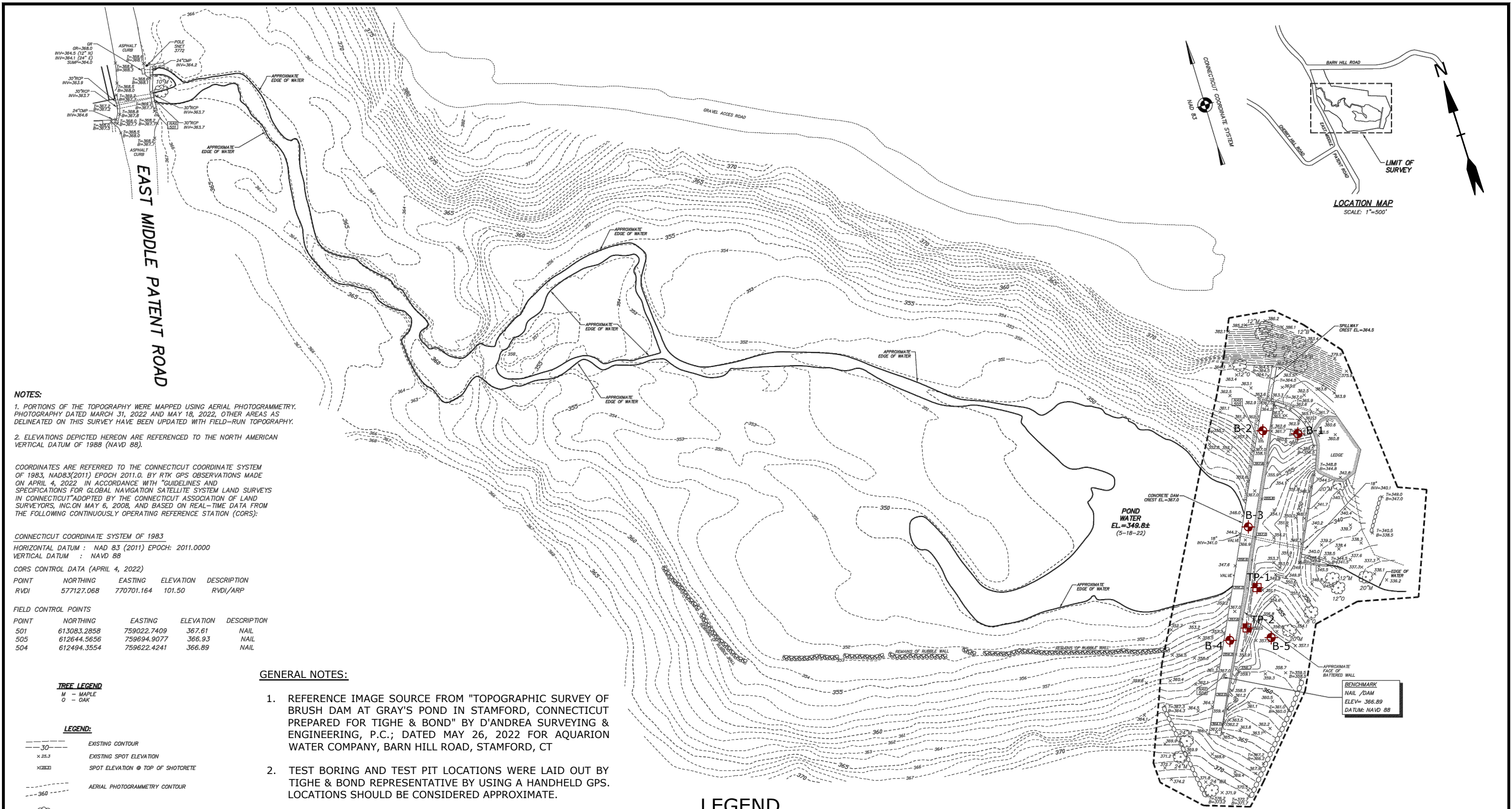
Brush_Reservoir_Dam Plan: ALt 5 NewSpillway_and_LoweredCrest 11/16/2022

River = GraysPondBrook Reach = 1 RS = 2100 IS



APPENDIX B
Subsurface Exploration Logs

Plotted On: Jul 15, 2022 12:34pm By: BLE
 Tighe & Bond: W:\Projects\Brush Reservoir Dam\Figure 2\brush reservoir.dam.dwg



NOTES:
 1. PORTIONS OF THE TOPOGRAPHY WERE MAPPED USING AERIAL PHOTOGRAMMETRY. PHOTOGRAPHY DATED MARCH 31, 2022 AND MAY 18, 2022, OTHER AREAS AS DELINEATED ON THIS SURVEY HAVE BEEN UPDATED WITH FIELD-RUN TOPOGRAPHY.
 2. ELEVATIONS DEPICTED HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

COORDINATES ARE REFERRED TO THE CONNECTICUT COORDINATE SYSTEM OF 1983, NAD83(2011) EPOCH 2011.0. BY RTK GPS OBSERVATIONS MADE ON APRIL 4, 2022 IN ACCORDANCE WITH "GUIDELINES AND SPECIFICATIONS FOR GLOBAL NAVIGATION SATELLITE SYSTEM LAND SURVEYS IN CONNECTICUT" ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON MAY 6, 2008, AND BASED ON REAL-TIME DATA FROM THE FOLLOWING CONTINUOUSLY OPERATING REFERENCE STATION (CORS):

CONNECTICUT COORDINATE SYSTEM OF 1983
 HORIZONTAL DATUM : NAD 83 (2011) EPOCH: 2011.0000
 VERTICAL DATUM : NAVD 88

CORS CONTROL DATA (APRIL 4, 2022)

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
RVD1	57127.068	770701.164	101.50	RVD1/ARP

FIELD CONTROL POINTS

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
501	613083.2858	759022.7409	367.61	NAIL
505	612644.5656	759694.9077	366.93	NAIL
504	612494.3554	759622.4241	366.89	NAIL

TREE LEGEND
 M - MAPLE
 O - OAK

LEGEND:

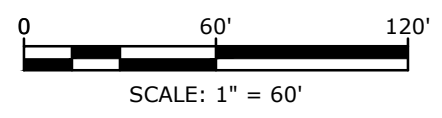
- 30--- EXISTING CONTOUR
- x 25.3 EXISTING SPOT ELEVATION
- x 360.0 SPOT ELEVATION @ TOP OF SHOTCRETE
- - - - - AERIAL PHOTOGRAMMETRY CONTOUR
- DECIDUOUS TREE
- EXISTING STONE WALL
- EXISTING RETAINING WALL
- --- LIMIT OF FIELD WORK CONDUCTED BY D'ANDREA SURVEYING & ENGINEERING, P.C. DATED APRIL 7, 2022 IN ACCORDANCE WITH CLASS "T-2" TOPOGRAPHIC ACCURACY

GENERAL NOTES:

- REFERENCE IMAGE SOURCE FROM "TOPOGRAPHIC SURVEY OF BRUSH DAM AT GRAY'S POND IN STAMFORD, CONNECTICUT PREPARED FOR TIGHE & BOND" BY D'ANDREA SURVEYING & ENGINEERING, P.C.; DATED MAY 26, 2022 FOR AQUARIUM WATER COMPANY, BARN HILL ROAD, STAMFORD, CT
- TEST BORING AND TEST PIT LOCATIONS WERE LAID OUT BY TIGHE & BOND REPRESENTATIVE BY USING A HANDHELD GPS. LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.
- TEST BORINGS B-1, B-2, B-3, B-4, AND B-5 WERE DRILLED BY NEW ENGLAND BORING CONTRACTORS OF ?, CT FROM JUNE 27 THROUGH JULY 6, 2022. TEST PITS TP-1 AND TP-2 WERE EXCAVATED BY TIGHE & BOND OF SHELTON, CT ON JUNE 29, 2022.
- DISTURBED ROCK SAMPLES IN THE TEST BORINGS WERE OBTAINED USING A 2-INCH NQ2 SIZED CORE BARREL.
- REFER TO TEST BORING AND TEST PIT LOGS FOR DETAILED INFORMATION.

LEGEND

- B-1 TIGHE & BOND BORING (TYP.)
- TP-1 TIGHE & BOND TEST PIT



BRUSH RESERVOIR DAM ALTERNATIVES ANALYSIS STAMFORD, CT	
SUBSURFACE EXPLORATION PLAN	
DATE: 07/14/2022	Tighe & Bond
SCALE: AS SHOWN	
FIGURE: 2	

Project: Brush Reservoir Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Opp
 Date Start: 06/27/22 End: 06/27/22
 Location: See Exploration Location Plan
 GS. Elev. 361.5' Datum: NAVD 88

	Casing	Sampler
Type	HSA	Coring
I.D./O.D.	3 1/4" ID	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5						Brown, fine to coarse SAND, some Gravel, little Silt	TOPSOIL		
							FILL		
		C-1 / 53	2-7	1 min		Hard, moderately weathered, moderately fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 53/60 = 88% RQD 23/60 = 38%			
				1 min					
				2 min					
				2 min					
10		C-2 / 52	7-12	1 min		Hard, moderately weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 52/60 = 87% RQD 27/60 = 45%	GRANITIC GNEISS		
				2 min					
				2 min					
				2 min					
15		C-3 / 25	12-15	2 min		Hard, moderately weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, very close to close, moderately dipping REC 25/36 = 69% RQD 12/36 = 33%	15'		
				2 min					
				2 min					
20						Boring Terminated at 15 feet.			
25									
30									

Notes: 1. Accurate groundwater reading could not be obtained since water was used as a drilling fluid. 2. Boring advanced using NQ2-sized core barrel.	Proportions Used TRACE (TR.) 0 - <10% LITTLE (LI.) 10 - <20% SOME (SO.) 20 - <35% AND 35 - <50%	Density/Consistency VERY LOOSE 0-4 VERY SOFT <2 LOOSE 4-10 SOFT 2-4 MEDIUM DENSE 10-30 MEDIUM 4-8 DENSE 30-50 STIFF 8-15 VERY DENSE >50 VERY STIFF 15-30 HARD >30
--	--	--

Project: Brush Reservoir Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Opp
 Date Start: 06/28/22 End: 06/28/22
 Location: See Exploration Location Plan
 GS. Elev. 367' Datum: NAVD 88

	Casing	Sampler
Type	-	Coring
I.D./O.D.	-	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		C-1 / 60	0-5	3 min		3" Bituminous Concrete	0.3' ASPHALT		
				4 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE		
				4 min					
				4 min					
				4 min					
			4 min						
10		C-2 / 36	5-8	3 min		Portland Cement Concrete	8.5'		
				3 min					
				3 min					
15		C-3 / 31	8-11	3 min		Hard, moderately severe weathered, slightly to extremely fractured, medium to coarse grained, GRANITIC GNEISS REC 31/36 = 86% RQD 9/36 = 25%	GRANITIC GNEISS		
				3 min					
		C-4 / 48	11-15	2 min		Hard, moderately weathered, slightly fractured, medium to coarse grained, GRANITIC GNEISS REC 48/48 = 100% RQD 37/48 = 77%			
				2 min					
20				3 min			20'		
				3 min					
		C-5 / 59	15-20	3 min		Hard, moderately weathered, slightly fractured, medium to coarse grained, GRANITIC GNEISS REC 59/60 = 98% RQD 50/60 = 83%			
				3 min					
				3 min					
25				3 min					
				3 min					
				3 min					
				3 min					
				3 min					
				3 min					
				3 min					
				3 min					
30				4 min					

Notes: 1. Groundwater observed at 15 feet after 24 hours. 2. Boring advanced using NQ2-sized core barrel.	<u>Proportions Used</u>	<u>Density/Consistency</u>
	TRACE (TR.) 0 - <10% LITTLE (LI.) 10 - <20% SOME (SO.) 20 - <35% AND 35 - <50%	VERY LOOSE 0-4 LOOSE 4-10 MEDIUM DENSE 10-30 DENSE 30-50 VERY DENSE >50

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
35				12 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE		
		C-9 / 46	31-35	5 min					
				5 min					
				5 min					
				7 min		Portland Cement Concrete	38'		
		C-10 / 36	35-38	4 min					
				13 min					
				12 min					
40		C-11 / 40	38-42	15 min		Hard, moderately to slightly weathered, moderately to slightly fractured, medium to coarse grained, GRANITIC GNEISS, thickly bedded REC 40/48 = 83% RQD 23/48 = 48%	GRANITIC GNEISS		
				7 min					
				31 min					
				16 min					
45						Boring Terminated at 42 feet.	42'		
50									
55									
60									
65									

Note
1. Accurate groundwater reading could not be obtained since water was used as a drilling fluid.
2. Boring advanced using NQ2-sized core barrel.

Project: Brush Pond Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Boring No. B-4
 Page 1 of 1
 File No. A1000-195
 Checked by: B. Opp

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Lee
 Date Start: 07/05/22 End: 07/06/22
 Location: See Exploration Location Plan
 GS. Elev. 367' Datum: NAVD 88

	Casing	Sampler
Type	-	Coring
I.D./O.D.	-	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 2 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		C-1 / 57	0-5	3 min		3" Bituminous Concrete	0.3' ASPHALT		
				3 min		Portland Cement Concrete			
				5 min					
				4 min					
				4 min					
10		C-2 / 48	5-9	4 min		Portland Cement Concrete	PORTLAND CEMENT CONCRETE	1	
				4 min					
				4 min					
				3 min					
		C-3 / 58	9-14	4 min		Portland Cement Concrete			
15				3 min					
				4 min					
				3 min					
		C-4 / 58	14-19	4 min		Portland Cement Concrete			
				4 min					
20				4 min					
				5 min					
				9 min					
		C-5 / 52	19-24	8 min		Portland Cement Concrete			
				10 min					
25				8 min					
				12 min					
				10 min					
		C-6 / 55	24-29	12 min		Hard, moderately weathered, moderate to extremely fractured, medium to coarse grained, GRANITIC GNEISS, medium bedding, thinly bedded	24' GRANITIC GNEISS		
				16 min		REC 55/60 = 92%			
			30 min		RQD 25/60 = 42%				
			26 min						
			26 min						
30						Boring Terminated at 29 feet.	29'		

Notes:
 1. Boulder encountered between 18' and 19'.
 2. Accurate groundwater reading could not be obtained since water was used as a drilling fluid.
 3. Boring advanced using NQ2-sized core barrel.

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency			
VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Project: Brush Pond Dam Alternatives Analysis
 Location: Stamford CT
 Client: Aquarion Water Company

Drilling Co.: New England Boring Contractors
 Foreman: A. McKernan
 T&B Rep.: B. Lee
 Date Start: 07/06/22 End: 07/06/22
 Location: See Exploration Location Plan
 GS. Elev. 357.5' Datum: NAVD 88

	Casing	Sampler
Type	HSA	Coring
I.D./O.D.	3 1/4" ID	2"/3"
Hammer Wt.	-	-
Hammer Fall	-	-
Rig Make/Model	SIMCO 2400 ATV	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
See Note 1 Below				

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5							0.5' TOPSOIL		
						Brown, fine to coarse SAND, trace Gravel, trace Silt	FILL		
10									
15						Brown, fine to medium SAND, little Silt, moist	15'	1	
						Boring Terminated at 15'			
20									
25									
30									

Notes:
 1. Soil sample moist at 15'.
 2. Probe only, no soil samples obtained.

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency		
VERY LOOSE	0-4	VERY SOFT <2
LOOSE	4-10	SOFT 2-4
MEDIUM DENSE	10-30	MEDIUM 4-8
DENSE	30-50	STIFF 8-15
VERY DENSE	>50	VERY STIFF 15-30
		HARD >30



195 Frances Avenue
 Cranston RI, 02910
 Phone: (401)-467-6454
 Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Middletown, CT
 PM: D. Valentine
 Assigned By: D. Valentine
 Collected By: B. Opp

Project Information:
Brush Reservoir Dam
Stamford, CT
 T&B Project Number: A1000-195
 Summary Page: 1 of 1
 Report Date: 07.20.22

LABORATORY TESTING DATA SHEET, Report No.: 7422-G-156

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Identification Tests								Proctor / CBR / Permeability Tests							Laboratory Log and Soil Description			
				As Received Moisture Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	pH	Dry unit wt. (pcf)	Test Moisture Content %	γ_d MAX (pcf) W_{opt} (%)	γ_d MAX (pcf) W_{opt} (%) (Corr.)	Target Test Setup as % of Proctor	CBR @ 0.1"	CBR @ 0.2"		Permeability cm/sec		
				D2216	D4318	D6913			D2974	D4792			D1557									
TP-1	1	0-4	22-S-2712				28.7	64.4	6.9											Brown poorly graded sand with silt and gravel		
TP-2	2	0-4	22-S-2713				22.9	68.9	8.2											Brown poorly graded sand with silt and gravel		
B-5	3	0-4	22-S-2714				8.0	82.5	9.5											Brown well-graded sand with silt		

Date Received: 07.14.22

Reviewed By: 

Date Reviewed: 07.21.22

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These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.1	14.6	11.0	23.7	29.7	6.9	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3"	100.0			
2"	88.2			
1 1/2"	88.2			
1"	87.1			
3/4"	85.9			
1/2"	80.9			
3/8"	78.7			
#4	71.3			
#10	60.3			84.6
#20	49.6			69.6
#40	36.6			51.4
#60	24.5			34.3
#100	14.5			20.3
#200	6.9			9.7

Material Description

Brown poorly graded sand with silt and gravel

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 57.2955	D ₈₅ = 17.4385	D ₆₀ = 1.9499
D ₅₀ = 0.8698	D ₃₀ = 0.3181	D ₁₅ = 0.1553
D ₁₀ = 0.1027	C _u = 18.99	C _c = 0.51
	<u>Classification</u>	
USCS= SP-SM	AASHTO=	A-1-b
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Fill Depth: 0-4'
 Sample Number: TP-1 / 1

Sample Date: 07.18.22

Thielsch Engineering Inc. Cranston, RI	Client: Tighe & Bond Project: Brush Reservoir Dam Stamford, CT Project No: A1000-195
Figure 22-S-2712	

Tested By: SF / JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	16.5	8.0	26.3	34.6	8.2	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
1"	100.0			
3/4"	93.6			
1/2"	89.7			
3/8"	86.3			
#4	77.1			
#10	69.1			89.6
#20	58.1			75.3
#40	42.8			55.5
#60	28.2			36.6
#100	16.6			21.5
#200	8.2			10.6

Material Description

Brown poorly graded sand with silt and gravel

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 13.0671	D ₈₅ = 8.6286	D ₆₀ = 0.9560
D ₅₀ = 0.5737	D ₃₀ = 0.2679	D ₁₅ = 0.1358
D ₁₀ = 0.0882	C _u = 10.84	C _c = 0.85
	<u>Classification</u>	
USCS= SP-SM	AASHTO=	A-1-b
	<u>Test Remarks</u>	

* (no specification provided)

Source of Sample: Fill Depth: 0-4'
 Sample Number: TP-2 / 2

Sample Date: 07.18.22

Thielsch Engineering Inc. Cranston, RI	Client: Tighe & Bond Project: Brush Reservoir Dam Stamford, CT Project No: A1000-195
Figure 22-S-2713	

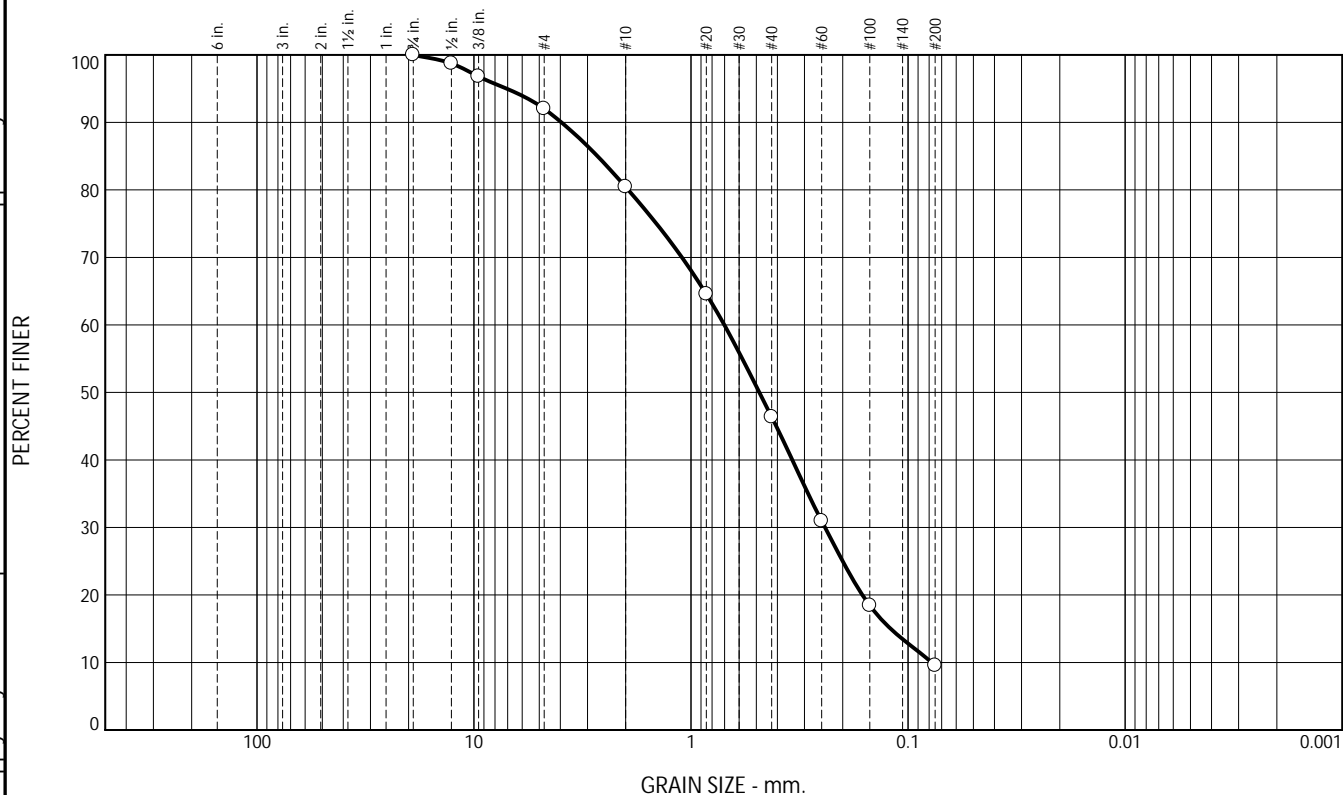
Tested By: SF / JB

Checked By:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report

ASTM D6913



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.0	11.6	34.0	36.9	9.5	

Test Results (ASTM D6913)				
Sieve Size or Diam. (mm.)	Finer (%)	Spec.* (%)	Out of Spec. (%)	Pct. of Fines
3/4"	100.0			
1/2"	98.7			
3/8"	96.8			
#4	92.0			
#10	80.4			87.4
#20	64.6			70.2
#40	46.4			50.4
#60	31.0			33.6
#100	18.4			20.0
#200	9.5			10.4

* (no specification provided)

Material Description

Brown well-graded sand with silt

PL= NP	<u>Atterberg Limits</u>	PI= NP
	LL= NV	
	<u>Coefficients</u>	
D ₉₀ = 3.9509	D ₈₅ = 2.6996	D ₆₀ = 0.7025
D ₅₀ = 0.4845	D ₃₀ = 0.2413	D ₁₅ = 0.1204
D ₁₀ = 0.0778	C _u = 9.03	C _c = 1.07
	<u>Classification</u>	
USCS= SW-SM	AASHTO=	A-1-b
	<u>Test Remarks</u>	

Source of Sample: Fill Depth: 0-4'
 Sample Number: B-5 / 3

Sample Date: 07.18.22

Thielsch Engineering Inc.

Cranston, RI

Client: Tighe & Bond
 Project: Brush Reservoir Dam
 Stamford, CT
 Project No: A1000-195

Figure 22-S-2714

Tested By: SF / JB

Checked By:



195 Frances Avenue
 Cranston RI, 02910
 Phone: (401)-467-6454
 Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Middletown, CT
 PM: D. Valentine
 Assigned By: D. Valentine
 Collected By: B. Opp

Project Information:
Brush Reservoir Dam
Stamford, CT
 T&B Project Number: A1000-195
 Summary Page: 1 of 1
 Report Date: 07.26.22

LABORATORY TESTING DATA SHEET, Report No.: 7422-G-158

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Specimen Data					Compressive Strength Tests								Rock Formation or Description or Remarks		
				Mohs Hardness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G _s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	σ _t PSI	I _{S50} PSI		(8) s _c PSI	
B-4	C-3		22-S-2716		1.984	4.467	150.9				4343	0.403	1.08	0.02				Grey Concrete	
Fresh Break																			
B-2	C-2		22-S-2717		1.978	4.379	147.3				3606	0.761	0.62	0.35				Grey Concrete	
Fresh Break																			
B-4	C-6		22-S-2718		1.984	4.564	165.1				4817	0.160	2.68	0.08				Grey Granite Gneiss	
Broke along suture																			
B-1	C-1		22-S-2719		1.986	4.468	162.7				10118	0.411	2.30	0.07				Grey Granite Gneiss	
Initial break along weatherd suture, then fresh break																			
(1) Volume Determined By Measuring Dimensions				Notes	(3) PLD=Point Load (diametrical),						Notes	(5) Strain at Peak Deviator Stress							
(2) Determined by Measuring Dimensions and Weight of Saturated Sample					PLA= Point Load (Axial) ST= Splitting Tensile							(6) Represents Secant Modulus at 50% of Total Failure Stress							
					U= Unconfined Compressive Strength							(7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress							
					(4) Taken at Peak Deviator Stress							(8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)							

Date Received: 07.15.22

Reviewed By: 

Date Reviewed: 07.26.22

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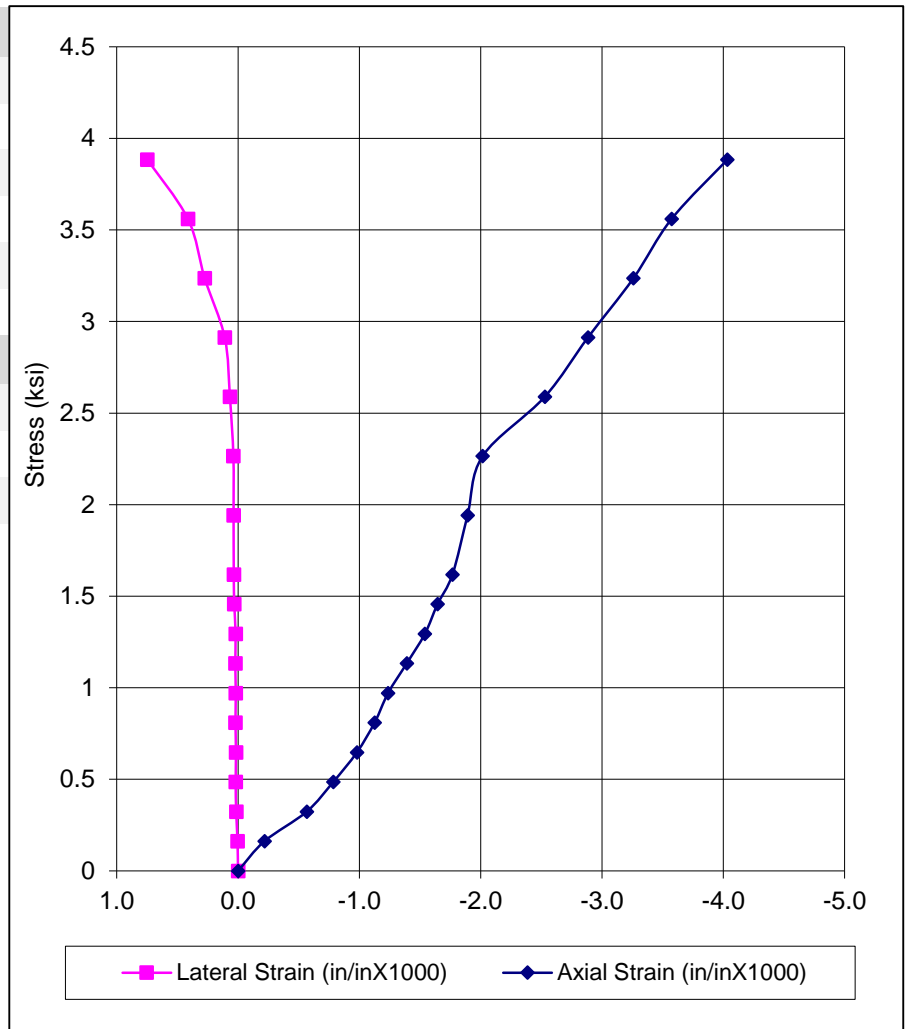
195 Frances Avenue
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 Phone: (401) 467-6454
 Fax: (401) 467-2398
www.thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Shelton, CT
 PM: D. Valentine
 Assigned by: B. Opp
 Collected by: B. Opp

Project Information:
 Brush Reservoir Dam
 Stamford, CT
 Project Number: A1000-195
 Technician: SL
 Report Date: 07.26.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	B-4	Unit Weight (pcf):	150.9
Sample #:	C-3	Failure Stress (psi):	4,343
Depth (ft):		Failure Mode:	Fresh
Tested Depth (ft):		Time to Failure (min)	3.37
Rock Type:	Grey Concrete		
Features:			
Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.984	Poisson's Ratio @ 50%:	0.02
Length, L (in):	4.467	Strain %:	0.403
L:D Ratio:	2.25	E sec PSI @ 50%:	1.08E+06



Testing Notes:



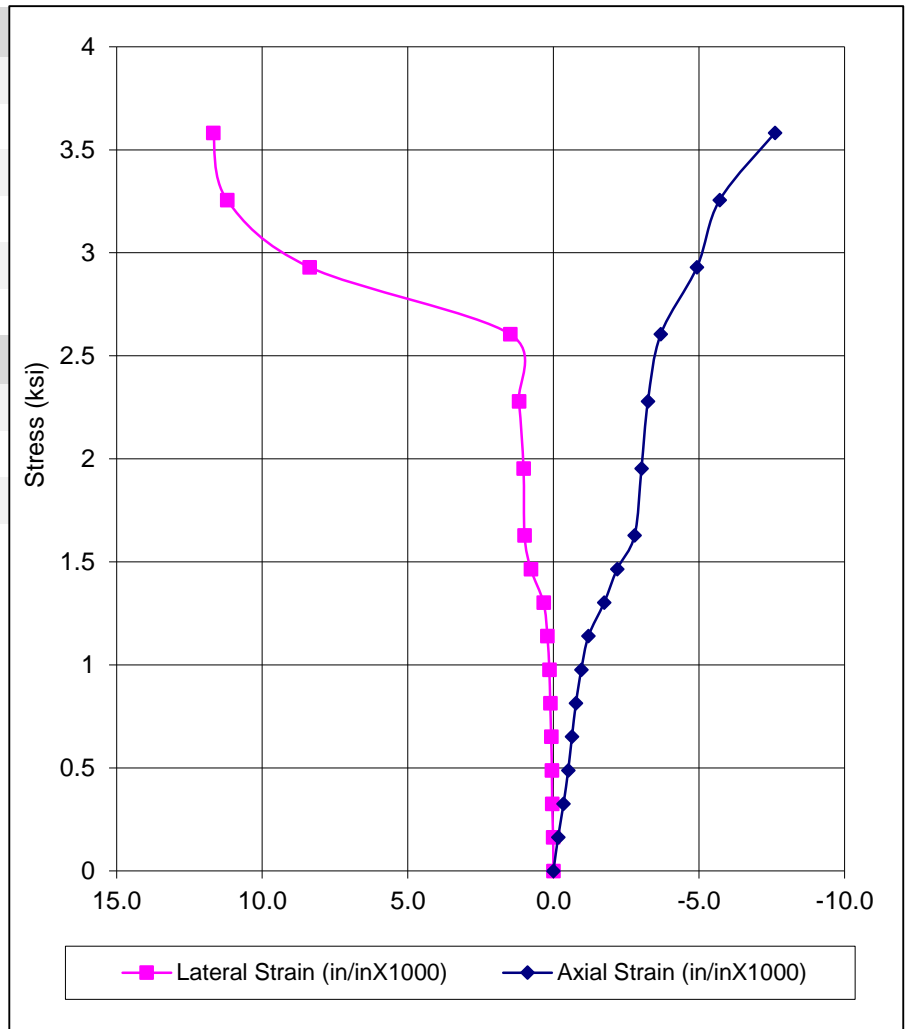
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 Fax: (401) 467-2398
www.thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Shelton, CT
 PM: D. Valentine
 Assigned by: B. Opp
 Collected by: B. Opp

Project Information:
 Brush Reservoir Dam
 Stamford, CT
 Project Number: A1000-195
 Technician: SL
 Report Date: 07.26.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	B-2	Unit Weight (pcf):	147.3
Sample #:	C-2	Failure Stress (psi):	3,606
Depth (ft):		Failure Mode:	Fresh
Tested Depth (ft):		Time to Failure (min)	3.00
Rock Type:	Grey Concrete		
Features:			
Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.978	Poisson's Ratio @ 50%:	0.35
Length, L (in):	4.379	Strain %:	0.761
L:D Ratio:	2.21	E sec PSI @ 50%:	6.16E+05



Testing Notes: Minor break where rock broke free of concrete



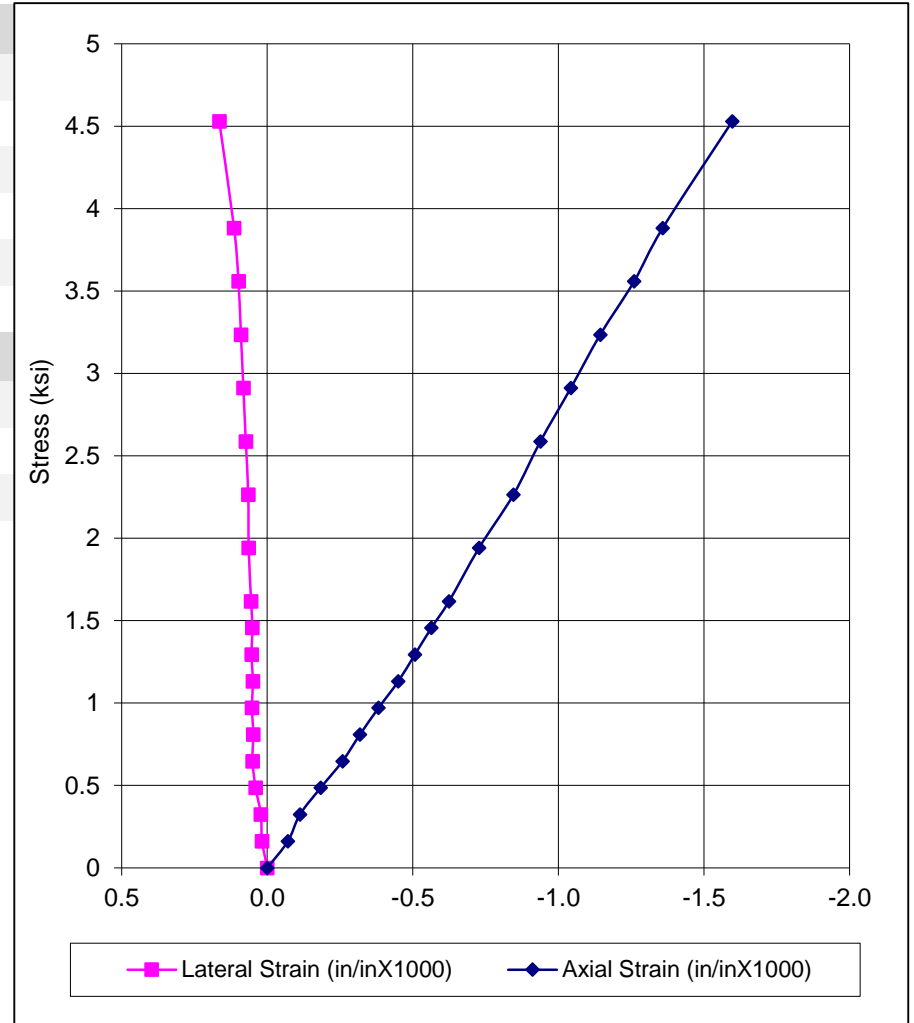
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 Fax: (401) 467-2398
www.thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Shelton, CT
 PM: D. Valentine
 Assigned by: B. Opp
 Collected by: B. Opp

Project Information:
 Brush Reservoir Dam
 Stamford, CT
 Project Number: A1000-195
 Technician: SL
 Report Date: 07.26.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	B-4	Unit Weight (pcf):	165.1
Sample #:	C-6	Failure Stress (psi):	4,817
Depth (ft):		Failure Mode:	Foliation
Tested Depth (ft):		Time to Failure (min)	3.58
Rock Type:	Grey Granite Gneiss		
Features:	Broke along suture		
Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.984	Poisson's Ratio @ 50%:	0.08
Length, L (in):	4.564	Strain %:	0.160
L:D Ratio:	2.30	E sec PSI @ 50%:	2.68E+06



Testing Notes:



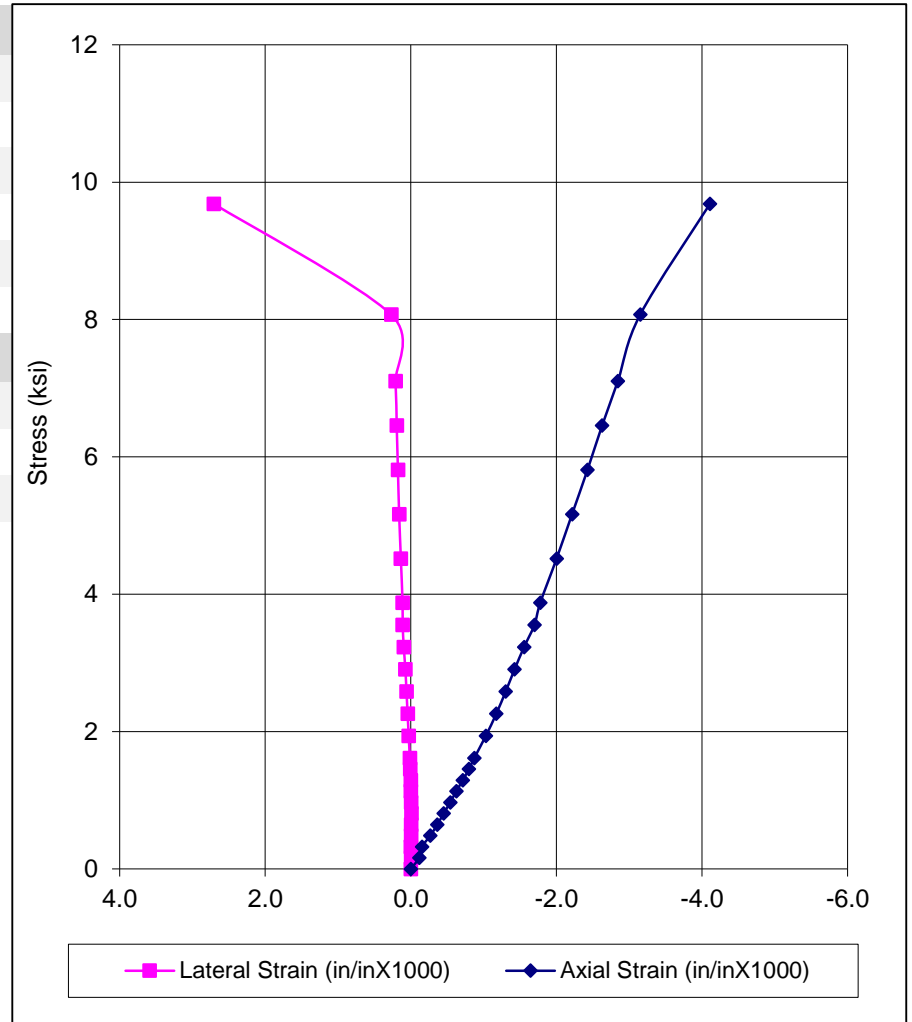
195 Frances Avenue
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 Fax: (401) 467-2398
www.thielsch.com
Let's Build a Solid Foundation

Client Information:
 Tighe & Bond
 Shelton, CT
 PM: D. Valentine
 Assigned by: B. Opp
 Collected by: B. Opp

Project Information:
 Brush Reservoir Dam
 Stamford, CT
 Project Number: A1000-195
 Technician: SL
 Report Date: 07.26.22

ASTM D7012 Compressive Strength and Elastic Moduli of Intact Rock Core Specimens

Sample Information		Compressive Test Information	
Boring ID:	B-1	Unit Weight (pcf):	162.7
Sample #:	C-1	Failure Stress (psi):	10,118
Depth (ft):		Failure Mode:	Fresh break
Tested Depth (ft):		Time to Failure (min)	8.23
Rock Type:	Grey Granite Gneiss		
Features:	Initial break along weathered plane		
Test Specimen Information		Elastic Moduli Test Information	
Diameter, D (in):	1.986	Poisson's Ratio @ 50%:	0.07
Length, L (in):	4.468	Strain %:	0.411
L:D Ratio:	2.25	E sec PSI @ 50%:	2.30E+06



Testing Notes: Sample initially broke along weathered plane, then fresh breaking occurred.

7/22

G-158

GEOTECHNICAL LABORATORY ROCK TESTING ASSIGNMENT SHEET



195 Frances Ave., Cranston, RI 02910

401-467-6454

Project Name Brush Reservoir Dam
Project No. A1000-195 .104
Project Manager D. Valentine
Date Received _____ (by _____)

Client Company Tighe + Bond
Site Location Stamford CT
Assigned By B. Opp
Date Assigned 7/8/22

Collected By B. Opp
Date Required 10 bus days

Boring	Sample No.	Depth Ft.	Lab #	Sample Data			Compression Tests										Notes				
				Water Content %	Bulk Gs.	Unit Wt.	Unconf. Comp. Strength	Triax CS	Point Load	Tensile Strength	Axial Strain	Lateral Strain	Direct Shear	Normal loads (for D.S.)	Slake Durability	4 x 8 Concrete Cylinder		6 x 12 Concrete Cylinder	Concrete Cores	Photography	
							D7012D														
B-4	C-3		2716				X														/
B-2	C-2		2717				X														/
B-4	C-6		2718				X														/
B-1	C-1		2719				X														/

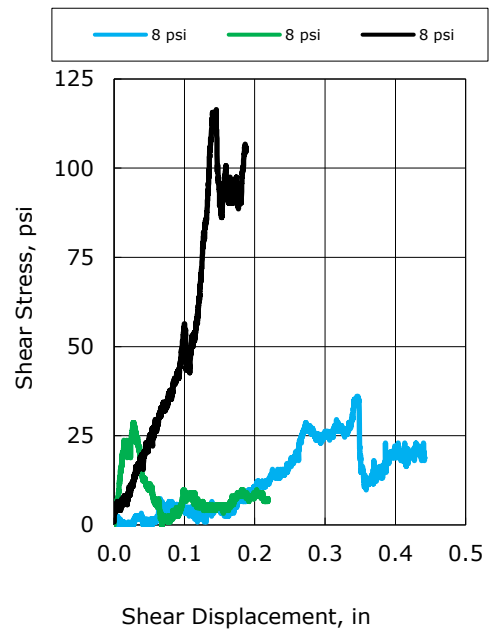
Notes: ① Axial + Lateral UCS Rock 7012D



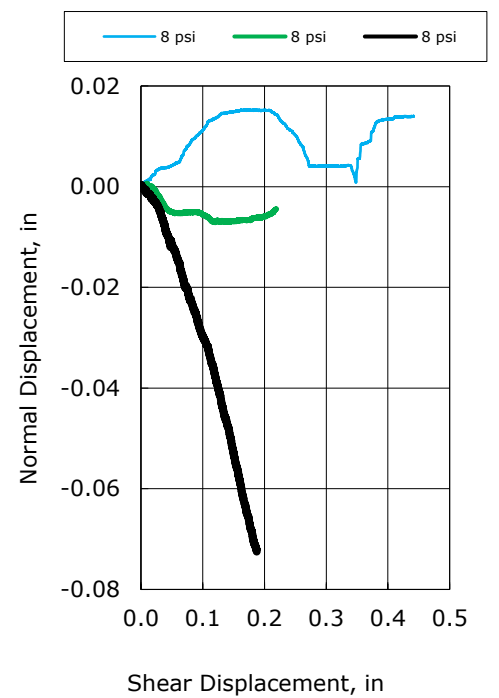
Client:	Tighe & Bond
Project Name:	Brush Reservoir Dam
Project Location:	Stamford, CT
GTX #:	315781
Start Date:	7/27/2022
End Date:	7/27/2022
Tested By:	tlm
Checked By:	jsc
Boring ID:	B-2
Sample ID:	C-2
Depth, ft:	8.5
Visual Description:	Rock/Concrete Core with open joint

Sliding Friction Test of Rock by ASTM D5607

Test specimen tested at 3 orientations:
Across, sliding up, and sliding down the
rock/concrete interface. Friction angle
not applicable for this test series.



Test No.:	SF-1	SF-2	SF-3
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Length, in:	3.30	3.30	3.30
Specimen Mass, grams:	376	376	376
Specimen Area, in ² :	3.07	3.07	3.07
Specimen Bulk Density, pcf	141	141	141
Shear Plane Area, in ²	0.76	0.76	0.76
Normal Stress, psi:	8.0	8.0	8.0
Peak Shear Stress, psi:	36.0	28.7	116
Post Peak Shear Stress, psi:	18.9	7.4	104.7
Horiz. Displacement Rate, in/min:	0.005	0.005	0.005



Peak Friction Angle:	---		
Peak Cohesive Intercept, psi:	---		
Post-Peak Friction Angle:	---		
Post-Peak Cohesive Intercept, psi:	---		
JRC Roughness	14-16	14-16	14-16

Notes: Specimen cut to length using diamond tipped saw blade.
Tested at as-received moisture content and density.
'Hydro-Stone Super X' encapsulating compound used to mount specimen in test rings.
Actual strength parameters may vary and should be determined by an engineer for site-specific conditions.

Client:	Tighe & Bond
Project Name:	Brush Reservoir Dam
Project Location:	Stamford, CT
GTX #:	315781
Start Date:	7/27/2022
End Date:	7/27/2022
Tested By:	tlm
Checked By:	jsc
Boring ID:	B-2
Sample ID:	C-2
Depth, ft:	8.5
Visual Description:	Rock/Concrete Core with open joint



Pre-Test



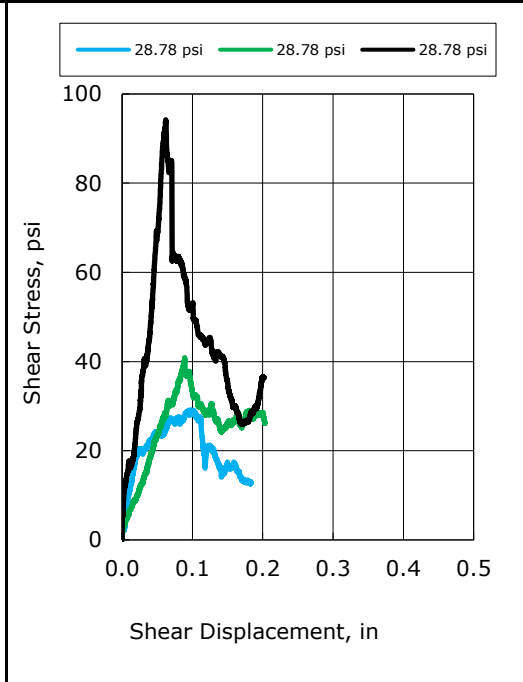
Post-Test



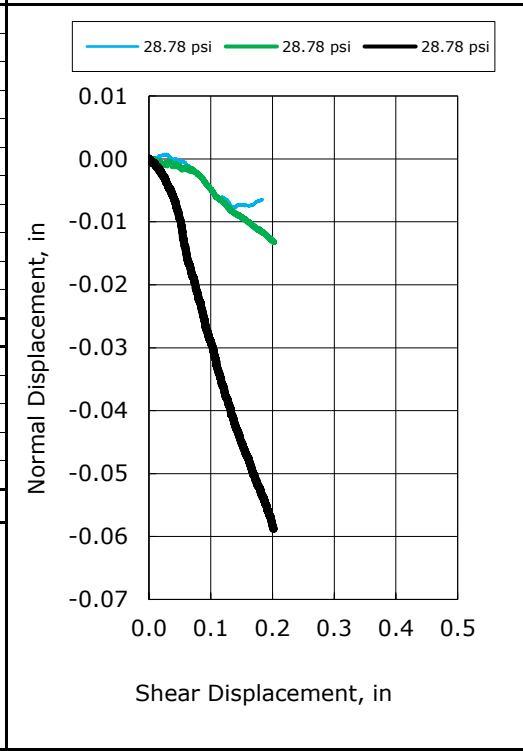
Client:	Tighe & Bond
Project Name:	Brush Reservoir Dam
Project Location:	Stamford, CT
GTX #:	315781
Start Date:	7/28/2022
End Date:	7/28/2022
Tested By:	tlm
Checked By:	jsc
Boring ID:	B-3
Sample ID:	C-10
Depth, ft:	38
Visual Description:	Rock/Concrete Core with open joint

Sliding Friction Test of Rock by ASTM D5607

Test specimen tested at 3 orientations:
Across, sliding up, and sliding down the
rock/concrete interface. Friction angle
not applicable for this test series.



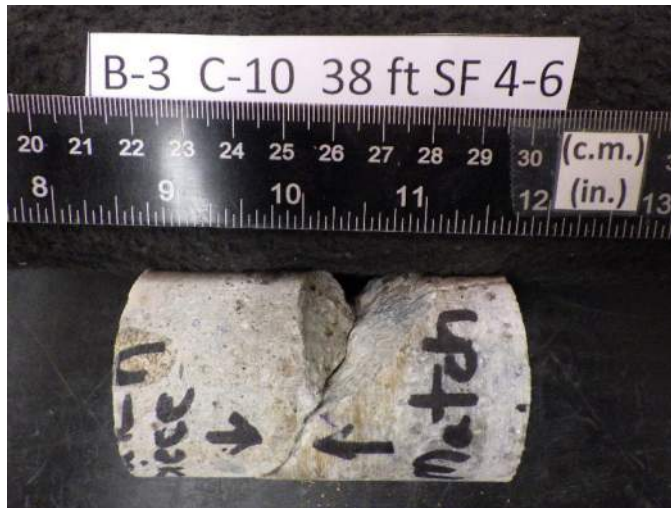
Test No.:	SF-4	SF-5	SF-6
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Length, in:	3.41	3.41	3.41
Specimen Mass, grams:	400	400	400
Specimen Area, in ² :	3.09	3.09	3.09
Specimen Bulk Density, pcf	145	145	145
Shear Plane Area, in ²	2.48	2.48	2.48
Normal Stress, psi:	28.8	28.8	28.8
Peak Shear Stress, psi:	29.0	40.9	94.2
Post Peak Shear Stress, psi:	12.8	26.2	36.5
Horiz. Displacement Rate, in/min:	0.005	0.005	0.005



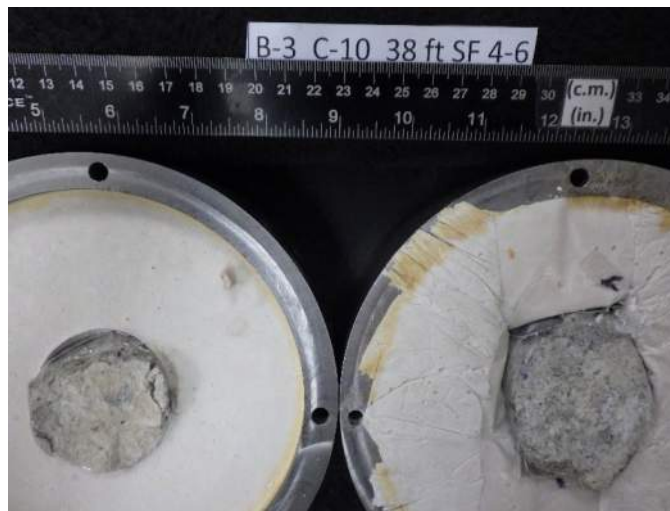
Peak Friction Angle:	---
Peak Cohesive Intercept, psi:	---
Post-Peak Friction Angle:	---
Post-Peak Cohesive Intercept, psi:	---
JRC Roughness	12-14 12-14 12-14

Notes: Specimen cut to length using diamond tipped saw blade.
Tested at as-received moisture content and density.
'Hydro-Stone Super X' encapsulating compound used to mount specimen in test rings.
Actual strength parameters may vary and should be determined by an engineer for site-specific conditions.

Client:	Tighe & Bond
Project Name:	Brush Reservoir Dam
Project Location:	Stamford, CT
GTX #:	315781
Start Date:	7/28/2022
End Date:	7/28/2022
Tested By:	tjm
Checked By:	jsc
Boring ID:	B-3
Sample ID:	C-10
Depth, ft:	38
Visual Description:	Rock/Concrete Core with open joint




Pre-Test



Post-Test



100% Recyclable 

www.tighebond.com