

TOWN OF GRAFTON, MASSACHUSETTS

**CONTRACT DOCUMENTS
FOR**



FITZPATRICK ROAD CULVERT REPLACEMENT

NOVEMBER 20, 2024

Town of Grafton
Grafton Memorial Municipal Center
30 Providence Road
Grafton, MA 01519

**SECTION 00 01 01
PROJECT DIRECTORY**

OWNER:

TOWN OF GRAFTON

Grafton Memorial Municipal Center
30 Providence Road
Grafton, MA 01519
Phone: (508) 839-5335 x1124
Fax: (508) 839-4602

DESIGN ENGINEER:

THE ENGINEERING CORPORATION, INC.

282 Merrimack Street
Lawrence, Massachusetts, 01843
Phone: (978) 794-1792

**BIDDING/CONSTRUCTION
ENGINEER:**

TOWN OF GRAFTON

Department of Public Works
Engineering Department
30 Providence Road
Grafton, Massachusetts, 01519
Phone: (508) 839-5335 x1500
Fax: (508) 839-4602

END OF SECTION

TABLE OF CONTENTS

<u>Section</u>	<u>Number of Pages</u>
<u>PROCUREMENT DOCUMENTS</u>	
00 01 01	Project Directory 1
00 01 10	Table of Contents 1
00 11 16	Invitation for Bids 1
00 21 39	Instructions to Bidders 4
00 41 13	Form for General Bid with Attachments "A" and "B" 8
00 43 13	Bid Bond..... 2
00 45 13	Bidders Reference Form 3
<u>CONTRACTING FORMS</u>	
00 51 00	Notice of Award 2
00 52 13	Contract Agreement 16
00 55 00	Notice to Proceed 2
00 61 13.13	Performance Bond..... 2
00 61 13.16	Payment Bond 2
<u>CONDITIONS OF THE CONTRACT</u>	
00 72 00	General Conditions of Contract..... 63
00 73 00	Supplementary General Conditions of Contract..... 2
<u>PREVAILING WAGES AND LABOR REGULATIONS</u>	
00 73 43	Prevailing Wages and Labor Regulations 2
	Prevailing Wages Rates 43
<u>SPECIFICATIONS</u>	
	Special Provisions 4
	Construction Specifications 60
<u>ATTACHMENTS</u>	
	Construction Drawings (By TEC, Dated 04/07/2022) 13
	Geotechnical Report (By Miller Engineering & Testing, Dated 01/15/2021) 25
	Hydraulic Memorandum (By Bay Colony Group, Dated 07/29/201)..... 32
	NOI Resource Area Impact Plan (By TEC, Dated 04/13/2021)..... 2
	NOI Order of Conditions File No. 164-1011 22

**SECTION 00 11 16
INVITATION FOR BIDS**

Sealed bids for furnishing, constructing, and installing the FITZPATRICK ROAD CULVERT REPLACEMENT will be received at the Grafton Memorial Municipal Center, 30 Providence Road, Grafton, MA 01519 until the time specified below at which time the bids will be publicly opened and read.

Specifications and bid forms may be obtained through TEC, Inc.'s website at www.theengineeringcorp.com/bids.

Bids will be opened at the Grafton Memorial Municipal Center by the Town Assistant Engineer on Thursday, December 19, 2024 at 1:00 p.m. Each bid must be accompanied by a bid security consisting of a bid bond, cash, or certified check issued by a responsible bank or trust company in the amount of 5% of the bid price. A performance bond in an amount equal to 100% of the total amount of the contract price with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract, as well as a labor and materials bond in an amount equal to 100% of the total contract price.

No Pre-Bid Conference and Site Visit is scheduled, however, contractors and subcontractors are highly encouraged to visit the site and become familiar with the project prior to submitting their bids. All questions are due in writing by Thursday December 12, 2024, at 12:00 pm.

All bids for this project are subject to applicable public bidding laws of Massachusetts, including, but not limited to G.L. c.30, §39M. Each Prospective bidder proposing to bid must be prequalified in accordance with 720 CMR 5.00, "Prequalification of Contractors". Bidders may obtain plans and specifications but may not bid without being listed on the official or waiver contractor lists issued by the MassDOT Prequalification Office. Selection of the contractor will be based upon bidder qualifications, including evidence of past performance in similar projects, and bid price. The contract will be awarded to the bidder deemed by the awarding authority to be the lowest responsible and eligible bidder.

Attention is directed to the minimum wage rates to be paid as determined by the Commissioner of Labor and Workforce Development and the weekly payroll record submittal requirements under the provisions of Massachusetts General Laws, Chapter 149, Section 26 through 27D inclusive.

The bidder agrees that its bid shall be good and may not be withdrawn for a period of 60 days, Saturdays, Sundays and legal holidays excluded, after the opening of the bids. The Town reserves the right to waive any informalities, to accept or reject, in whole or in part, any or all bids, or take whatever other action may be deemed to be in the best interest of the Town.

By: Evan Brassard, Town Administrator

**SECTION 00 21 39
INSTRUCTIONS TO BIDDERS**

1. Receipt and Opening of Bids

Any bid may be withdrawn prior to the respective date and time scheduled for the opening of such bids or authorized postponement thereof. No bid may be withdrawn for sixty (60) days, Saturdays, Sundays and Legal Holidays excluded, after the opening of the bids. No telephone change in bid or withdrawal of bid will be received or recognized. Any modification or correction of the bid must be submitted in a sealed envelope, properly labeled on the outside and received prior to the opening of the bid.

2. Contract Documents

- A. Complete set(s) of the Contract Documents stated in the Advertisement or Invitation for Bids may be obtained as per the Invitation for Bids. The deposit, if any, will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 30 days after opening of Bids.
- B. Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.
- C. Owner and Engineer, in making copies of Contract Documents do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

3. Examination of Contract Documents

Each contractor shall fully acquaint itself with and thoroughly examine the Contract Documents. Failure of any contractor to acquaint itself with the Contract Documents shall, in no way, relieve a contractor of any obligations with respect to its bid.

4. Addenda and Interpretations

- A. No interpretations of the meaning of the Contract Documents or other documents will be made to any contractor orally. Every request for such interpretation shall be in writing addressed to the Department of Public Works, Grafton Municipal Center, 30 Providence Road, Grafton, MA 01519 to be given consideration and must be received at least seven (7) days prior to the date of bid opening.
- B. Any and all such interpretation or any additions or deletions to the bid and any supplemental instructions will be through addendum that must be acquired electronically at www.theengineeringcorp.com/bids. Each bidder must acknowledge receipt of all addenda issued on the Form of General Bid. Failure of any contractor to receive any addendum or interpretation shall not relieve such contractor from any obligation under the bid as submitted.
- C. All addenda so issued shall become part of the Contract Documents.

5. Preparation of Bids

Each bid must be submitted on the prescribed form. All blank spaces for bid prices must be filled in, in ink or typewritten, in both words and figures. Each bid must include a completed bid form (with Certificate of Non-Collusion and Certificate of Tax Compliance), bid deposit, and completed Bidder's Reference Form; the Contractor is encouraged to remove these forms from the Project Manual. The bid shall be enclosed in a sealed envelope with the following plainly marked on the outside:

"Fitzpatrick Road Culvert Replacement, Town of Grafton, Massachusetts"

If the bid is mailed, the contractor shall enclose the sealed bid in an outer envelope marked as indicated above and addressed as follows:

From: Contractor's Name and Business Address
To: TOWN OF GRAFTON
30 Providence Road
Grafton, Massachusetts 01519
Attn: Brian Szczurko, Assistant Engineer

All sealed bid packages shall be marked on the outside with "Fitzpatrick Road Culvert Replacement" and shall be received by the Owner no later than the time and date for bid opening as defined in the Invitation for Bids.

All contractors are cautioned to allow ample time for the transmittal of bids. Bids received after the specified time and date will not be accepted or recognized. The time of receipt will determine the acceptability of mailed bids, regardless of the postmark.

6. Right to Reject Bids

The Awarding Authority reserves the right to waive any information, to reject any or all bids and to accept that bid which is in the best interest of the Town of Grafton. The Awarding Authority reserves the right to reject any or all unbalanced bids.

7. Method of Award

- A. The Contract will be awarded to the "lowest responsible and eligible bidder" pursuant to Massachusetts General Laws Chapter 30, Section 39M as amended.
- B. Such a bidder shall possess the skill, ability and integrity necessary for the faithful performance of the work, shall be able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, in the work, and shall otherwise comply with all applicable provisions of law.
- C. The award of the contract will be made within forty-five (45) days, Saturdays, Sundays and Legal Holidays excluded, after the opening of the bids. The contractor will be sent a written notification of the award.

- D. The award of the contract will be made to the contractor who submits the lowest responsible and eligible bid within the funding limits available for the project for the cumulative sum of the base bid and as many alternates as possible, in order of alternates as prioritized on the Form for General Bid. Funding limits shall be announced by the OWNER at the bid opening, prior to the opening of the bids. Contract award shall be subject to availability of an appropriation for funding.
- E. If the contractor selected fails to execute a contract in accordance with the items of the bid, an award may be made to the contractor who submits the next lowest responsible and eligible bid.

8. Execution of Contracts

The prepared contract forms and bond forms will be sent to the contractor, who shall execute and deliver the contract and furnish the required surety and insurance to the Town Administrator within ten (10) business days after presentation thereof in accordance with the bid; and shall furnish the executed contract, a payment bond which shall be in the sum of 100% of the contract price, and a performance bond which shall be in the sum of 100% of the contract price, the premiums of which is to be paid by the contractor and is included in the contract price. The surety company must be qualified to do business under the laws of the Commonwealth of Massachusetts and must be satisfactory to the Town. Attorneys-in-fact who sign bonds must file with the bond a certified and effectively dated copy of the Power of Attorney.

9. Qualification of Contractors:

No bids will be accepted from any party which the Town deems being irresponsible or unreliable. The Town has the right to request any contractor to supply proof that it is financially capable and thoroughly experienced to do the work called for in the Contract Documents.

The contractor shall be a company which has been in business for a minimum of ten (10) years and having completed at least five previous projects in similar size and nature to proposed roadway and drainage improvements. Such projects shall be detailed and submitted with the bid documents and shall contain at minimum:

1. Project Name and Location and Principal in Charge
2. Brief Description of the Project (include reference to relevant experience for this project)
3. Clients Name and Address
4. Completion Date (Actual or Estimated)
5. Project Cost
 - a. Total construction cost
 - b. Total construction cost for work which contractor was responsible for

The successful contractor shall have an adequate labor force to meet the Town's schedule for this project. The contractor shall work in harmony with Town of Grafton personnel.

10. Intent:

All work shall be in strict accordance with Federal, State, Local and governing codes and with adherence to the requirements of Contract Documents.

11. Labor:

The contractor shall be aware of the prevailing wage rates and health and welfare contributions as set forth by the Massachusetts Prevailing Wage rates as determined by the Commissioner of Labor and Industries under the provisions of M.G.L. chapter 149, sections 26 through 27D shall prevail on this project and of all applicable safety laws of the Commonwealth and the Federal Occupational Safety and Health Act.

12. Warranty:

The successful contractor shall replace, repair or make good without cost to the Town of Grafton any defects arising from defective labor or material, as determined by the Town of Grafton or a designee after inspection and for a period of 12 months from the substantial completion date except as otherwise noted within the Contract Documents.

Work shall be completed in accordance with the project schedule and testing requirements set within the Contract Documents as may be amended through the project writing in with approval of the Town.

13. Sales Tax Exemption:

The Town of Grafton is exempt from the State Sales Tax under the Sales Act, Chapter 14 of the Acts of 1966 and all amendments thereto. Grafton's Tax Exempt No. will be provided to the contractor upon award of the contract. All purchases of supplies and materials in relation to this work are therefore exempt. This should be considered when pricing this project.

END OF SECTION

TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
FORM OF GENERAL BID

Proposal of _____(hereinafter called "Bidder"), organized and existing under the laws of the State of _____, doing business as _____*, to Town of Grafton, Grafton Memorial Municipal Center, 30 Providence Road, Grafton, Massachusetts (hereinafter called "Owner").

Bidder hereby proposes to perform all work for FITZPATRICK ROAD CULVERT REPLACEMENT, in strict accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

By submission of this Bid, each Bidder certifies, and in the case of a joint Bid each party thereto certifies as to his own organization, that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid with any other Bidder or with any competitor.

Bidder hereby agrees to commence work under this Contract on or before a date to be specified in the Notice to Proceed and to fully complete the project within the specified time period in accordance with Article 4 of the Contract.

Bidder acknowledges receipt of the following Addenda:

*Insert a "Corporation", a "a Partnership", or "an Individual" as applicable.

BID SCHEDULE

Bidder agrees to perform all the work described in the Contract Documents for the following unit prices or lump sums. This proposal shall be filled in by the Bidder in ink, with the unit prices written in words and numerals and the extensions shown in the "Amount" column. For complete information concerning these items, see the Specifications.

ITEM NO.	QTY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE		TOTAL	
			DOLLARS	CENTS	DOLLARS	CENTS
101.	0.2	CLEARING AND GRUBBING AT _____ ACRES				
120.	200	EARTH EXCAVATION AT _____ CY				
120.1	20	UNCLASSIFIED EXCAVATION AT _____ CY				
140.	3200	BRIDGE EXCAVATION AT _____ CY				
143.	200	CHANNEL EXCAVATION AT _____ CY				
151.	15	GRAVEL BORROW AT _____ CY				
151.2	185	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES AT _____ CY				
153.1	15	CONTROLLED DENSITY FILL – NON-EXCAVATABLE AT _____ CY				
156.	110	CRUSHED STONE AT _____ TON				
170.	165	FINE GRADING AND COMPACTING – SUBGRADE AREA AT _____ SY				
402.	6	DENSE GRADED CRUSHED STONE FOR SUB-BASE AT _____ CY				

CARRIED FORWARD _____

BROUGHT FORWARD _____

ITEM NO.	QTY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE		TOTAL	
			DOLLARS	CENTS	DOLLARS	CENTS
443.	4	WATER FOR ROADWAY DUST CONTROL AT _____ MGAL				
450.23.	30	SUPERPAVE SURFACE COURSE – 12.5 (SSC – 12.5) AT _____ TON				
450.31	45	SUPERPAVE INTERMEDIATE COURSE – 12.5 (SIC – 12.5) AT _____ TON				
452.	40	ASPHALT EMULSION FOR TACK COAT AT _____ GAL				
453.	90	HMA JOINT SEALANT AT _____ FT				
482.3	86	SAWCUTTING ASPHALT PAVEMENT AT _____ FT				
620.12	200	GUARDRAIL, TL-2 (SINGLE FACED) AT _____ FT				
627.1	2	TRAILING ANCHORAGE AT _____ EACH				
627.82	2	GUARDRAIL TANGENT END TREATMENT, TL-2 AT _____ EACH				
628.25	4	TRANSITION TO THRIE BEAM AT _____ EACH				
630.2	280	HIGHWAY GUARD REMOVED AND DISCARDED AT _____ FT				
632.	13	GUARDRAIL POST – STEEL AT _____ EACH				

CARRIED FORWARD _____

BROUGHT FORWARD _____

ITEM NO.	QTY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE		TOTAL	
			DOLLARS	CENTS	DOLLARS	CENTS
634.1	18	THRIE BEAM GUARD PANEL AT _____ EACH				
391.	85	BALANCE STONE WALL REMOVED AND REBUILT AT _____ FT				
697.2	20	FLOATING SILT FENCE AT _____ FT				
698.1	80	GEOTEXTILE FABRIC FOR STABILIZATION AT _____ SY				
698.4	170	GEOTEXTILE FOR PERMANENT EROSION CONTROL AT _____ SY				
748.	1	MOBILIZATION AT _____ LS				
751.	40	LOAM BORROW AT _____ CY				
755.35	1	INLAND WETLAND REPLICATION AREA AT _____ LS				
755.75	50	WETLAND SPECIALIST AT _____ HR				
755.76	1	WETLANDS MONITORING REPORTS AT _____ LS				
765.	240	SEEDING AT _____ SY				
767.121	370	SEDIMENT CONTROL BARRIER AT _____ FT				
767.31	240	STRAW MULCH AT _____ SY				

CARRIED FORWARD _____

BROUGHT FORWARD _____

ITEM NO.	QTY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE		TOTAL	
			DOLLARS	CENTS	DOLLARS	CENTS
769.	168	PAVEMENT MILLING MULCH UNDER GUARDRAIL AT _____ FT				
833.5	9	DEMOUNTABLE REFLECTORIZED DELINEATOR - GUARDRAIL AT _____ EACH				
833.7	4	DELINEATION FOR GUARDRAIL TERMINI AT _____ EACH				
850.41	80	ROADWAY FLAGGER AT _____ HR				
852.	164	SAFETY SIGNING FOR TRAFFIC MANAGEMENT AT _____ SY				
853.1	2	PORTABLE BREAKAWAY BARRICADE TYPE III AT _____ EACH				
853.2	50	TEMPORARY BARRIER AT _____ FT				
983.1	90	RIPRAP AT _____ TON				
983.521	50	STREAMBED RESTORATION AT _____ CY				
986.2	40	MODIFIED ROCKFILL AT _____ CY				
991.1	1	CONTROL OF WATER – STRUCTURE NO. G-08-061 (C97) AT _____ LS				
995.01	1	BRIDGE STRUCTURE, BRIDGE NO. G-08-061 (C97) AT _____ LS				
999.01	1	POLICE DETAILS AT <u>TWENTY THOUSAND</u> ALLOWANCE	\$20,000	00	\$20,000	00

CARRIED FORWARD _____

ITEM NO. ITEM DESCRIPTION AND PRICE

1. Base Bid - Supply all materials, equipment and labor to complete the work as defined in the Contract Documents. The lump sum of:

Base Bid Dollars (Numerals)

Base Bid Dollars (Words)

Note:

1. All prices shall be stated in both words and numerals. In the event of a discrepancy between the price in words and the price in numerals, the words shall govern.
2. All prices shall be typewritten or written by hand in ink. Interlineation, alteration or erasure will void the bid.

Respectfully submitted:

Signature

Date

Title

Company

Address

City, State, Zip

(Seal - if Bid is by a Corporation)

Attest _____

The full names and residences of all persons interested in this Bid as principals are as follows: (In case of Corporation, include and identify President, Treasurer, Secretary, and Manager).

ATTACHMENT A

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any person. As used in this certification, the "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Signature of person signing bid or proposal

Print Name

Title

Name of Organization/Business

Date

ATTACHMENT B

CERTIFICATE OF TAX COMPLIANCE

Pursuant to Massachusetts General Law, Chapter 62C, Section 49A(b):

The undersigned certifies under the pains and penalties of perjury that said property owner has complied with all laws of the Commonwealth of Massachusetts and the Town of Grafton and is current with all local, state, and federal taxes and other assessments including child support payments as required under the law.

Signature of person signing bid or proposal

Print Name

Title

Name of Organization/Business

Federal Identification Number: 04- or TIN

Date

**TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
BID BOND**

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address): _____

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

Town of Grafton
30 Providence Street
Grafton, Massachusetts 01519

BID

Bid Due Date:

Project (Brief Description Including Location): Fitzpatrick Road over Cronin Brook Culvert Replacement, Grafton, Massachusetts

BOND

Bond Number:

Date (Not later than Bid due date):

Penal sum _____

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature and Title

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title

Attest: _____
Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

- 3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
- 3.2. All Bids are rejected by Owner, or
- 3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

END OF SECTION

**SECTION 00 45 13
BIDDERS REFERENCE FORM**

Bidders Name: _____

Project Title: Fitzpatrick Road Culvert Replacement

The bidder must provide five (5) business references for projects performed & completed within the past five (5) years. (attach additional pages if necessary)

(1) Project Name: _____

Project Location: _____

Principal in Charge: _____

Description of Project: _____

Client Name: _____ Contact: _____

Client Address: _____

Completion Date: _____

Total Construction Cost: _____

Total Construction Cost for Work Which Contractor was Responsible for: _____

(2) Project Name: _____

Project Location: _____

Principal in Charge: _____

Description of Project: _____

Client Name: _____ Contact: _____

Client Address: _____

Completion Date: _____

Total Construction Cost: _____

Total Construction Cost for Work Which Contractor was Responsible for: _____

(3) Project Name: _____

Project Location: _____

Principal in Charge: _____

Description of Project: _____

Client Name: _____ Contact: _____

Client Address: _____

Completion Date: _____

Total Construction Cost: _____

Total Construction Cost for Work Which Contractor was Responsible for: _____

(4) Project Name: _____

Project Location: _____

Principal in Charge: _____

Description of Project: _____

Client Name: _____ Contact: _____

Client Address: _____

Completion Date: _____

Total Construction Cost: _____

Total Construction Cost for Work Which Contractor was Responsible for: _____

(5) Project Name: _____

Project Location: _____

Principal in Charge: _____

Description of Project: _____

Client Name: _____ Contact: _____

Client Address: _____

Completion Date: _____

Total Construction Cost: _____

Total Construction Cost for Work Which Contractor was Responsible for: _____

References will be contacted to confirm the bidder's skills, abilities and qualifications to faithfully perform the work as specified.

END OF SECTION

TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
NOTICE OF AWARD

Dated _____

[Certified Mail -- Return Receipt Requested]

TO: _____
(BIDDER)

ADDRESS: _____

Contract: Fitzpatrick Road Culvert Replacement, Grafton, MA

(Insert name of Contract as it appears in the Bidding Documents)

Engineer's Project No.: 1060.00

OWNER's Contract No. _____

You are notified that your Bid dated _____ for the above Contract has been considered. You are the apparent Successful Bidder and will be awarded a Contract for _____

(Indicate total Work, alternates or sections or Work awarded)

For all Work, at the prices stated in Contractor's Bid, of the Contract Sum of _____ Dollars (\$_____).

Four copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

Four 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 OWNER four fully executed counterparts of the Contract Documents.
2. Deliver with the executed Contract Agreement the Contract security (Bonds) as specified in the Instructions to Bidders (Article 8)
3. Deliver to the Owner a certificate of insurance matching or exceeding the insurance requirement and limits defined in the Instructions to Bidders (Article 13).
4. (List other conditions precedent):

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

Within ten days after you comply with the above conditions and funds have been procured, OWNER will return to you one fully executed counterpart of the Contract Documents.

(OWNER)

By:

(AUTHORIZED SIGNATURE)

(TITLE)

Copy to ENGINEER

END OF SECTION

TOWN OF GRAFTON

DATE: _____

This Contract is entered into on, or as of, this date by and between the Town of Grafton, 30 Providence Road, Grafton, mA 01519 (the "Town"), and

1. This is a Contract for the procurement of the following:

The Contractor shall provide all materials, labor, tools, equipment, vehicles, and insurance to undertake the construction of the **Fitzpatrick Road Culvert Replacement Project** including, but not limited to, precast structure installation, streambed restoration, wetlands replication, approach roadway reconstruction, guardrail installation, and all other associated work specified in the bid. All work is to be performed under the direction of the Engineer or his designee as outlined in the bid documents for "**Fitzpatrick Road Culvert Replacement**".

2. The Contract price to be paid to the Contractor by the Town is as follows:

The Town shall pay the contractor for the performance of this Contract, in accordance with the prices listed on the attached Bid Quotation Form on a unit price basis.

The Contractor agrees to invoice the Highway Department or DPW in such form as the department may require. The Town shall have thirty-five (35) days after the receipt of a proper invoice in which to make payment. The Contractor agrees that no late penalty interest shall accrue for late payments except as provided by law. The Town shall withhold five percent (5%) of the invoice amount as security to cover any claims, which may arise due to unsatisfactory Work or failure to complete the Work.

3. Payment will be made as follows:

3.1 If any portion of the contract price is to be paid by a private citizen(s) no work shall be performed until a sum has been deposited with the Town Treasurer, upon an estimate made by the board, committee or officer having charge of the work, sufficient to cover the payment for the portion of the said work chargeable to the private citizen(s).

3.1 Fees and Reimbursable Costs combined shall not exceed _____ as more fully set forth in the Contractor Documents.

3.2 There shall be no further costs, fees, or reimbursable charges due the Contractor under this Contract unless said fees and/or costs are so set forth in writing. The Town will not pay any surcharge or premium on top of the direct out of pocket expenses, if any.

3.3 Final payment including any unpaid balance of the Contractor's compensation shall be due and payable when the Project/Goods/Services is/are delivered to the Town when the project is completed and the services are complete and/or the goods are delivered and accepted.

4 Security

The Contractor must provide security in the form of 100% performance bond, 100% payment bond, and 5% bid surety, conditioned upon the faithful performance of this Contract.

5 Definitions

5.1 Acceptance: All Contracts require proper acceptance of the described goods or services by the Town. Proper acceptance shall be understood to include inspection of goods and certification of acceptable performance for services by authorized representatives of the Town to insure that the goods or services are complete and are as specified in the Contract.

5.2 Contract Documents: All documents relative to the Contract including (where used) Request for Proposals and all attachments thereto, Instructions to Bidders, Proposal Form, General Conditions, Supplementary General Conditions, General Specifications, Other Specifications included in Project Manual, Drawings, all Addenda issued during the bidding period and Contractor's Response to the Request for Proposal. The Contract documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the document is to include all labor and materials, equipment and transportation necessary for the proper performance of the Contract.

5.3 The Contractor: The "other party" to any Contract with the Town. This term shall (as the sense and particular Contract so require) include Vendor, Contractor, Engineer, or other label used to identify the other party in the particular Contract. Use of the term "Contractor" shall be understood to refer to any other such label used.

5.4 Date of Substantial Performance: The date when the work is sufficiently complete, the services are performed, or the goods delivered, in accordance with Contract documents, as modified by approved Amendments and Change Orders.

5.5 Goods: Goods, Supplies, Services or Materials.

5.6 Subcontractor: Those having a direct Contract with the Contractor. The term includes one who furnished material worked to a special design according to the Drawings or Specifications of this work, but does not include one who merely furnishes material not so worked.

5.7 Work: The services or materials contracted for, or both.

6 Term of Contract and Time for Performance

This Contract shall be fully performed by the Contractor in accordance with the provisions of the Contract Documents on or before September 30, 2025, unless extended, in writing, at the sole discretion of the Town, and not subject to assent by the Contractor, and subject to the availability and appropriation of funds as certified by the Town Accountant. Time is of the essence for the completion of the Contract. As described above, the Town may extend the contract for two additional one-year terms at the sole discretion of the Town.

7 Subject Appropriation

Notwithstanding anything in the Contract documents to the contrary, any and all payments which the Town is required to make under this Contract shall be subject to appropriation or other availability of funds as certified by the Town Accountant. In the absence of appropriation or availability as certified herein, this Contract shall be immediately terminated without liability for damages, penalties or other charges to the Town. In the event this is a multi-year contract, this Contract shall be subject to annual appropriation and in the event funds are not so appropriated, this Contract shall terminate immediately without liability for damages, penalties or charges to the Town.

8 Permits and Approvals

Permits, Licenses, Approvals and all other legal or administrative prerequisites to its performance of the Contract shall be secured and paid for by the Contractor.

9 Termination and Default

9.1 Without Cause: The Town may terminate this Contract on seven (7) calendar days notice when in the Town's sole discretion it determines it is in the best interests of the Town to do so, by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor. Upon termination without cause, Contractor will be paid for services rendered to the date of termination.

9.2 For Cause: If the Contractor is determined by the Town to be in default of any term or condition of this Contract, the Town may terminate this Contract on seven (7) days notice by providing notice to the Contractor, which shall be in writing and shall be deemed delivered and received when given in person to the Contractor, or when received by fax, express mail, certified mail return receipt requested, regular mail postage prepaid or delivered by any other appropriate method evidencing actual receipt by the Contractor.

9.3 Default: The following shall constitute events of a default under the Contract:

1) any material misrepresentation made by the Contractor to the Town; 2) any failure to perform any of its obligations under this Contract including, but not limited to the following: (i) failure to commence performance of this Contract at the time specified in this Contract due to a reason or circumstance within the Contractor's reasonable control, (ii) failure to perform this Contract with sufficient personnel and equipment or with sufficient material to ensure the completion of this Contract within the specified time due to a reason or circumstance within the Contractor's reasonable control, (iii) failure to perform this

Contract in a manner reasonably satisfactory to the Town, (iv) failure to promptly re-perform within a reasonable time the services that were rejected by the Town as unsatisfactory, or erroneous, (v) discontinuance of the services for reasons not beyond the Contractor's reasonable control, (vi) failure to comply with a material term of this Contract, including, but not limited to, the provision of insurance and non-discrimination, (vii) any other acts specifically and expressly stated in this Contract as constituting a basis for termination of this Contract, and (viii) failure to comply with any and all requirements of state law and/or regulations, and Town bylaw and/or regulations.

10 Suspension or Delay

The Town may order the Contractor, in writing, to suspend, delay or interrupt all or any part of the Services without cause for such period of time as the Town may determine to be appropriate for its convenience. In the event of any such suspension, delay or interruption, the Contractor's compensation shall be equitably adjusted. No adjustment shall be made if the Contractor is or otherwise would have been responsible for the suspension, delay or interruption of the Services, or if another provision of this Contract is applied to render an equitable adjustment.

11 The Contractor's Breach and the Town's Remedies

Failure of the Contractor to comply with any of the terms or conditions of this Contract shall be deemed a material breach of this Contract, and the Town of Grafton shall have all the rights and remedies provided in the Contract documents, the right to cancel, terminate, or suspend the Contract in whole or in part, the right to maintain any and all actions at law or in equity or other proceedings with respect to a breach of this Contract, including "Damages" including but not limited to costs, attorney's fees or other damages resulting from said breach ("Damages") as well as specific performance, and the right to select among the remedies available to it by all of the above.

From any sums due to the Contractor for services, the Town may keep the whole or any part of the amount for expenses, losses and Damages incurred by the Town as a consequence of procuring services as a result of any failure, omission or mistake of the Contractor in providing services as provided in this Contract.

12 Statutory Compliance

12.1 This Contract will be construed and governed by the provisions of applicable federal, state and local laws and regulations; and wherever any provision of the Contract or Contract documents shall conflict with any provision or requirement of federal, state or local law or regulation, then the provisions of law and regulation shall control. Where applicable to the Contract, the provisions of the General Laws are incorporated by reference into this Contract, including, but not limited to, the following:

General Laws Chapter 30B – Procurement of Goods and Services

General laws Chapter 30, Sec. 39, et seq: - Public Works Contracts

General Laws Chapter 149, Section 44A, et seq: - Public Buildings Contracts

12.2 Wherever applicable law mandates the inclusion of any term and provision into a municipal contract, this Section shall be understood to import such term or provision into this Contract. To whatever extent any provision of this Contract shall be inconsistent with any law or regulation limiting the power or liability of cities and towns, such law or regulation shall control.

12.3 The Contractor shall comply with all Federal, State and local laws, rules, regulations, policies and orders applicable to the Work provided pursuant to this Contract, such provisions being incorporated herein by reference, and shall be responsible for obtaining all necessary licenses, permits, and approvals required for the supply of such Work.

The Contractor shall indemnify and hold the Town harmless for and against any and all fines, penalties or monetary liabilities incurred by the Town as a result of the failure of the Contractor to comply with the previous sentence. If any discrepancy or inconsistency is discovered in the Drawings, Specifications or Contract for this work in violation of any such law, by-law, regulation, order or decree, it shall forthwith report the same in writing to the Town. It shall, at all times, itself observe and comply with all such existing and future laws, by-laws, regulations, orders and decrees; and shall protect and indemnify the Town, and its duly appointed agents against any claim or liability arising from or based on any violation whether by him or its agents, employees or subcontractors of any such law, by-law, regulation or decree.

13 Conflict of Interest

Both the Town and the Contractor acknowledge the provisions of the State Conflict of Interest Law (General Laws Chapter 268A), and this Contract expressly prohibits any activity which shall constitute a violation of that law. The Contractor shall be deemed to have investigated the application of M.G.L. c. 268A to the performance of this Contract; and by executing the Contract documents the Contractor certifies to the Town that neither it nor its agents, employees, or subcontractors are thereby in violation of General Laws Chapter 268A.

14 Certification of Tax Compliance

This Contract must include a certification of tax compliance by the Contractor, as required by General Laws Chapter 62C, Section 49A (Requirement of Tax Compliance by All Contractors Providing Goods, Services, or Real Estate Space to the Commonwealth or Subdivision).

15 Non-Discrimination/Affirmative Action

The Contractor shall carry out the obligations of this Agreement in compliance with all requirements imposed by or pursuant to federal, State and local ordinances, statutes, rules and regulations and policies prohibiting discrimination in employment, including but not limited to, Title VII of the Civil Rights Act of 1964; the Age Discrimination in Employment Act of 1967; Section 504 of the Rehabilitation Act of 1973 and Mass. G. L. c. 151B, and any other executive orders, rules, regulations, requirements and policies relating thereto enacted by the Commonwealth of Massachusetts and the Town as they may be amended from time to time. Contractor shall not discriminate against any qualified employee or applicant for employment because of race, color, national origin, ancestry, age, sex, religion, physical or mental handicap or sexual orientation.

15.1 As used in this section "affirmative action" means positive steps to ensure all qualified persons equal employment opportunity without regard to race, color, religion, sex or national origin at all stages of the employment process: recruitment, section, placement, promotion, training, layoff and termination. It may include, but is not limited to, the following:

- (a) Inclusion in all solicitation and advertisements for employees of a statement that the Contractor is an "Equal Opportunity Employer";
- (b) Placement of solicitations and advertisements for employees in media that reaches minority groups;
- (c) Notification in writing of all recruitment sources that the Contractor solicits the referral of applicants without regard to race, color, religion, sex or national origin;
- (d) Direct solicitation of the support of responsible and appropriate community, state and federal agencies to assist recruitment efforts;
- (e) Participation in, or establishment of, apprenticeship or training programs where outside programs are inadequate or unavailable to minority groups;
- (f) Modification of collective bargaining agreements to eliminate restrictive barriers established by dual lines of seniority, dual rates of pay or dual lines of promotion or progression which are based on race, color, religion, sex or national origin; and
- (g) Review selection, placement, promotion, training, layoff and termination procedures and requirements to ensure that they do not intentionally or unintentionally discriminate against qualified persons because of race, color, religion, sex or national origin.

15.2 The Contractor, if applicable, shall include in all compliance and progress reports submitted to the town a report which shall include: (a) A certificate stating that he or she is currently in compliance with the provisions of G.L. c. 152B and setting forth the Affirmative Action he or she is currently undertaking and will undertake during the contract period to provide equal employment opportunity for all qualified persons without regard to race, color, religion, sex or national origin; and (b) A statement in wiring supporting information signed by an authorized officer or agent on behalf of any labor union or other agency which refers workers or provides or supervises apprenticeship or other training programs which the Contractor deals, to the effect that the union or other agency's practices and policies do not discriminate on the basis of race, color, religion, sex or national origin; provided, in the event that the union or other agency shall refuse to execute such a statement, the Contractor need only so certify in writing.

15.3 A copy of any such report as described above, shall be filed in the office of the Town Clerk and shall upon said filing become a public record.

15.4 The Contractor will take Affirmative Action to ensure that employees are solicited and employed, and that employees are treated during employment, without regard to race, color, religion, sex or national origin.

15.5 The Contractor will in all solicitation or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.

15.6 In determining whether steps taken by the Contractor constitute Affirmative Action, the Town shall take into account the relevant characteristics of the Contractor including, but not limited to, the number of employees and the location of the principal and branch offices.

16 Assignment

The Contractor shall not assign, sublet or otherwise transfer this Agreement, in whole or in part, without the prior written consent of the Town, and shall not assign any of the moneys payable under this Contract, except by and with the written consent of the Town.

17 Condition of Enforceability Against the Town

This Contract is only binding upon, and enforceable against, the Town if: (1) the Contract is signed by the Board of Selectmen or its designee; and (2) endorsed with approval by the Town Accountant as to appropriation or availability of funds; and (3) endorsed with approval by the Town Counsel as to form.

18 Corporate Contractor

If the Contractor is a corporation, it shall endorse upon this Contract (or attach hereto) its Clerk's Certificate certifying the corporate capacity and authority of the party signing this Contract for the corporation. Such certificate shall be accompanied by a letter or other instrument stating that such authority continues in full force and effect as of the date the Contract is executed by the Contractor. This Contract shall not be enforceable against the Town of Grafton unless and until the Contractor complies with this section.

The Contractor, if a foreign corporation, shall file with the Commissioner of Corporations a Power of Attorney and duly authenticated copies of its Charter or Certificate of Incorporation; and said Contractor shall comply with all the laws of the Commonwealth.

19 Contractor's Personnel

The Contractor shall utilize only its employees and shall not utilize any third-party contractors without prior written approval of the Town.

20 Liability of Public Officials

To the full extent permitted by law, no official, employee, agent, or representative of the Town of Grafton shall be individually or personally liable on any obligation of the Town under this Contract.

21 Indemnification

The Contractor shall indemnify, defend and save harmless the Town, the Town's officers, agents and employees, from and against any and all damages, liabilities, actions, suits, proceedings, claims, demands, losses, costs, expenses, recoveries and judgments of every nature and description (including attorneys' fees) that may arise in whole or in part out of or in connection with the work being performed or to be performed, or out of any act or omission by the Contractor, its employees, agents, subcontractors, material men, and anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not

it is caused in part by any party indemnified hereunder. The Contractor further agrees to reimburse the Town for damage to its property caused by the Contractor, its employees, agents, subcontractors or material men, and anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, including damages caused by his, its or their use of faulty, defective, or unsuitable material or equipment, unless the damage is caused by the Town's gross negligence or willful misconduct.

21.1 The Contractor further agrees to indemnify and hold harmless the Town, including the agents, employees and representatives of either, from and against all claims, damages, losses and expenses, including attorney's fees, arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom and (b) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

21.2 The Contractor shall be responsible for all damage or injury to property of any character during the prosecution of the work resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work or due to the non-execution of the work or at any time due to defective work or materials.

21.3 In any and all claims against the town or any of their agents or employees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in anyway by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workmen's Compensation Acts, disability benefit acts or other employee benefit acts.

21.4 The Contractor hereby assumes the entire responsibility and liability for any and all injury to or death of any or all persons, including the Contractor's employees, and for any and all damage to property caused by, resulting from or arising in whole or in part out of any act, omission, or neglect on the part of the Contractor or of any Subcontractor or of anyone directly or indirectly employed by any of them, or of anyone for whose acts any of them may be liable in connection with operations under the Contract.

The foregoing provisions shall not be deemed to be released, waived, limit or modified in any respect by reason of any surety or insurance provided by the Contractor under the Contract.

22 Insurance

22.1 Workers Compensation Insurance

The Contractor shall provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws of Massachusetts (The Worker's Compensation Act) to all employees of the Contractor who are subject to the provisions of Chapter 152 of the General Laws of Massachusetts.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

The Contractor shall furnish to the Town a certificate evidencing such insurance prior to the execution of this Contract before the same shall be binding on the parties thereto, except if specifically waived by the Town.

22.2 Professional Liability Insurance

Liability of \$1 million per claim and \$2 million aggregate.

Failure to provide and continue in force such insurance during the period of this Contract shall be deemed a material breach of this Contract, shall operate as an immediate termination thereof, and Contractor shall indemnify the Town for all losses, claims, and actions resulting from the failure to provide the insurance required by this Article.

22.3 Other Insurance Requirements

- a. Comprehensive commercial general liability insurance with limits of at least \$1 Million per occurrence and \$2 Million annual aggregate for property damage and \$1 Million per person and \$2 Million per occurrence for bodily injury, which shall include the Town of Grafton as an additional insured, and which shall cover bodily injury, sickness or disease, or death of any person including employees and those persons other than the Contractor's employees, and claims insured by usual personal liability coverage, death, or property damage arising out of the Work including injury or destruction of tangible property, including loss of use resulting therefrom.
- b. Motor vehicle insurance for any motor vehicles used in performing the Work, with limits of at least \$500,000 per person, and \$1 Million per accident.
- c. The intent of the Specifications regarding insurance is to specify minimum coverage and minimum limits of liability acceptable under the Contract. However, it shall be the Contractor's responsibility to purchase and maintain insurance of such character and in such amounts as will adequately protect it and the Town from and against all claims, damages, losses and expenses resulting from exposure to any casualty liability in the performance of the work, including and not limited to Professional liability insurance where applicable.
- d. All policies shall identify the Town as an additional insured (except Workers' Compensation). The Contractor shall notify the Town immediately upon the cancellation or amendment to any policy. Renewal Certificates shall be filed with the Town at least ten (10) days prior to the expiration of the required policies. Certificates evidencing all such coverage shall be provided to the Town upon the execution of this Agreement, and upon the renewal of any such coverage. Each such

certificate shall specifically refer to this Contract and shall state that such insurance is as required by this Contract. **Failure to provide the notices required in this Section or to continue in force such insurance shall be deemed a material breach of this Contract and shall be grounds for immediate termination.** Said insurance shall include: Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from premises, operations, independent Contractors, personal injury, contractual liability. All Certificates of Insurance shall be on the "MIIA" or "ACORD" Certificate of Insurance form, shall contain true transcripts from the policies, authenticated by the proper officer of the Insurer, evidencing in particular those insured, the extent of coverage, the location and operations to which the insurance applies, the expiration date and the above-mentioned notice clauses. All insurance shall be written on an occurrence basis. Coverage's shall be maintained without interruption from date of the Contract until date of final payment and termination of any coverage required to be maintained after payment.

- e. The Contractor shall obtain and maintain during the term of this Contract the insurance coverage in companies licensed to do business in the Commonwealth of Massachusetts and acceptable to the Town.

23 Documents, Materials (etc.)

Any materials, reports, information, data, etc. given to or prepared or assembled by the Contractor under this Contract are to be kept confidential and shall not be made available to any individual or organization by the Contractor (except agents, servants, or employees of the Contractor) without the prior written approval of the Town, except as otherwise required by law. The Contractor shall comply with the provisions Chapter 66A of the General Laws of Massachusetts as it relates to public documents, and all other state and federal laws and regulations relating to confidentiality, security, privacy and use of confidential data.

Any materials produced in whole or in part under this Contract shall not be subject to copyright, except by the Town, in the United States or any other country. The Town shall have unrestricted authority to, without payment of any royalty, commission, or additional fee of any type or nature, publicly disclose, reproduce, distribute and otherwise use, and authorize others to use, in whole or in part, any reports, data or other materials prepared under this Contract.

All data, reports, programs, software, equipment, furnishings, and any other documentation or product paid for by the Town shall rest in the Town at the termination of this Contract. The Contractor shall at all times, during or after termination of this Contract, obtain the prior written approval of the Town before making any statement bearing on the work performed or data collected under this Contract to the press or issues any material for publication through any medium.

24 No Employment

The Contractor acknowledges and agrees that it is acting as an independent Contractor for all services rendered pursuant to this Contract, and neither the Contractor, nor its employees, agents, servants nor any person for whose conduct the Contractor is responsible shall be

considered an employee or agent of the Town for any purpose and shall not file any claim or bring any action for any worker's compensation unemployment benefits and compensation for which they may otherwise be eligible as a Town employee as a result of work performed pursuant to the terms of this Contract.

25 Audit, Inspection, and Recordkeeping

At any time during normal business hours, and as often as the Town may deem it reasonably necessary, there shall be available in the office of the Contractor for the purpose of audit, examination, and/or to make excerpts or transcript all records, contracts, invoices, materials, payrolls, records of personnel, conditions of employment and other data relating to all matters covered by this Agreement.

26 Payment

The Town agrees to make all reasonable efforts to pay to the Contractor the sum set forth in the Contractor's bid or proposal within thirty (30) days of receipt of an invoice detailing the work completed and acceptance from the Town of the work completed.

27 Waiver and Amendment

Amendments, or waivers of any additional term, condition, covenant, duty or obligation contained in this Contract may be made only by written amendment executed by all signatories to the original Agreement, prior to the effective date of the amendment.

To the extent allowed by law, any conditions, duties, and obligations contained in this Contract may be waived only by written Agreement by both parties.

Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any manner limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach of a similar or different matter.

28 Severability

If any term or condition of this Contract or any application thereof shall to any extent be held invalid, illegal or unenforceable by the court of competent jurisdiction, the validity, legality, and enforceability of the remaining terms and conditions of this Contract shall not be deemed affected thereby unless one or both parties would be substantially or materially prejudiced.

29 Forum and Choice of Law

This Contract and any performance herein shall be governed by and be construed in accordance with the laws of the Commonwealth. Any and all proceedings or actions relating to subject matter herein shall be brought and maintained in the courts of the Commonwealth or the federal district court sitting in the Commonwealth, which shall have exclusive jurisdiction thereof. This paragraph shall not be construed to limit any other legal rights of the parties.

30 Notices

Any notice permitted or required under the provisions of this Contract to be given or served by either of the parties hereto upon the other party hereto shall be in writing and signed in the name or on the behalf of the party giving or serving the same. Notice shall be deemed to have been received at the time of actual service or three (3) business days after the date of a certified or registered mailing properly addressed. Notice to the Contractor shall be deemed sufficient if sent to the address set forth on page 1 or furnished from time to time in writing hereafter.

31 Binding on Successors

This Contract is binding upon the parties hereto, their successors, assigns and legal representatives (and where not corporate, the heirs and estate of the Contractor). Neither the Town nor the Contractor shall assign or transfer any interest in the Contract without the written consent of the other.

32 Entire Agreement

This Contract, including all documents incorporated herein by reference, constitutes the entire integrated agreement between the parties with respect to the matters described. This Contract supersedes all prior agreements, negotiations and representations, either written or oral, and it shall not be modified or amended except by a written document executed by the parties hereto.

33 Supplemental Conditions

If this Contract is for Construction, the following provisions will apply:

See SUPPLEMENTARY GENERAL CONDITIONS OF CONTRACT

IN WITNESS WHEREOF the parties have hereto and to two other identical instruments set forth their hands and executed this as an instrument under seal this the day and year first above written.

The Town of Grafton by:

The Contractor by:

Chairman, Board of Selectmen

Signature Date

Print Name & Title

CERTIFICATION OF GOOD FAITH

The undersigned certifies under pains and penalties of perjury that this contract has been obtained in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

The Contractor by:

Print Name

Title/Authority

CERTIFICATE OF STATE TAX COMPLIANCE

Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A

_____, authorized signatory for
Name of Signatory

_____, whose principal place of business is at
Name of Contractor

_____, does hereby certify under
Address the pains and penalties of perjury that

_____,
Name of Contractor

Has paid all Massachusetts taxes and has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

EXAMPLE CLERK'S CERTIFICATE

Action of Shareholders
Written Consent

(Date)

The undersigned, being the Shareholders of _____, a Massachusetts Corporation (the "Corporation") entitled to vote on the action, hereby consent to the adoption of the following votes:

VOTED: That the [President and/or the Vice President or named individual], each of them acting singly is, authorized to execute any and all contract documents and to enter into and negotiate the terms of all contracts and to accomplish same and to execute any and all documents, instruments, and agreements in order to effectuate the transaction and that said transaction shall be valid, binding, effective, and legally enforceable.

VOTED: That the officers are, and each of them acting singly is, authorized, from time to time, in the name and on behalf of the Corporation to take or cause to be taken all such action(s) as s/he or they, as the case may be, deem necessary, appropriate or advisable to effect the foregoing votes, as may be shown by the officer or officers execution or performance which shall be conclusive evidence that the same is authorized by the directors of this Corporation.

VOTED: That the officers are, and each of them acting singly is, authorized, from time to time, in the name and on behalf of this Corporation, under its corporate seal, if desired, attested by an appropriate officer, if desired, to execute, make oath to, acknowledge, deliver and file any and all of the agreements, instruments, certificates and documents referred to or related to the foregoing votes.

VOTED: That the officers are, and each of them acting singly is, authorized, from time to time and on behalf of this Corporation, under its corporate seal, if desired, to execute, acknowledge and deliver any and all agreements, instruments, certificates and documents referred to or related to the foregoing votes, with such changes as the officer or officers so acting may deem necessary or desirable, and the signature of such officer or officers to be conclusive evidence that the same is authorized by the directors of this Corporation.

Clerk of Corporation Certificate

I, _____ the Clerk of the foregoing corporation, do hereby certify that the above vote was taken at a duly called meeting of the shareholders of the Corporation on _____, 20__.

Clerk of Corporation

SEAL

CONTRACT CHECKLIST

Initials

- 1. Certification of Signatures _____
 - For Corporation: need President’s signature or Clerk’s Certificate dated no more than 2 yeas ago With Corporate Seal affixed (see attached form)
 - For LLC: need Manager signature or signed vote of the LLC

- 2. Certificate of Non-collusion _____

- 3. Insurance Certificate _____
(showing Town as additional insured)
 - Matches amount of insurance required under contract

- 4. Certificate of Good Faith _____

- 5. Certificate of Tax Compliance _____

- 6. Signed by Contractor _____
 - Matches certification by Corp officer of authority.

- 7. Certificate of Good Standing for Corporation or Certificate of Legal Existence for LLC both from the Secretary of State _____

Contract Reviewed by: _____

Signature

Name, Title

TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
NOTICE TO PROCEED

Dated _____

TO: _____
(CONTRACTOR)

ADDRESS: _____

Contract: Fitzpatrick Road Culvert Replacement, Grafton, Massachusetts

(Insert name of Contract as it appears in the Contract Documents)

Engineer's Project No.: T1060.00

OWNER'S CONTRACT NO.: _____

You are notified that the Contract Times under the above contract will commence to run on _____. By that date, you are to start performing your obligations under the Contract Documents. In accordance with Article 4 of the Contract Agreement, the date of Substantial Completion is _____.

Also, before you may start any Work at the Site, you must (add other requirements):

(CONTRACTOR)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

(DATE)

(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

(DATE)

Copy to ENGINEER

END OF SECTION

TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
PERFORMANCE BOND

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address): Town of Grafton
 30 Providence Street
 Grafton, Massachusetts, 01519

CONTRACT

Date:

Amount:

Description (Name and Location): Fitzpatrick Road Culvert Replacement, Grafton, Massachusetts

BOND

Bond Number:

Date (Not earlier than Contract Date):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____(Seal)

Name and Title:

SURETY

_____(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____

Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____(Seal)

Name and Title:

SURETY

_____(Seal)

Surety's Name and Corporate Seal

By: _____

Signature and Title

(Attach Power of Attorney)

Attest: _____

Signature and Title:

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

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;
2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:

- 4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
- 4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
- 4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
- 4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and
- 6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.

12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

END OF SECTION

TOWN OF GRAFTON
FITZPATRICK ROAD CULVERT REPLACEMENT
PAYMENT BOND

CONTRACTOR (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address): Town of Grafton
 30 Providence Street
 Grafton, Massachusetts 01519

CONTRACT

Date:
Amount:
Description (Name and Location): Fitzpatrick Road Culvert Replacement, Grafton, Massachusetts

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____(Seal)
Name and Title:

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

(Space is provided below for signatures of additional parties, if required.)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL
Company:

Signature: _____(Seal)
Name and Title:

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title
(Attach Power of Attorney)

Attest: _____
Signature and Title:

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2. Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. When a Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at Surety's expense take the following actions:
 - 6.1. Send an answer to that Claimant, with a copy to Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
 - 6.2. Pay or arrange for payment of any undisputed amounts.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.
14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. DEFINITIONS

- 15.1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's Subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.
- 15.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

END OF SECTION

SECTION 00 72 00
GENERAL CONDITIONS

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. *Agency* – The Federal or state agency named as such in the Agreement.
 3. *Agreement* – The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 4. *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.
 5. *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.
 6. *Bid* – The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 7. *Bidder* – The individual or entity who submits a Bid directly to Owner.
 8. *Bidding Documents* – The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 9. *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.
 10. *Change Order* – A document recommended by Engineer which is signed by Contractor and Owner and Agency 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.
 11. *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.
 12. *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.

SECTION 00 72 00
GENERAL CONDITIONS

13. *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’s submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
14. *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).
15. *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.
16. *Contractor* – The individual or entity with whom Owner has entered into the Agreement.
17. *Cost of the Work* – See Paragraph 11.01.A for definition.
18. *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.
19. *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.
20. *Engineer* – The individual or entity named as such in the Agreement.
21. *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.
22. *General Requirements* – Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
23. *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 in connection with the Work.
24. *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.
25. *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.
26. *Liens* – Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

SECTION 00 72 00
GENERAL CONDITIONS

27. *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.
28. *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.
29. *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.
30. *Owner* – The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
31. *PCBs* – Polychlorinated biphenyls
32. *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.
33. *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.
34. *Project* – The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
35. *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.
36. *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.
37. *Related Entity* – An officer, director, partner, employee, agent, consultant, or subcontractor.
38. *Resident Project Representative* – The authorized representative of Engineer who may be assigned to the Site or any part thereof.
39. *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.
40. *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.

SECTION 00 72 00
GENERAL CONDITIONS

41. *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.
42. *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.
43. *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.
44. *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.
45. *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.
46. *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.
47. *Successful Bidder* – The Bidder submitting a responsive Bid to whom Owner makes an award.
48. *Supplementary Conditions* – That part of the Contract Documents which amends or supplements these General Conditions.
49. *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 any Subcontractor.
50. *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.
51. *Unit Price Work* – Work to be paid for on the basis of unit prices.
52. *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.

SECTION 00 72 00
GENERAL CONDITIONS

53. *Work Change Directive* – A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and Agency upon recommendation of the 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 following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following 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 requirements of and information in the Contract Documents and conformance with the design concept of the completed 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*

**SECTION 00 72 00
GENERAL CONDITIONS**

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 which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.
- G. Massachusetts General Law Chapter 30 § 39R shall be part of this specification by reference in its entirety.

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 five printed or hard copies of the Drawings and Specifications. 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.

SECTION 00 72 00
GENERAL CONDITIONS

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;
 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 equaling those of the submitted Bid. Lump sum items shall be subdivided into a list of items which when added together equal the Contract Price for the lump sum item 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

- 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.

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 therefore.
 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended 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 state department, 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, or Engineer, or any of their Related Entities, 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. The Contractor shall take no advantage of any apparent error or omission in the drawings or specifications. In the event the Contractor discovers such an error or omission, the Contractor shall immediately notify the Engineer. Contractor shall also promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the Contract. The Contractor shall obtain a written interpretation or clarification from Engineer before proceeding with any work affected thereby.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, 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.

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, code, or instruction (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 Engineer's consultants, including electronic media editions; or
 2. reuse any of 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 adaption by Engineer.

**SECTION 00 72 00
GENERAL CONDITIONS**

- B. The prohibition 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. Copies of data furnished by Owner or Engineer to Contractor or 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.
- D. Massachusetts General Law Chapter 30 § 39I Deviations shall be part of this specification by reference in its entirety.

**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 therefore 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

4.02 SUBSURFACE AND PHYSICAL CONDITIONS

- A. *Reports and Drawings:* 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 Contract Documents; and
 2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general 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 Related Entities 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 at or contiguous to the Site 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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, Owner and Engineer, and any of their Related Entities 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.
 - d. Massachusetts General Law Chapter 30 § 39N shall be part of this specification by reference and in its entirety.

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:

SECTION 00 72 00
GENERAL CONDITIONS

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; 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 survey 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

SECTION 00 72 00
GENERAL CONDITIONS

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:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general 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 Related Entities 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.
- 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 to Contractor written notice: (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.

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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, 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, 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 current 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

**SECTION 00 72 00
GENERAL CONDITIONS**

Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent must be accompanied by a certified copy of the agent's authority to act.

- 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 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. Failure of the Owner to demand such certificates or other evidence of full compliance with these insurance requirements or failure of the Owner to identify a deficiency from evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

5.04 CONTRACTOR'S LIABILITY INSURANCE

- A. Contractor shall purchase and maintain such liability and other 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:

SECTION 00 72 00
GENERAL CONDITIONS

- 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, 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, 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 Agreement, Supplementary Conditions, or required by Laws or Regulations, whichever is greater;
 3. include completed operations insurance;
 4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 5. 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);
 6. 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
 7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.
 - a. 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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, Contractor shall either self insure or purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (Contractor shall be responsible for any deductible or self-insured retention.) This insurance, either self provided or purchased, 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, partners, employees, agents, consultants and subcontractors of any of them, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss 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 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 additional insured to whom a certificate of insurance has been issued.
- B. Contractor shall purchase and maintain such boiler and machinery 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, 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 an insured or additional insured.

**SECTION 00 72 00
GENERAL CONDITIONS**

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with 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 additional insured 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.

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 to be listed as insureds or additional insureds (and the officers, directors, 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 additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, 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 to be listed as insured or additional insured (and the officers, directors, 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 Contractor as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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, 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 Contractor and made payable to Contractor as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Contractor 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.
- B. Contractor 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 Contractor's exercise of this power. If such objection be made, Contractor 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, Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Contractor 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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. The superintendent will be Contractor’s representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 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.

SECTION 00 72 00
GENERAL CONDITIONS

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 that 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 procedure requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented in 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) will 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 or not 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 or not 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;

SECTION 00 72 00
GENERAL CONDITIONS

- 4) and 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:*
1. During Bidding. 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.
 2. 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 either a Change Order for a substitute or 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 item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the 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.

SECTION 00 72 00
GENERAL CONDITIONS

- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.
- G. Massachusetts General Law Chapter 30 § 39M(b) shall be part of this specification by reference in its entirety.

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 anything in the Contract Documents 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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 an additional insured 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, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, 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.
- H. The Contractor shall not award work valued at more than fifty (50%) percent of the Contract Price to Subcontractor(s), without prior written approval of the Owner.

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, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 primary 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 therefore 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.
- B. Owner is exempt from payment of sales and compensating use taxes of the Commonwealth of Massachusetts and of cities and counties thereof on all materials to be incorporated into the Work.
 - 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 - 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work

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.

SECTION 00 72 00
GENERAL CONDITIONS

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, 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. 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

**SECTION 00 72 00
GENERAL CONDITIONS**

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. 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 , 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).
- D. 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

6.17 SHOP DRAWINGS AND SAMPLES

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the acceptable 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 determined and verified:
 - a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and
 - d. shall also have 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.
 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 Related Entities 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:

SECTION 00 72 00
GENERAL CONDITIONS

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, 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 respective consultants, agents, officers, directors, partners, or employees 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.

SECTION 00 72 00
GENERAL CONDITIONS

- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 via 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, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall 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 their work and will only cut or alter their 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's 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 in respect of providing lands and easements and providing engineering survey 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 in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 INSURANCE

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

**SECTION 00 72 00
GENERAL CONDITIONS**

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 in 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. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

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 and will not be changed without written consent of Owner and Engineer.

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

**SECTION 00 72 00
GENERAL CONDITIONS**

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.

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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 believe 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

**SECTION 00 72 00
GENERAL CONDITIONS**

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.

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, subject to written approval by Agency 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.B.

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

**SECTION 00 72 00
GENERAL CONDITIONS**

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 notice 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) is required by the provisions of any bond to be given to a surety, 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 Time 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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 include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.
 - 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 at the Site. 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.

SECTION 00 72 00
GENERAL CONDITIONS

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, 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, expressages, 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:

SECTION 00 72 00
GENERAL CONDITIONS

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 and 11.01.B.
- 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

SECTION 00 72 00
GENERAL CONDITIONS

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 Bid price of a particular item of Unit Price Work amounts to more than 5 percent of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by Contractor differs by more than 25 percent 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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 Paragraph 12.01.C.2.a 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

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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.B.
 - 1. delays caused by or within the control of Contractor; or
- D. Owner, Engineer and the Related Entities of each of them 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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. All 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, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site 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 said 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, it must, if requested by Engineer, be uncovered for observation.

SECTION 00 72 00
GENERAL CONDITIONS

- 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 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).

SECTION 00 72 00
GENERAL CONDITIONS

- 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.

SECTION 00 72 00
GENERAL CONDITIONS

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 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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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. No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage, or invest the retainage for the benefit of the Contractor.

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 on the Site 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;

SECTION 00 72 00
GENERAL CONDITIONS

- 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to 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. that 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;

**SECTION 00 72 00
GENERAL CONDITIONS**

- 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. The Application for Payment with Engineer's recommendations will be presented to the Owner for consideration. If the Owner finds the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 14.02.D will become due ten days after the Application for Payment is presented to the Owner, and the Owner will make payment to the 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. the Contractor's performance or furnishing of the Work is inconsistent with funding Agency requirements;
 - d. there are other items entitling Owner to a set-off against the amount recommended; or
 - e. 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 corrects to Owner's satisfaction the reasons for such action.
- 3. If it is subsequently determined 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.

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.

**SECTION 00 72 00
GENERAL CONDITIONS**

14.04 SUBSTANTIAL COMPLETIONS

- 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, Agency, Contractor, and Engineer shall make a prefinal 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 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 will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

SECTION 00 72 00
GENERAL CONDITIONS

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, Agency, 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.7;
 - 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)

**SECTION 00 72 00
GENERAL CONDITIONS**

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 or Owner's property might in any way be responsible 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. The remaining balance of any sum included in the final Application for Payment but held by OWNER for Work not fully completed and accepted will become due when the Work is fully completed and accepted.

14.09 WAIVER OF CLAIMS

- A. The making and acceptance of final payment will constitute:

**SECTION 00 72 00
GENERAL CONDITIONS**

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 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

**SECTION 00 72 00
GENERAL CONDITIONS**

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.

**SECTION 00 72 00
GENERAL CONDITIONS**

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. Owner and Contractor may mutually 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. 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 their intent to submit the Claim to a court of competent jurisdiction.

**SECTION 00 72 00
GENERAL CONDITIONS**

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.

**SECTION 00 72 00
GENERAL CONDITIONS**

ARTICLE 18 – FEDERAL REQUIREMENTS

18.01 CONFLICT OF INTEREST

- A. Contractor may not knowingly contract with a supplier or manufacturer if the individual or entity who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer.
- B. Owner's officers, employees, or agents shall not engage in the award or administration of this Contract if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (i) the employee, officer or agent; (ii) any member of their immediate family; (iii) their partner or (iv) an organization that employs, or is about to employ, any of the above, has a financial interest in Contractor. Owner's officers, employees, or agents shall neither solicit nor accept gratuities, favors or anything of monetary value from Contractor or subcontractors.

18.02 GRATUITIES

- A. If Owner finds after a notice and hearing that Contractor, or any of Contractor's agents or representatives, offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of Owner in an attempt to secure this Contract or favorable treatment in awarding, amending, or making any determinations related to the performance of this Contract, Owner may, by written notice to Contractor, terminate this Contract. Owner may also pursue other rights and remedies that the law or this Contract provides. However, the existence of the facts on which Owner bases such findings shall be an issue and may be reviewed in proceedings under the dispute resolution provisions of this Contract.
- B. In the event this Contract is terminated as provided in paragraph 18.02.A, Owner may pursue the same remedies against Contractor as it could pursue in the event of a breach of this Contract by Contractor. As a penalty, in addition to any other damages to which it may be entitled by law, Owner may pursue exemplary damages in an amount (as determined by Owner) which shall not be less than three nor more than ten times the costs Contractor incurs in providing any such gratuities to any such officer or employee.

18.03 AUDIT AND ACCESS TO RECORDS

- A. For all negotiated contracts and negotiated modifications (except those of \$10,000 or less), Owner, the Comptroller General, or any of their duly authorized representatives, shall have access to any books, documents, papers, and records of the Contractor, which are pertinent to the Contract, for the purpose of making audits, examinations, excerpts and transcriptions. Contractor shall maintain all required records for three years after final payment is made and all other pending matters are closed.

18.04 SMALL, MINORITY AND WOMEN'S BUSINESSES

- A. If Contractor intends to let any subcontracts for a portion of the work, Contractor shall take affirmative steps to assure that small, minority and women's businesses are used when possible as sources of supplies, equipment, construction, and services. Affirmative steps shall consist of: (1) including qualified small, minority and women's businesses on solicitation lists; (2) assuring that small, minority and women's businesses are solicited whenever they are potential sources; (3) dividing total

**SECTION 00 72 00
GENERAL CONDITIONS**

requirements when economically feasible, into small tasks or quantities to permit maximum participation of small, minority, and women's businesses; (4) establishing delivery schedules, where the requirements of the work permit, which will encourage participation by small, minority and women's businesses; (5) using the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce; (6) requiring each party to a subcontract to take the affirmative steps of this section; and (7) Contractor is encouraged to procure goods and services from labor surplus area firms.

18.05 ANTI-KICKBACK

- A. Contractor shall comply with the Copeland Anti-Kickback Act (18 USC 874 and 40 USC 276c) as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Buildings or Public Works Financed in Whole or in Part by Loans or Grants of the United States"). The Act provides that Contractor or subcontractor shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public facilities, to give up any part of the compensation to which they are otherwise entitled. Owner shall report all suspected or reported violations to the Commonwealth of Massachusetts, Department of Labor.

18.06 CLEAN AIR AND POLLUTION CONTROL ACTS

- A. If this Contract exceeds \$100,000, Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 USC 7401 *et seq.*) and the Federal Water Pollution Control Act as amended (33 USC 1251 *et seq.*). Contractor will report violations to the Agency and the Regional Office of the EPA.

18.07 STATE ENERGY POLICY

- A. Contractor shall comply with the Energy Policy and Conservation Act (P.L. 94-163). Mandatory standards and policies relating to energy efficiency, contained in any applicable State Energy Conservation Plan, shall be utilized.

18.08 EQUAL OPPORTUNITY REQUIREMENTS

- A. If this Contract exceeds \$10,000, Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- B. Contractor's compliance with Executive Order 11246 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4 and its efforts to meet the goals established for the geographical area where the Contract is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the Contract, and in each trade, the Contractor shall make a good faith effort to employ women and minorities evenly on each of its projects. The transfer of minority or female employees from Contractor to Contractor or from project to project for the sole purpose of meeting Contractor's goals

SECTION 00 72 00
GENERAL CONDITIONS

shall be a violation of the Contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

- C. Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the Contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number; estimated dollar amount of subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the Contract is to be performed.

18.09 ENVIRONMENTAL REQUIREMENTS

- A. When constructing a project involving trenching and/or other related earth excavations, Contractor shall comply with the following environmental constraints:
1. Wetlands – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert wetlands.
 2. Floodplains – When disposing of excess, spoil, or other construction materials on public or private property, Contractor shall not fill in or otherwise convert 100 year floodplain areas delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, i.e., alluvial soils on NRCS Soil Survey Maps.
 3. Historic Preservation – Any excavation by Contractor that uncovers an historical or archaeological artifact shall be immediately reported to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO).
 4. Endangered Species – Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service.

END OF SECTION

**SECTION 00 73 00
SUPPLEMENTARY GENERAL CONDITIONS OF CONTRACT**

§ SC 1.1 INTRODUCTION

The following provisions modify, change, delete from or add to Section 005213 Contract Agreement. Where any Subsection of the Agreement is modified or any Article Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplemental Conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

§ SC 2.1 PREVAILING WAGE

In accordance with General Laws Chapter 149, Section 26 through 27D, the Contractor is obligated to comply with the prevailing wage rates established by the Commissioner of the Department of Labor and Workforce Development for mechanics, apprentices, chauffeurs, teamsters and laborers employed on the Project. The schedule of applicable prevailing wage rates for the Project, together with a Certificate of Compliance therewith, are set forth in Attachments herein.

§ SC 3.1 CONTRACTOR'S LIABILITY INSURANCE

In no case shall the limits of liability be less than the following:

1. Contractor's Liability Insurance
 - a. Workers' Compensation:
 1. State: Statutory
 2. Employer Liability:

\$1,000,000	Bodily Injury by Accident
\$1,000,000	Bodily Injury by Disease - policy limit
 3.

\$1,000,000	Bodily Injury by Disease - each
\$2,000,000	Umbrella Liability - all limits
 - b. Comprehensive General Liability (including Premises-Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage):
 1. Bodily Injury:

\$1,000,000	Each Occurrence
\$3,000,000	Aggregate
 2. Products and Completed Operations

\$1,000,000	Each Occurrence (bodily injury and property damage)
\$3,000,000	Aggregate
 3. Property Damage Liability (including coverage for XCU hazards).

\$1,000,000	Each Occurrence
\$3,000,000	Aggregate
 4. Products and Completed Operations insurance shall be maintained for a minimum period of 2 years after final payment and Contractor shall continue to provide evidence of such coverage to Owner on an annual basis during the aforementioned.

- 5. Contractual Liability (Hold Harmless Coverage):
 - \$1,000,000 Bodily Injury Each Occurrence
 - \$1,000,000 Property Damage Each Occurrence
 - \$2,000,000 Property Damage Aggregate

- 6. Personal Injury, with Employment Exclusion deleted:
 - \$1,000,000 All Limits

- c. Comprehensive Automobile Liability (owned, non-owned, hired):
 - 1. Bodily Injury
 - \$1,000,000 Each Person
 - \$1,000,000 Each Accident

 - 2. Property Damage
 - \$1,000,000 Each Accident

- d. Property Insurance / Builders Risk: the full Contact sum

- e. Umbrella Liability Coverage
 - \$2,000,000 All Limits

In the event that any of the insurance requirements listed above conflict with the provided on the Contract Agreement, those specified in the Contract Agreement shall supersede those specified above.

**SECTION 00 73 43
PREVAILING WAGES AND LABOR REGULATIONS**

1. Prevailing Wage Rates

- a. The rate per hour to be paid to mechanics, apprentices, teamsters, chauffeurs, and laborers employed on the Work shall not be less than the rate of wages in the attached "Minimum Wage Rates" as determined by the Commissioner of the Massachusetts Department of Labor Division of Occupational Safety. This schedule shall continue to be the minimum rate of wages for said employees during the life of this Contract. Any questions relative to the applicability of any wage rate shall be directed to the Division of Occupational Safety.
- b. Keep a legible copy of said schedule posted on the site at all times. Provide the Owner, on a weekly basis, and keep an on-site file of the wage rates and classifications of labor employed on this Work in order that they may be available for inspection by the Owner, Department, Architect, or any agency having jurisdiction.
- c. Pay reserve police officers employed on the Work the prevailing rate of wages paid to regular police officers as required by MGL c149 § 34B, as amended. Such police officers shall be covered by Worker's Compensation Insurance and Employers Liability Insurance provided by the Contractor.

2. Wage Rate Reporting

- a. The Contractor and all subcontractors shall provide certified payroll affidavits verifying compliance with MGL c149 §§ 26-27H.
- b. The Contractor and all subcontractors shall provide a Statement of Compliance within 15 days of the completion of its portion of the work. This statement shall be submitted to the Owner on the form found elsewhere in this section.
- c. Weekly Payroll Form at <https://www.mass.gov/doc/weekly-certified-payroll-report/download>
- d. Statement of Compliance at <https://www.mass.gov/doc/weekly-statement-of-compliance/download>

3. Apprentice Requirements

Apprentices employed pursuant to this determination of wage rates must be registered and approved by the State Apprenticeship Council wherever rates for journeymen or apprentices are not listed.

4. Employee OSHA Safety Training

- a. All employees who work on this construction site must have no less than 10 hours of OSHA-approved safety and health training. See chapter 306 of the Acts of 2004.
- b. The Contractor and all Subcontractors shall furnish to the Owner, with the certified payroll reports, documentation indicating that each employee has successfully completed 10 hours of a course in construction safety and health. This course must be approved by the United States Occupational Health and Safety Administration (OSHA).



MAURA HEALEY
Governor

KIM DRISCOLL
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

LAUREN JONES
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: Town of Grafton
Contract Number: **City/Town:** GRAFTON
Description of Work: The construction project includes the replacement of a 37-foot-long culvert carrying Cronin Brook under Fitzpatrick Road and associated roadway and guardrail improvements.
Job Location: Fitzpatrick Road

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, the awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.
- This annual update requirement is generally not applicable to 27F "rental of equipment" contracts. For such contracts, the prevailing wage rates issued by DLS shall remain in effect for the duration of the contract term. However, if the prevailing wage rate sheet issued does not contain wage rates for each year covered by the contract term, the Awarding Authority must request updated rate sheets from DLS and provide them to the contractor to ensure the correct rates are being paid throughout the duration of the contract. Additionally, if an Awarding Authority exercises an option to renew or extend the contract term, they must request updated rate sheets from DLS and provide them to the contractor.
- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. For a sample payroll reporting form go to <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Contractors must obtain the wage schedules from awarding authorities. Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$39.95	\$15.07	\$18.67	\$0.00	\$73.69
	12/01/2024	\$39.95	\$15.07	\$20.17	\$0.00	\$75.19
	01/01/2025	\$39.95	\$15.57	\$20.17	\$0.00	\$75.69
	06/01/2025	\$40.95	\$15.57	\$20.17	\$0.00	\$76.69
	12/01/2025	\$40.95	\$15.57	\$21.78	\$0.00	\$78.30
	01/01/2026	\$40.95	\$16.17	\$21.78	\$0.00	\$78.90
	06/01/2026	\$41.95	\$16.17	\$21.78	\$0.00	\$79.90
	12/01/2026	\$41.95	\$16.17	\$23.52	\$0.00	\$81.64
	01/01/2027	\$41.95	\$16.77	\$23.52	\$0.00	\$82.24
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.02	\$15.07	\$18.67	\$0.00	\$73.76
	12/01/2024	\$40.02	\$15.07	\$20.17	\$0.00	\$75.26
	01/01/2025	\$40.02	\$15.57	\$20.17	\$0.00	\$75.76
	06/01/2025	\$41.02	\$15.57	\$20.17	\$0.00	\$76.76
	12/01/2025	\$41.02	\$15.57	\$21.78	\$0.00	\$78.37
	01/01/2026	\$41.02	\$16.17	\$21.78	\$0.00	\$78.97
	06/01/2026	\$42.02	\$16.17	\$21.78	\$0.00	\$79.97
	12/01/2026	\$42.02	\$16.17	\$23.52	\$0.00	\$81.71
	01/01/2027	\$42.02	\$16.77	\$23.52	\$0.00	\$82.31
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.14	\$15.07	\$18.67	\$0.00	\$73.88
	12/01/2024	\$40.14	\$15.07	\$20.17	\$0.00	\$75.38
	01/01/2025	\$40.14	\$15.57	\$20.17	\$0.00	\$75.88
	06/01/2025	\$41.14	\$15.57	\$20.17	\$0.00	\$76.88
	12/01/2025	\$41.14	\$15.57	\$21.78	\$0.00	\$78.49
	01/01/2026	\$41.14	\$16.17	\$21.78	\$0.00	\$79.09
	06/01/2026	\$42.14	\$16.17	\$21.78	\$0.00	\$80.09
	12/01/2026	\$42.14	\$16.17	\$23.52	\$0.00	\$81.83
	01/01/2027	\$42.14	\$16.77	\$23.52	\$0.00	\$82.43
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	06/01/2024	\$41.80	\$14.50	\$11.05	\$0.00	\$67.35
	12/01/2024	\$42.80	\$14.50	\$11.05	\$0.00	\$68.35
	06/01/2025	\$43.80	\$14.50	\$11.05	\$0.00	\$69.35
	12/01/2025	\$44.80	\$14.50	\$11.05	\$0.00	\$70.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2024	\$48.12	\$7.07	\$20.60	\$0.00	\$75.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
2	65	\$31.28	\$7.07	\$13.22	\$0.00	\$51.57
3	70	\$33.68	\$7.07	\$14.23	\$0.00	\$54.98
4	75	\$36.09	\$7.07	\$15.24	\$0.00	\$58.40
5	80	\$38.50	\$7.07	\$16.25	\$0.00	\$61.82
6	85	\$40.90	\$7.07	\$17.28	\$0.00	\$65.25
7	90	\$43.31	\$7.07	\$18.28	\$0.00	\$68.66
8	95	\$45.71	\$7.07	\$19.32	\$0.00	\$72.10

Notes:

Apprentice to Journeyworker Ratio:1:4

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	08/01/2024	\$62.36	\$11.49	\$22.90	\$0.00	\$96.75
BRICKLAYERS LOCAL 3 (WORCESTER)	02/01/2025	\$63.66	\$11.49	\$22.90	\$0.00	\$98.05
	08/01/2025	\$65.81	\$11.49	\$22.90	\$0.00	\$100.20
	02/01/2026	\$67.16	\$11.49	\$22.90	\$0.00	\$101.55
	08/01/2026	\$69.36	\$11.49	\$22.90	\$0.00	\$103.75
	02/01/2027	\$70.76	\$11.49	\$22.90	\$0.00	\$105.15

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Worcester

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.18	\$11.49	\$22.90	\$0.00	\$65.57
2	60	\$37.42	\$11.49	\$22.90	\$0.00	\$71.81
3	70	\$43.65	\$11.49	\$22.90	\$0.00	\$78.04
4	80	\$49.89	\$11.49	\$22.90	\$0.00	\$84.28
5	90	\$56.12	\$11.49	\$22.90	\$0.00	\$90.51

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.83	\$11.49	\$22.90	\$0.00	\$66.22
2	60	\$38.20	\$11.49	\$22.90	\$0.00	\$72.59
3	70	\$44.56	\$11.49	\$22.90	\$0.00	\$78.95
4	80	\$50.93	\$11.49	\$22.90	\$0.00	\$85.32
5	90	\$57.29	\$11.49	\$22.90	\$0.00	\$91.68

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
BULLDOZER/GRADER/SCRAPER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$46.63	\$9.65	\$18.22	\$0.00	\$74.50
	12/01/2024	\$48.10	\$9.65	\$18.22	\$0.00	\$75.97
	06/01/2025	\$49.60	\$9.65	\$18.22	\$0.00	\$77.47
	12/01/2025	\$51.10	\$9.65	\$18.22	\$0.00	\$78.97
	06/01/2026	\$52.65	\$9.65	\$18.22	\$0.00	\$80.52
	12/01/2026	\$54.15	\$9.65	\$18.22	\$0.00	\$82.02
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.48	\$9.65	\$18.22	\$0.00	\$73.35
	12/01/2024	\$46.95	\$9.65	\$18.22	\$0.00	\$74.82
	06/01/2025	\$48.45	\$9.65	\$18.22	\$0.00	\$76.32
	12/01/2025	\$49.95	\$9.65	\$18.22	\$0.00	\$77.82
	06/01/2026	\$51.50	\$9.65	\$18.22	\$0.00	\$79.37
	12/01/2026	\$53.00	\$9.65	\$18.22	\$0.00	\$80.87
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.81	\$9.65	\$18.22	\$0.00	\$73.68
	12/01/2024	\$47.28	\$9.65	\$18.22	\$0.00	\$75.15
	06/01/2025	\$48.78	\$9.65	\$18.22	\$0.00	\$76.65
	12/01/2025	\$50.28	\$9.65	\$18.22	\$0.00	\$78.15
	06/01/2026	\$51.83	\$9.65	\$18.22	\$0.00	\$79.70
	12/01/2026	\$53.33	\$9.65	\$18.22	\$0.00	\$81.20
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71	
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	09/01/2024	\$48.37	\$9.83	\$19.97	\$0.00	\$78.17
	03/01/2025	\$49.62	\$9.83	\$19.97	\$0.00	\$79.42
	09/01/2025	\$50.87	\$9.83	\$19.97	\$0.00	\$80.67
	03/01/2026	\$52.12	\$9.83	\$19.97	\$0.00	\$81.92
	09/01/2026	\$53.37	\$9.83	\$19.97	\$0.00	\$83.17
	03/01/2027	\$54.62	\$9.83	\$19.97	\$0.00	\$84.42

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
2	45	\$21.77	\$9.83	\$1.73	\$0.00	\$33.33
3	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
4	55	\$26.60	\$9.83	\$3.40	\$0.00	\$39.83
5	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
6	70	\$33.86	\$9.83	\$16.51	\$0.00	\$60.20
7	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77
8	80	\$38.70	\$9.83	\$18.24	\$0.00	\$66.77

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$22.33	\$9.83	\$1.73	\$0.00	\$33.89
2	45	\$22.33	\$9.83	\$1.73	\$0.00	\$33.89
3	55	\$27.29	\$9.83	\$3.40	\$0.00	\$40.52
4	55	\$27.29	\$9.83	\$3.40	\$0.00	\$40.52
5	70	\$34.73	\$9.83	\$16.51	\$0.00	\$61.07
6	70	\$34.73	\$9.83	\$16.51	\$0.00	\$61.07
7	80	\$39.70	\$9.83	\$18.24	\$0.00	\$67.77
8	80	\$39.70	\$9.83	\$18.24	\$0.00	\$67.77

Notes:

Apprentice to Journeyworker Ratio:1:5

CARPENTER WOOD FRAME	10/01/2024	\$26.65	\$7.02	\$4.80	\$0.00	\$38.47
CARPENTERS-ZONE 3 (Wood Frame)	10/01/2025	\$27.75	\$7.02	\$4.80	\$0.00	\$39.57
	10/01/2026	\$28.85	\$7.02	\$4.80	\$0.00	\$40.67

All Aspects of New Wood Frame Work

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Wood Frame) - Zone 3

Effective Date - 10/01/2024

Table with 7 columns: Step, percent, Apprentice Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows 1-8 showing wage progression from \$15.99 to \$23.99.

Effective Date - 10/01/2025

Table with 7 columns: Step, percent, Apprentice Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows 1-8 showing wage progression from \$16.65 to \$24.98.

Notes:

Apprentice to Journeyworker Ratio:1:5

Summary row for CEMENT MASONRY/PLASTERING BRICKLAYERS LOCAL 3 (WORCESTER) with Effective Date 01/01/2024, Base Wage \$49.33, Health \$13.00, Pension \$23.57, Supplemental Unemployment \$1.30, Total Rate \$87.20.

Apprentice - CEMENT MASONRY/PLASTERING - Worcester

Effective Date - 01/01/2024

Table with 7 columns: Step, percent, Apprentice Base Wage, Health, Pension, Supplemental Unemployment, Total Rate. Rows 1-7 showing wage progression from \$24.67 to \$44.40.

Notes: Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CHAIN SAW OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$57.15	\$15.30	\$16.40	\$0.00	\$88.85
	12/01/2024	\$58.63	\$15.30	\$16.40	\$0.00	\$90.33
	06/01/2025	\$59.96	\$15.30	\$16.40	\$0.00	\$91.66
	12/01/2025	\$61.43	\$15.30	\$16.40	\$0.00	\$93.13
	06/01/2026	\$62.76	\$15.30	\$16.40	\$0.00	\$94.46
	12/01/2026	\$64.24	\$15.30	\$16.40	\$0.00	\$95.94
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DELEADER (BRIDGE) <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.23	\$9.95	\$0.00	\$0.00	\$39.18
2	55	\$32.15	\$9.95	\$6.66	\$0.00	\$48.76
3	60	\$35.08	\$9.95	\$7.26	\$0.00	\$52.29
4	65	\$38.00	\$9.95	\$7.87	\$0.00	\$55.82
5	70	\$40.92	\$9.95	\$20.32	\$0.00	\$71.19
6	75	\$43.85	\$9.95	\$20.93	\$0.00	\$74.73
7	80	\$46.77	\$9.95	\$21.53	\$0.00	\$78.25
8	90	\$52.61	\$9.95	\$22.74	\$0.00	\$85.30

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN	06/10/2024	\$45.53	\$9.65	\$18.40	\$0.00	\$73.58
LABORERS - ZONE 2	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: BACKHOE/LOADER/HAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/10/2024	\$46.53	\$9.65	\$18.40	\$0.00	\$74.58
	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS <i>LABORERS - ZONE 2</i>	06/10/2024	\$46.28	\$9.65	\$18.40	\$0.00	\$74.33
	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	06/10/2024	\$46.53	\$9.65	\$18.40	\$0.00	\$74.58
	12/02/2024	\$48.00	\$9.65	\$18.40	\$0.00	\$76.05
	06/02/2025	\$49.50	\$9.65	\$18.40	\$0.00	\$77.55
	12/01/2025	\$51.00	\$9.65	\$18.40	\$0.00	\$79.05
	06/01/2026	\$52.55	\$9.65	\$18.40	\$0.00	\$80.60
	12/07/2026	\$54.05	\$9.65	\$18.40	\$0.00	\$82.10
	06/07/2027	\$55.65	\$9.65	\$18.40	\$0.00	\$83.70
	12/06/2027	\$57.25	\$9.65	\$18.40	\$0.00	\$85.30
	06/05/2028	\$58.93	\$9.65	\$18.40	\$0.00	\$86.98
	12/04/2028	\$60.60	\$9.65	\$18.40	\$0.00	\$88.65
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 2</i>	06/10/2024	\$46.28	\$9.65	\$18.40	\$0.00	\$74.33
	12/02/2024	\$47.75	\$9.65	\$18.40	\$0.00	\$75.80
	06/02/2025	\$49.25	\$9.65	\$18.40	\$0.00	\$77.30
	12/01/2025	\$50.75	\$9.65	\$18.40	\$0.00	\$78.80
	06/01/2026	\$52.30	\$9.65	\$18.40	\$0.00	\$80.35
	12/07/2026	\$53.80	\$9.65	\$18.40	\$0.00	\$81.85
	06/07/2027	\$55.40	\$9.65	\$18.40	\$0.00	\$83.45
	12/06/2027	\$57.00	\$9.65	\$18.40	\$0.00	\$85.05
	06/05/2028	\$58.68	\$9.65	\$18.40	\$0.00	\$86.73
	12/04/2028	\$60.35	\$9.65	\$18.40	\$0.00	\$88.40
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: WRECKING LABORER <i>LABORERS - ZONE 2</i>	06/10/2024	\$45.53	\$9.65	\$18.40	\$0.00	\$73.58
	12/02/2024	\$47.00	\$9.65	\$18.40	\$0.00	\$75.05
	06/02/2025	\$48.50	\$9.65	\$18.40	\$0.00	\$76.55
	12/01/2025	\$50.00	\$9.65	\$18.40	\$0.00	\$78.05
	06/01/2026	\$51.55	\$9.65	\$18.40	\$0.00	\$79.60
	12/07/2026	\$53.05	\$9.65	\$18.40	\$0.00	\$81.10
	06/07/2027	\$54.65	\$9.65	\$18.40	\$0.00	\$82.70
	12/06/2027	\$56.25	\$9.65	\$18.40	\$0.00	\$84.30
	06/05/2028	\$57.93	\$9.65	\$18.40	\$0.00	\$85.98
	12/04/2028	\$59.60	\$9.65	\$18.40	\$0.00	\$87.65
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
	For apprentice rates see "Apprentice- OPERATING ENGINEERS"					
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$68.70	\$9.40	\$23.12	\$0.00	\$101.22
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$49.07	\$9.40	\$23.12	\$0.00	\$81.59
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$73.60	\$9.40	\$23.12	\$0.00	\$106.12
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$103.05	\$9.40	\$23.12	\$0.00	\$135.57
For apprentice rates see "Apprentice- PILE DRIVER"						
DRAWBRIDGE OPERATOR (Construction) <i>DRAWBRIDGE - SEIU LOCAL 888</i>	07/01/2020	\$26.77	\$6.67	\$3.93	\$0.16	\$37.53
ELECTRICIAN <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELECTRICIAN - Local 96

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.82	\$13.99	\$0.56	\$0.00	\$33.37
2	45	\$21.17	\$13.99	\$0.64	\$0.00	\$35.80
3	48	\$22.58	\$13.99	\$15.79	\$0.00	\$52.36
4	55	\$25.88	\$13.99	\$16.26	\$0.00	\$56.13
5	65	\$30.58	\$13.99	\$16.91	\$0.00	\$61.48
6	80	\$37.64	\$13.99	\$17.90	\$0.00	\$69.53

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.26	\$14.98	\$0.58	\$0.00	\$34.82
2	45	\$21.67	\$14.98	\$0.65	\$0.00	\$37.30
3	48	\$23.12	\$14.98	\$16.09	\$0.00	\$54.19
4	55	\$26.49	\$14.98	\$16.57	\$0.00	\$58.04
5	65	\$31.30	\$14.98	\$17.25	\$0.00	\$63.53
6	80	\$38.53	\$14.98	\$18.26	\$0.00	\$71.77

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2024	\$61.98	\$16.18	\$20.96	\$0.00	\$99.12
ELEVATOR CONSTRUCTORS LOCAL 41	01/01/2025	\$62.83	\$16.28	\$21.36	\$0.00	\$100.47
	01/01/2026	\$63.68	\$16.38	\$21.76	\$0.00	\$101.82
	01/01/2027	\$64.53	\$16.48	\$22.16	\$0.00	\$103.17

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ELEVATOR CONSTRUCTOR - Local 41

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$30.99	\$16.18	\$0.00	\$0.00	\$47.17
2	55	\$34.09	\$16.18	\$20.96	\$0.00	\$71.23
3	65	\$40.29	\$16.18	\$20.96	\$0.00	\$77.43
4	70	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
5	80	\$49.58	\$16.18	\$20.96	\$0.00	\$86.72

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.42	\$16.28	\$0.00	\$0.00	\$47.70
2	55	\$34.56	\$16.28	\$21.36	\$0.00	\$72.20
3	65	\$40.84	\$16.28	\$21.36	\$0.00	\$78.48
4	70	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
5	80	\$50.26	\$16.28	\$21.36	\$0.00	\$87.90

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER	01/01/2024	\$43.39	\$16.18	\$20.96	\$0.00	\$80.53
<i>ELEVATOR CONSTRUCTORS LOCAL 41</i>	01/01/2025	\$43.98	\$16.28	\$21.36	\$0.00	\$81.62
	01/01/2026	\$44.58	\$16.38	\$21.76	\$0.00	\$82.72
	01/01/2027	\$45.17	\$16.48	\$22.16	\$0.00	\$83.81

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
<i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY	11/01/2024	\$52.08	\$15.00	\$16.40	\$0.00	\$83.48
<i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2025	\$53.52	\$15.00	\$16.40	\$0.00	\$84.92
	11/01/2025	\$54.81	\$15.00	\$16.40	\$0.00	\$86.21
	05/01/2026	\$56.25	\$15.00	\$16.40	\$0.00	\$87.65
	11/01/2026	\$57.54	\$15.00	\$16.40	\$0.00	\$88.94
	05/01/2027	\$58.97	\$15.00	\$16.40	\$0.00	\$90.37

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2024	\$53.67	\$15.00	\$16.40	\$0.00	\$85.07
	05/01/2025	\$55.12	\$15.00	\$16.40	\$0.00	\$86.52
	11/01/2025	\$56.42	\$15.00	\$16.40	\$0.00	\$87.82
	05/01/2026	\$57.87	\$15.00	\$16.40	\$0.00	\$89.27
	11/01/2026	\$59.17	\$15.00	\$16.40	\$0.00	\$90.57
	05/01/2027	\$60.62	\$15.00	\$16.40	\$0.00	\$92.02
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	11/01/2024	\$25.67	\$15.00	\$16.40	\$0.00	\$57.07
	05/01/2025	\$26.52	\$15.00	\$16.40	\$0.00	\$57.92
	11/01/2025	\$27.28	\$15.00	\$16.40	\$0.00	\$58.68
	05/01/2026	\$28.13	\$15.00	\$16.40	\$0.00	\$59.53
	11/01/2026	\$28.89	\$15.00	\$16.40	\$0.00	\$60.29
	05/01/2027	\$29.74	\$15.00	\$16.40	\$0.00	\$61.14
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$45.23	\$15.30	\$16.40	\$0.00	\$76.93
	12/01/2024	\$46.41	\$15.30	\$16.40	\$0.00	\$78.11
	06/01/2025	\$47.47	\$15.30	\$16.40	\$0.00	\$79.17
	12/01/2025	\$48.64	\$15.30	\$16.40	\$0.00	\$80.34
	06/01/2026	\$49.70	\$15.30	\$16.40	\$0.00	\$81.40
	12/01/2026	\$50.88	\$15.30	\$16.40	\$0.00	\$82.58
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$27.01	\$9.65	\$17.80	\$0.00	\$54.46
	12/01/2024	\$27.01	\$9.65	\$17.80	\$0.00	\$54.46
	06/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	12/01/2025	\$28.09	\$9.65	\$17.80	\$0.00	\$55.54
	06/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
	12/01/2026	\$29.21	\$9.65	\$17.80	\$0.00	\$56.66
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE II</i>	03/01/2024	\$49.47	\$8.83	\$20.27	\$0.00	\$78.57

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - FLOORCOVERER - Local 2168 Zone II

Effective Date - 03/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.74	\$8.83	\$1.76	\$0.00	\$35.33
2	55	\$27.21	\$8.83	\$1.76	\$0.00	\$37.80
3	60	\$29.68	\$8.83	\$3.52	\$0.00	\$42.03
4	65	\$32.16	\$8.83	\$3.52	\$0.00	\$44.51
5	70	\$34.63	\$8.83	\$16.75	\$0.00	\$60.21
6	75	\$37.10	\$8.83	\$16.75	\$0.00	\$62.68
7	80	\$39.58	\$8.83	\$18.51	\$0.00	\$66.92
8	85	\$42.05	\$8.83	\$18.51	\$0.00	\$69.39

Notes: Steps are 750 hrs.
 % After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
 Step 1&2 \$32.63/ 3&4 \$39.28/ 5&6 \$59.86/ 7&8 \$66.52

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Apprentice - GLAZIER - Local 35 Zone 2

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$9.95	\$0.00	\$0.00	\$33.33
2	55	\$25.72	\$9.95	\$6.66	\$0.00	\$42.33
3	60	\$28.06	\$9.95	\$7.26	\$0.00	\$45.27
4	65	\$30.39	\$9.95	\$7.87	\$0.00	\$48.21
5	70	\$32.73	\$9.95	\$20.32	\$0.00	\$63.00
6	75	\$35.07	\$9.95	\$20.93	\$0.00	\$65.95
7	80	\$37.41	\$9.95	\$21.53	\$0.00	\$68.89
8	90	\$42.08	\$9.95	\$22.74	\$0.00	\$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.98	\$9.95	\$0.00	\$0.00	\$33.93
2	55	\$26.38	\$9.95	\$6.66	\$0.00	\$42.99
3	60	\$28.78	\$9.95	\$7.26	\$0.00	\$45.99
4	65	\$31.17	\$9.95	\$7.87	\$0.00	\$48.99
5	70	\$33.57	\$9.95	\$20.32	\$0.00	\$63.84
6	75	\$35.97	\$9.95	\$20.93	\$0.00	\$66.85
7	80	\$38.37	\$9.95	\$21.53	\$0.00	\$69.85
8	90	\$43.16	\$9.95	\$22.74	\$0.00	\$75.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

HOISTING ENGINEER/CRANES/GRADALLS	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
OPERATING ENGINEERS LOCAL 4	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - OPERATING ENGINEERS - Local 4

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$30.82	\$15.30	\$0.00	\$0.00	\$46.12
2	60	\$33.62	\$15.30	\$16.40	\$0.00	\$65.32
3	65	\$36.42	\$15.30	\$16.40	\$0.00	\$68.12
4	70	\$39.22	\$15.30	\$16.40	\$0.00	\$70.92
5	75	\$42.02	\$15.30	\$16.40	\$0.00	\$73.72
6	80	\$44.82	\$15.30	\$16.40	\$0.00	\$76.52
7	85	\$47.63	\$15.30	\$16.40	\$0.00	\$79.33
8	90	\$50.43	\$15.30	\$16.40	\$0.00	\$82.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$31.61	\$0.00	\$0.00	\$0.00	\$31.61
2	60	\$34.49	\$15.30	\$16.40	\$0.00	\$66.19
3	65	\$37.36	\$15.30	\$16.40	\$0.00	\$69.06
4	70	\$40.24	\$15.30	\$16.40	\$0.00	\$71.94
5	75	\$43.11	\$15.30	\$16.40	\$0.00	\$74.81
6	80	\$45.98	\$15.30	\$16.40	\$0.00	\$77.68
7	85	\$48.86	\$15.30	\$16.40	\$0.00	\$80.56
8	90	\$51.73	\$15.30	\$16.40	\$0.00	\$83.43

Notes:

Apprentice to Journeyworker Ratio:1:6

HVAC (DUCTWORK) SHEETMETAL WORKERS LOCAL 63	07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
	01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) ELECTRICIANS LOCAL 96	09/01/2024	\$47.05	\$13.99	\$19.22	\$0.00	\$80.26
	09/07/2025	\$48.16	\$14.98	\$19.60	\$0.00	\$82.74
	09/06/2026	\$49.38	\$15.96	\$20.00	\$0.00	\$85.34

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) SHEETMETAL WORKERS LOCAL 63	07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
	01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING -WATER) PLUMBERS LOCAL 4	09/01/2024	\$55.00	\$9.90	\$17.77	\$0.00	\$82.67
	03/01/2025	\$56.40	\$9.90	\$17.77	\$0.00	\$84.07
	09/01/2025	\$57.80	\$9.90	\$17.77	\$0.00	\$85.47
	03/01/2026	\$59.20	\$9.90	\$17.77	\$0.00	\$86.87

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC MECHANIC <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.00	\$9.90	\$17.77	\$0.00	\$82.67
	03/01/2025	\$56.40	\$9.90	\$17.77	\$0.00	\$84.07
	09/01/2025	\$57.80	\$9.90	\$17.77	\$0.00	\$85.47
	03/01/2026	\$59.20	\$9.90	\$17.77	\$0.00	\$86.87
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21
For apprentice rates see "Apprentice- LABORER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.28	\$9.65	\$17.80	\$0.00	\$66.73
	12/01/2024	\$40.61	\$9.65	\$17.80	\$0.00	\$68.06
	06/01/2025	\$42.00	\$9.65	\$17.80	\$0.00	\$69.45
	12/01/2025	\$43.38	\$9.65	\$17.80	\$0.00	\$70.83
	06/01/2026	\$44.82	\$9.65	\$17.80	\$0.00	\$72.27
	12/01/2026	\$46.26	\$9.65	\$17.80	\$0.00	\$73.71
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	09/01/2024	\$51.23	\$14.75	\$19.61	\$0.00	\$85.59
	09/01/2025	\$54.31	\$14.75	\$19.61	\$0.00	\$88.67
	09/01/2026	\$57.38	\$14.75	\$19.61	\$0.00	\$91.74

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Worcester

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.62	\$14.75	\$14.32	\$0.00	\$54.69
2	60	\$30.74	\$14.75	\$15.37	\$0.00	\$60.86
3	70	\$35.86	\$14.75	\$16.43	\$0.00	\$67.04
4	80	\$40.98	\$14.75	\$17.49	\$0.00	\$73.22

Effective Date - 09/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.16	\$14.75	\$14.32	\$0.00	\$56.23
2	60	\$32.59	\$14.75	\$15.37	\$0.00	\$62.71
3	70	\$38.02	\$14.75	\$16.43	\$0.00	\$69.20
4	80	\$43.45	\$14.75	\$17.49	\$0.00	\$75.69

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (WORCESTER AREA)</i>	03/16/2024	\$53.67	\$8.35	\$26.70	\$0.00	\$88.72

Apprentice - IRONWORKER - Local 7 Worcester

Effective Date - 03/16/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$32.20	\$8.35	\$26.70	\$0.00	\$67.25
2	70	\$37.57	\$8.35	\$26.70	\$0.00	\$72.62
3	75	\$40.25	\$8.35	\$26.70	\$0.00	\$75.30
4	80	\$42.94	\$8.35	\$26.70	\$0.00	\$77.99
5	85	\$45.62	\$8.35	\$26.70	\$0.00	\$80.67
6	90	\$48.30	\$8.35	\$26.70	\$0.00	\$83.35

Notes:

Apprentice to Journeyworker Ratio:1:4

JACKHAMMER & PAVING BREAKER OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

LABORER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - LABORER - Zone 2

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.12	\$9.65	\$18.40	\$0.00	\$51.17
2	70	\$26.97	\$9.65	\$18.40	\$0.00	\$55.02
3	80	\$30.82	\$9.65	\$18.40	\$0.00	\$58.87
4	90	\$34.68	\$9.65	\$18.40	\$0.00	\$62.73

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$18.40	\$0.00	\$51.97
2	70	\$27.90	\$9.65	\$18.40	\$0.00	\$55.95
3	80	\$31.89	\$9.65	\$18.40	\$0.00	\$59.94
4	90	\$35.87	\$9.65	\$18.40	\$0.00	\$63.92

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY)	06/01/2024	\$38.53	\$9.65	\$17.80	\$0.00	\$65.98
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2024	\$39.86	\$9.65	\$17.80	\$0.00	\$67.31
	06/01/2025	\$41.25	\$9.65	\$17.80	\$0.00	\$68.70
	12/01/2025	\$42.63	\$9.65	\$17.80	\$0.00	\$70.08
	06/01/2026	\$44.07	\$9.65	\$17.80	\$0.00	\$71.52
	12/01/2026	\$45.51	\$9.65	\$17.80	\$0.00	\$72.96

Apprentice - LABORER (Heavy & Highway) - Zone 2

Effective Date - 06/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.12	\$9.65	\$17.80	\$0.00	\$50.57
2	70	\$26.97	\$9.65	\$17.80	\$0.00	\$54.42
3	80	\$30.82	\$9.65	\$17.80	\$0.00	\$58.27
4	90	\$34.68	\$9.65	\$17.80	\$0.00	\$62.13

Effective Date - 12/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$23.92	\$9.65	\$17.80	\$0.00	\$51.37
2	70	\$27.90	\$9.65	\$17.80	\$0.00	\$55.35
3	80	\$31.89	\$9.65	\$17.80	\$0.00	\$59.34
4	90	\$35.87	\$9.65	\$17.80	\$0.00	\$63.32

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
	12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	06/03/2024	\$38.62	\$9.65	\$17.76	\$0.00	\$66.03
	12/02/2024	\$39.95	\$9.65	\$17.76	\$0.00	\$67.36
	06/02/2025	\$41.34	\$9.65	\$17.76	\$0.00	\$68.75
	12/01/2025	\$42.72	\$9.65	\$17.76	\$0.00	\$70.13
	06/01/2026	\$44.16	\$9.65	\$17.76	\$0.00	\$71.57
	12/07/2026	\$45.60	\$9.65	\$17.76	\$0.00	\$73.01
	06/07/2027	\$47.05	\$9.65	\$17.76	\$0.00	\$74.46
	12/06/2027	\$48.50	\$9.65	\$17.76	\$0.00	\$75.91
	06/05/2028	\$50.00	\$9.65	\$17.76	\$0.00	\$77.41
	12/04/2028	\$51.50	\$9.65	\$17.76	\$0.00	\$78.91
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46	
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.53	\$9.65	\$18.40	\$0.00	\$66.58
	12/01/2024	\$39.86	\$9.65	\$18.40	\$0.00	\$67.91
	06/01/2025	\$41.25	\$9.65	\$18.40	\$0.00	\$69.30
	12/01/2025	\$42.63	\$9.65	\$18.40	\$0.00	\$70.68
	06/01/2026	\$44.07	\$9.65	\$18.40	\$0.00	\$72.12
	12/01/2026	\$45.51	\$9.65	\$18.40	\$0.00	\$73.56
	06/01/2027	\$46.96	\$9.65	\$18.40	\$0.00	\$75.01
	12/01/2027	\$48.41	\$9.65	\$18.40	\$0.00	\$76.46
	06/01/2028	\$49.91	\$9.65	\$18.40	\$0.00	\$77.96
12/01/2028	\$51.41	\$9.65	\$18.40	\$0.00	\$79.46	
This classification applies to the removal of standing trees, and the trimming and removal of branches and limbs when related to public works construction or site clearance incidental to construction . For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71	
For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
MARBLE & TILE FINISHERS BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2024	\$49.32	\$11.49	\$21.62	\$0.00	\$82.43
	02/01/2025	\$50.36	\$11.49	\$21.62	\$0.00	\$83.47
	08/01/2025	\$52.08	\$11.49	\$21.62	\$0.00	\$85.19
	02/01/2026	\$53.16	\$11.49	\$21.62	\$0.00	\$86.27
	08/01/2026	\$54.92	\$11.49	\$21.62	\$0.00	\$88.03
	02/01/2027	\$56.04	\$11.49	\$21.62	\$0.00	\$89.15

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.66	\$11.49	\$21.62	\$0.00	\$57.77
2	60	\$29.59	\$11.49	\$21.62	\$0.00	\$62.70
3	70	\$34.52	\$11.49	\$21.62	\$0.00	\$67.63
4	80	\$39.46	\$11.49	\$21.62	\$0.00	\$72.57
5	90	\$44.39	\$11.49	\$21.62	\$0.00	\$77.50

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.18	\$11.49	\$21.62	\$0.00	\$58.29
2	60	\$30.22	\$11.49	\$21.62	\$0.00	\$63.33
3	70	\$35.25	\$11.49	\$21.62	\$0.00	\$68.36
4	80	\$40.29	\$11.49	\$21.62	\$0.00	\$73.40
5	90	\$45.32	\$11.49	\$21.62	\$0.00	\$78.43

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS, TILELAYERS & TERRAZZO MECH BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2024	\$64.52	\$11.49	\$23.56	\$0.00	\$99.57
	02/01/2025	\$65.82	\$11.49	\$23.56	\$0.00	\$100.87
	08/01/2025	\$67.97	\$11.49	\$23.56	\$0.00	\$103.02
	02/01/2026	\$69.32	\$11.49	\$23.56	\$0.00	\$104.37
	08/01/2026	\$71.52	\$11.49	\$23.56	\$0.00	\$106.57
	02/01/2027	\$72.92	\$11.49	\$23.56	\$0.00	\$107.97

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.26	\$11.49	\$23.56	\$0.00	\$67.31
2	60	\$38.71	\$11.49	\$23.56	\$0.00	\$73.76
3	70	\$45.16	\$11.49	\$23.56	\$0.00	\$80.21
4	80	\$51.62	\$11.49	\$23.56	\$0.00	\$86.67
5	90	\$58.07	\$11.49	\$23.56	\$0.00	\$93.12

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.91	\$11.49	\$23.56	\$0.00	\$67.96
2	60	\$39.49	\$11.49	\$23.56	\$0.00	\$74.54
3	70	\$46.07	\$11.49	\$23.56	\$0.00	\$81.12
4	80	\$52.66	\$11.49	\$23.56	\$0.00	\$87.71
5	90	\$59.24	\$11.49	\$23.56	\$0.00	\$94.29

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANICS MAINTENANCE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 2) <i>MILLWRIGHTS LOCAL 1121 - Zone 2</i>	01/01/2024	\$42.76	\$10.08	\$21.47	\$0.00	\$74.31
	01/06/2025	\$45.09	\$10.08	\$21.47	\$0.00	\$76.64
	01/05/2026	\$47.42	\$10.08	\$21.47	\$0.00	\$78.97

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MILLWRIGHT - Local 1121 Zone 2

Effective Date - 01/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.52	\$10.08	\$5.50	\$0.00	\$39.10
2	65	\$27.79	\$10.08	\$6.50	\$0.00	\$44.37
3	75	\$32.07	\$10.08	\$18.97	\$0.00	\$61.12
4	85	\$36.35	\$10.08	\$19.97	\$0.00	\$66.40

Effective Date - 01/06/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.80	\$10.08	\$5.50	\$0.00	\$40.38
2	65	\$29.31	\$10.08	\$6.50	\$0.00	\$45.89
3	75	\$33.82	\$10.08	\$18.97	\$0.00	\$62.87
4	85	\$38.33	\$10.08	\$19.97	\$0.00	\$68.38

Notes: Step 1&2 Appr. indentured after 1/6/2020 receive no pension, but do receive annuity. (Step 1 \$5.72, Step 2 \$6.66)
Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:4

MORTAR MIXER LABORERS - ZONE 2	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

OILER (OTHER THAN TRUCK CRANES,GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2024	\$24.71	\$15.30	\$16.40	\$0.00	\$56.41
	12/01/2024	\$25.37	\$15.30	\$16.40	\$0.00	\$57.07
	06/01/2025	\$25.97	\$15.30	\$16.40	\$0.00	\$57.67
	12/01/2025	\$26.63	\$15.30	\$16.40	\$0.00	\$58.33
	06/01/2026	\$27.22	\$15.30	\$16.40	\$0.00	\$58.92
	12/01/2026	\$27.89	\$15.30	\$16.40	\$0.00	\$59.59

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

OILER (TRUCK CRANES, GRADALLS) OPERATING ENGINEERS LOCAL 4	06/01/2024	\$30.28	\$15.30	\$16.40	\$0.00	\$61.98
	12/01/2024	\$31.08	\$15.30	\$16.40	\$0.00	\$62.78
	06/01/2025	\$31.80	\$15.30	\$16.40	\$0.00	\$63.50
	12/01/2025	\$32.60	\$15.30	\$16.40	\$0.00	\$64.30
	06/01/2026	\$33.32	\$15.30	\$16.40	\$0.00	\$65.02
	12/01/2026	\$34.12	\$15.30	\$16.40	\$0.00	\$65.82

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OTHER POWER DRIVEN EQUIPMENT - CLASS II <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	07/01/2024	\$57.26	\$9.95	\$23.95	\$0.00	\$91.16
	01/01/2025	\$58.46	\$9.95	\$23.95	\$0.00	\$92.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.63	\$9.95	\$0.00	\$0.00	\$38.58
2	55	\$31.49	\$9.95	\$6.66	\$0.00	\$48.10
3	60	\$34.36	\$9.95	\$7.26	\$0.00	\$51.57
4	65	\$37.22	\$9.95	\$7.87	\$0.00	\$55.04
5	70	\$40.08	\$9.95	\$20.32	\$0.00	\$70.35
6	75	\$42.95	\$9.95	\$20.93	\$0.00	\$73.83
7	80	\$45.81	\$9.95	\$21.53	\$0.00	\$77.29
8	90	\$51.53	\$9.95	\$22.74	\$0.00	\$84.22

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.23	\$9.95	\$0.00	\$0.00	\$39.18
2	55	\$32.15	\$9.95	\$6.66	\$0.00	\$48.76
3	60	\$35.08	\$9.95	\$7.26	\$0.00	\$52.29
4	65	\$38.00	\$9.95	\$7.87	\$0.00	\$55.82
5	70	\$40.92	\$9.95	\$20.32	\$0.00	\$71.19
6	75	\$43.85	\$9.95	\$20.93	\$0.00	\$74.73
7	80	\$46.77	\$9.95	\$21.53	\$0.00	\$78.25
8	90	\$52.61	\$9.95	\$22.74	\$0.00	\$85.30

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	07/01/2024	\$48.16	\$9.95	\$23.95	\$0.00	\$82.06
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2025	\$49.36	\$9.95	\$23.95	\$0.00	\$83.26

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.08	\$9.95	\$0.00	\$0.00	\$34.03
2	55	\$26.49	\$9.95	\$6.66	\$0.00	\$43.10
3	60	\$28.90	\$9.95	\$7.26	\$0.00	\$46.11
4	65	\$31.30	\$9.95	\$7.87	\$0.00	\$49.12
5	70	\$33.71	\$9.95	\$20.32	\$0.00	\$63.98
6	75	\$36.12	\$9.95	\$20.93	\$0.00	\$67.00
7	80	\$38.53	\$9.95	\$21.53	\$0.00	\$70.01
8	90	\$43.34	\$9.95	\$22.74	\$0.00	\$76.03

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.68	\$9.95	\$0.00	\$0.00	\$34.63
2	55	\$27.15	\$9.95	\$6.66	\$0.00	\$43.76
3	60	\$29.62	\$9.95	\$7.26	\$0.00	\$46.83
4	65	\$32.08	\$9.95	\$7.87	\$0.00	\$49.90
5	70	\$34.55	\$9.95	\$20.32	\$0.00	\$64.82
6	75	\$37.02	\$9.95	\$20.93	\$0.00	\$67.90
7	80	\$39.49	\$9.95	\$21.53	\$0.00	\$70.97
8	90	\$44.42	\$9.95	\$22.74	\$0.00	\$77.11

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	07/01/2024	\$46.22	\$9.95	\$23.95	\$0.00	\$80.12
PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$47.42	\$9.95	\$23.95	\$0.00	\$81.32

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.11	\$9.95	\$0.00	\$0.00	\$33.06
2	55	\$25.42	\$9.95	\$6.66	\$0.00	\$42.03
3	60	\$27.73	\$9.95	\$7.26	\$0.00	\$44.94
4	65	\$30.04	\$9.95	\$7.87	\$0.00	\$47.86
5	70	\$32.35	\$9.95	\$20.32	\$0.00	\$62.62
6	75	\$34.67	\$9.95	\$20.93	\$0.00	\$65.55
7	80	\$36.98	\$9.95	\$21.53	\$0.00	\$68.46
8	90	\$41.60	\$9.95	\$22.74	\$0.00	\$74.29

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.71	\$9.95	\$0.00	\$0.00	\$33.66
2	55	\$26.08	\$9.95	\$6.66	\$0.00	\$42.69
3	60	\$28.45	\$9.95	\$7.26	\$0.00	\$45.66
4	65	\$30.82	\$9.95	\$7.87	\$0.00	\$48.64
5	70	\$33.19	\$9.95	\$20.32	\$0.00	\$63.46
6	75	\$35.57	\$9.95	\$20.93	\$0.00	\$66.45
7	80	\$37.94	\$9.95	\$21.53	\$0.00	\$69.42
8	90	\$42.68	\$9.95	\$22.74	\$0.00	\$75.37

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2024	\$46.76	\$9.95	\$23.95	\$0.00	\$80.66
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$47.96	\$9.95	\$23.95	\$0.00	\$81.86

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.38	\$9.95	\$0.00	\$0.00	\$33.33
2	55	\$25.72	\$9.95	\$6.66	\$0.00	\$42.33
3	60	\$28.06	\$9.95	\$7.26	\$0.00	\$45.27
4	65	\$30.39	\$9.95	\$7.87	\$0.00	\$48.21
5	70	\$32.73	\$9.95	\$20.32	\$0.00	\$63.00
6	75	\$35.07	\$9.95	\$20.93	\$0.00	\$65.95
7	80	\$37.41	\$9.95	\$21.53	\$0.00	\$68.89
8	90	\$42.08	\$9.95	\$22.74	\$0.00	\$74.77

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.98	\$9.95	\$0.00	\$0.00	\$33.93
2	55	\$26.38	\$9.95	\$6.66	\$0.00	\$42.99
3	60	\$28.78	\$9.95	\$7.26	\$0.00	\$45.99
4	65	\$31.17	\$9.95	\$7.87	\$0.00	\$48.99
5	70	\$33.57	\$9.95	\$20.32	\$0.00	\$63.84
6	75	\$35.97	\$9.95	\$20.93	\$0.00	\$66.85
7	80	\$38.37	\$9.95	\$21.53	\$0.00	\$69.85
8	90	\$43.16	\$9.95	\$22.74	\$0.00	\$75.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)	07/01/2024	\$44.82	\$9.95	\$23.95	\$0.00	\$78.72
PAINTERS LOCAL 35 - ZONE 2	01/01/2025	\$46.02	\$9.95	\$23.95	\$0.00	\$79.92

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.41	\$9.95	\$0.00	\$0.00	\$32.36
2	55	\$24.65	\$9.95	\$6.66	\$0.00	\$41.26
3	60	\$26.89	\$9.95	\$7.26	\$0.00	\$44.10
4	65	\$29.13	\$9.95	\$7.87	\$0.00	\$46.95
5	70	\$31.37	\$9.95	\$20.32	\$0.00	\$61.64
6	75	\$33.62	\$9.95	\$20.93	\$0.00	\$64.50
7	80	\$35.86	\$9.95	\$21.53	\$0.00	\$67.34
8	90	\$40.34	\$9.95	\$22.74	\$0.00	\$73.03

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.01	\$9.95	\$0.00	\$0.00	\$32.96
2	55	\$25.31	\$9.95	\$6.66	\$0.00	\$41.92
3	60	\$27.61	\$9.95	\$7.26	\$0.00	\$44.82
4	65	\$29.91	\$9.95	\$7.87	\$0.00	\$47.73
5	70	\$32.21	\$9.95	\$20.32	\$0.00	\$62.48
6	75	\$34.52	\$9.95	\$20.93	\$0.00	\$65.40
7	80	\$36.82	\$9.95	\$21.53	\$0.00	\$68.30
8	90	\$41.42	\$9.95	\$22.74	\$0.00	\$74.11

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY)	06/01/2024	\$38.53	\$9.65	\$17.80	\$0.00	\$65.98
LABORERS - ZONE 2 (HEAVY & HIGHWAY)	12/01/2024	\$39.86	\$9.65	\$17.80	\$0.00	\$67.31
	06/01/2025	\$41.25	\$9.65	\$17.80	\$0.00	\$68.70
	12/01/2025	\$42.63	\$9.65	\$17.80	\$0.00	\$70.08
	06/01/2026	\$44.07	\$9.65	\$17.80	\$0.00	\$71.52
	12/01/2026	\$45.51	\$9.65	\$17.80	\$0.00	\$72.96

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PANEL & PICKUP TRUCKS DRIVER	06/01/2024	\$39.78	\$15.07	\$18.67	\$0.00	\$73.52
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2024	\$39.78	\$15.07	\$20.17	\$0.00	\$75.02
	01/01/2025	\$39.78	\$15.57	\$20.17	\$0.00	\$75.52
	06/01/2025	\$40.78	\$15.57	\$20.17	\$0.00	\$76.52
	12/01/2025	\$40.78	\$15.57	\$21.78	\$0.00	\$78.13
	01/01/2026	\$40.78	\$16.17	\$21.78	\$0.00	\$78.73
	06/01/2026	\$41.78	\$16.17	\$21.78	\$0.00	\$79.73
	12/01/2026	\$41.78	\$16.17	\$23.52	\$0.00	\$81.47
	01/01/2027	\$41.78	\$16.77	\$23.52	\$0.00	\$82.07

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 2)</i> For apprentice rates see "Apprentice- PILE DRIVER"	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 2)</i>	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63

Apprentice - PILE DRIVER - Local 56 Zone 2

Effective Date - 08/01/2020

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: Apprentice wages shall be no less than the following Steps;
(Same as set in Zone 1)
1\$57.06/2\$61.96/3\$66.87/4\$69.32/5\$71.78/6\$71.78/7\$76.68/8\$76.68

Apprentice to Journeyworker Ratio:1:5

PIPELAYER <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
	12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71

For apprentice rates see "Apprentice- LABORER"

PIPELAYER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

PLUMBER & PIPEFITTER <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.00	\$9.90	\$17.77	\$0.00	\$82.67
	03/01/2025	\$56.40	\$9.90	\$17.77	\$0.00	\$84.07
	09/01/2025	\$57.80	\$9.90	\$17.77	\$0.00	\$85.47
	03/01/2026	\$59.20	\$9.90	\$17.77	\$0.00	\$86.87

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PLUMBER/PIPEFITTER - Local 4

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.00	\$9.90	\$0.00	\$0.00	\$31.90
2	50	\$27.50	\$9.90	\$0.00	\$0.00	\$37.40
3	60	\$33.00	\$9.90	\$0.00	\$0.00	\$42.90
4	70	\$38.50	\$9.90	\$8.06	\$0.00	\$56.46
5	80	\$44.00	\$9.90	\$8.06	\$0.00	\$61.96

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$22.56	\$9.90	\$0.00	\$0.00	\$32.46
2	50	\$28.20	\$9.90	\$0.00	\$0.00	\$38.10
3	60	\$33.84	\$9.90	\$0.00	\$0.00	\$43.74
4	70	\$39.48	\$9.90	\$8.06	\$0.00	\$57.44
5	80	\$45.12	\$9.90	\$8.06	\$0.00	\$63.08

Notes:

Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85%
 Step 4 w/lic \$52.59, Step 5 w/lic \$57.44

Apprentice to Journeyworker Ratio:1:3

PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.00	\$9.90	\$17.77	\$0.00	\$82.67
	03/01/2025	\$56.40	\$9.90	\$17.77	\$0.00	\$84.07
	09/01/2025	\$57.80	\$9.90	\$17.77	\$0.00	\$85.47
	03/01/2026	\$59.20	\$9.90	\$17.77	\$0.00	\$86.87

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21

For apprentice rates see "Apprentice- LABORER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	06/01/2024	\$39.53	\$9.65	\$18.40	\$0.00	\$67.58
	12/01/2024	\$40.86	\$9.65	\$18.40	\$0.00	\$68.91
	06/01/2025	\$42.25	\$9.65	\$18.40	\$0.00	\$70.30
	12/01/2025	\$43.63	\$9.65	\$18.40	\$0.00	\$71.68
	06/01/2026	\$45.07	\$9.65	\$18.40	\$0.00	\$73.12
	12/01/2026	\$46.51	\$9.65	\$18.40	\$0.00	\$74.56
	06/01/2027	\$47.96	\$9.65	\$18.40	\$0.00	\$76.01
	12/01/2027	\$49.41	\$9.65	\$18.40	\$0.00	\$77.46
	06/01/2028	\$50.91	\$9.65	\$18.40	\$0.00	\$78.96
	12/01/2028	\$52.41	\$9.65	\$18.40	\$0.00	\$80.46
For apprentice rates see "Apprentice- LABORER"						
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	06/01/2024	\$39.53	\$9.40	\$17.55	\$0.00	\$66.48
	12/01/2024	\$40.86	\$9.40	\$17.55	\$0.00	\$67.81
	06/01/2025	\$42.25	\$9.40	\$17.55	\$0.00	\$69.20
	12/01/2025	\$43.63	\$9.40	\$17.55	\$0.00	\$70.58
	06/01/2026	\$45.07	\$9.40	\$17.55	\$0.00	\$72.02
	12/01/2026	\$46.51	\$9.40	\$17.55	\$0.00	\$73.46
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
POWER SHOVEL/DERRICK/TRENCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$36.17	\$15.30	\$16.40	\$0.00	\$67.87
	12/01/2024	\$37.12	\$15.30	\$16.40	\$0.00	\$68.82
	06/01/2025	\$37.97	\$15.30	\$16.40	\$0.00	\$69.67
	12/01/2025	\$38.92	\$15.30	\$16.40	\$0.00	\$70.62
	06/01/2026	\$39.78	\$15.30	\$16.40	\$0.00	\$71.48
	12/01/2026	\$40.73	\$15.30	\$16.40	\$0.00	\$72.43
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS 170 - Dauphinais (Bellingham)</i>	01/01/2024	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	12/01/2024	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
	01/01/2025	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2024	\$38.78	\$9.65	\$18.40	\$0.00	\$66.83
	12/01/2024	\$40.11	\$9.65	\$18.40	\$0.00	\$68.16
	06/01/2025	\$41.50	\$9.65	\$18.40	\$0.00	\$69.55
	12/01/2025	\$42.88	\$9.65	\$18.40	\$0.00	\$70.93
	06/01/2026	\$44.32	\$9.65	\$18.40	\$0.00	\$72.37
	12/01/2026	\$45.76	\$9.65	\$18.40	\$0.00	\$73.81
	06/01/2027	\$47.21	\$9.65	\$18.40	\$0.00	\$75.26
	12/01/2027	\$48.66	\$9.65	\$18.40	\$0.00	\$76.71
	06/01/2028	\$50.16	\$9.65	\$18.40	\$0.00	\$78.21
12/01/2028	\$51.66	\$9.65	\$18.40	\$0.00	\$79.71	
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofer Waterproofing &Roofer Damproofg) <i>ROOFERS LOCAL 33</i>	08/01/2024	\$51.03	\$13.03	\$21.70	\$0.00	\$85.76
	02/01/2025	\$52.28	\$13.03	\$21.70	\$0.00	\$87.01
	08/01/2025	\$53.78	\$13.03	\$21.70	\$0.00	\$88.51
	02/01/2026	\$55.03	\$13.03	\$21.70	\$0.00	\$89.76

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - ROOFER - Local 33

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.52	\$13.03	\$6.52	\$0.00	\$45.07
2	60	\$30.62	\$13.03	\$21.70	\$0.00	\$65.35
3	65	\$33.17	\$13.03	\$21.70	\$0.00	\$67.90
4	75	\$38.27	\$13.03	\$21.70	\$0.00	\$73.00
5	85	\$43.38	\$13.03	\$21.70	\$0.00	\$78.11

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.14	\$13.03	\$6.52	\$0.00	\$45.69
2	60	\$31.37	\$13.03	\$21.70	\$0.00	\$66.10
3	65	\$33.98	\$13.03	\$21.70	\$0.00	\$68.71
4	75	\$39.21	\$13.03	\$21.70	\$0.00	\$73.94
5	85	\$44.44	\$13.03	\$21.70	\$0.00	\$79.17

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
 Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.
 (Hot Pitch Mechanics' receive \$1.00 hr. above ROOFER)

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE <i>ROOFERS LOCAL 33</i>	08/01/2024	\$51.28	\$13.03	\$21.70	\$0.00	\$86.01
	02/01/2025	\$52.53	\$13.03	\$21.70	\$0.00	\$87.26
	08/01/2025	\$54.03	\$13.03	\$21.70	\$0.00	\$88.76
	02/01/2026	\$55.28	\$13.03	\$21.70	\$0.00	\$90.01
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER <i>SHEETMETAL WORKERS LOCAL 63</i>	07/01/2024	\$40.98	\$12.20	\$18.74	\$2.13	\$74.05
	01/01/2025	\$42.23	\$12.20	\$18.74	\$2.13	\$75.30

Apprentice - SHEET METAL WORKER - Local 63

Effective Date - 07/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.44	\$5.49	\$4.86	\$0.85	\$29.64
2	50	\$20.49	\$6.10	\$5.40	\$0.94	\$32.93
3	55	\$22.54	\$6.71	\$9.71	\$1.15	\$40.11
4	60	\$24.59	\$7.32	\$9.71	\$1.23	\$42.85
5	65	\$26.64	\$7.93	\$9.71	\$1.31	\$45.59
6	70	\$28.69	\$8.54	\$9.71	\$1.39	\$48.33
7	75	\$30.74	\$9.15	\$9.71	\$1.47	\$51.07
8	80	\$32.78	\$9.76	\$17.66	\$1.78	\$61.98
9	85	\$34.83	\$10.37	\$17.66	\$1.86	\$64.72
10	90	\$36.88	\$10.98	\$17.66	\$1.94	\$67.46

Effective Date - 01/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$19.00	\$5.49	\$4.86	\$0.85	\$30.20
2	50	\$21.12	\$6.10	\$5.40	\$0.94	\$33.56
3	55	\$23.23	\$6.71	\$9.71	\$1.15	\$40.80
4	60	\$25.34	\$7.32	\$9.71	\$1.23	\$43.60
5	65	\$27.45	\$7.93	\$9.71	\$1.31	\$46.40
6	70	\$29.56	\$8.54	\$9.71	\$1.39	\$49.20
7	75	\$31.67	\$9.15	\$9.71	\$1.47	\$52.00
8	80	\$33.78	\$9.76	\$17.66	\$1.78	\$62.98
9	85	\$35.90	\$10.37	\$17.66	\$1.86	\$65.79
10	90	\$38.01	\$10.98	\$17.66	\$1.94	\$68.59

Notes:

Apprentice to Journeyworker Ratio:1:3

SPECIALIZED EARTH MOVING EQUIP < 35 TONS	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPECIALIZED EARTH MOVING EQUIP > 35 TONS <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.53	\$15.07	\$18.67	\$0.00	\$74.27
	12/01/2024	\$40.53	\$15.07	\$20.17	\$0.00	\$75.77
	01/01/2025	\$40.53	\$15.57	\$20.17	\$0.00	\$76.27
	06/01/2025	\$41.53	\$15.57	\$20.17	\$0.00	\$77.27
	12/01/2025	\$41.53	\$15.57	\$21.78	\$0.00	\$78.88
	01/01/2026	\$41.53	\$16.17	\$21.78	\$0.00	\$79.48
	06/01/2026	\$42.53	\$16.17	\$21.78	\$0.00	\$80.48
	12/01/2026	\$42.53	\$16.17	\$23.52	\$0.00	\$82.22
	01/01/2027	\$42.53	\$16.77	\$23.52	\$0.00	\$82.82
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1</i>	10/01/2024	\$70.84	\$11.51	\$23.30	\$0.00	\$105.65
	03/01/2025	\$72.64	\$11.51	\$23.30	\$0.00	\$107.45

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1

Effective Date - 10/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$24.79	\$11.51	\$12.90	\$0.00	\$49.20
2	40	\$28.34	\$11.51	\$13.70	\$0.00	\$53.55
3	45	\$31.88	\$11.51	\$14.50	\$0.00	\$57.89
4	50	\$35.42	\$11.51	\$15.30	\$0.00	\$62.23
5	55	\$38.96	\$11.51	\$16.10	\$0.00	\$66.57
6	60	\$42.50	\$11.51	\$16.90	\$0.00	\$70.91
7	65	\$46.05	\$11.51	\$17.70	\$0.00	\$75.26
8	70	\$49.59	\$11.51	\$18.50	\$0.00	\$79.60
9	75	\$53.13	\$11.51	\$19.30	\$0.00	\$83.94
10	80	\$56.67	\$11.51	\$20.10	\$0.00	\$88.28

Effective Date - 03/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$25.42	\$11.51	\$12.90	\$0.00	\$49.83
2	40	\$29.06	\$11.51	\$13.70	\$0.00	\$54.27
3	45	\$32.69	\$11.51	\$14.50	\$0.00	\$58.70
4	50	\$36.32	\$11.51	\$15.30	\$0.00	\$63.13
5	55	\$39.95	\$11.51	\$16.10	\$0.00	\$67.56
6	60	\$43.58	\$11.51	\$16.90	\$0.00	\$71.99
7	65	\$47.22	\$11.51	\$17.70	\$0.00	\$76.43
8	70	\$50.85	\$11.51	\$18.50	\$0.00	\$80.86
9	75	\$54.48	\$11.51	\$19.30	\$0.00	\$85.29
10	80	\$58.11	\$11.51	\$20.10	\$0.00	\$89.72

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
STEAM BOILER OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	08/01/2024	\$63.44	\$11.49	\$23.59	\$0.00	\$98.52
	02/01/2025	\$64.74	\$11.49	\$23.59	\$0.00	\$99.82
	08/01/2025	\$66.89	\$11.49	\$23.59	\$0.00	\$101.97
	02/01/2026	\$68.24	\$11.49	\$23.59	\$0.00	\$103.32
	08/01/2026	\$70.44	\$11.49	\$23.59	\$0.00	\$105.52
	02/01/2027	\$71.84	\$11.49	\$23.59	\$0.00	\$106.92

Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 08/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$31.72	\$11.49	\$23.59	\$0.00	\$66.80
2	60	\$38.06	\$11.49	\$23.59	\$0.00	\$73.14
3	70	\$44.41	\$11.49	\$23.59	\$0.00	\$79.49
4	80	\$50.75	\$11.49	\$23.59	\$0.00	\$85.83
5	90	\$57.10	\$11.49	\$23.59	\$0.00	\$92.18

Effective Date - 02/01/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$32.37	\$11.49	\$23.59	\$0.00	\$67.45
2	60	\$38.84	\$11.49	\$23.59	\$0.00	\$73.92
3	70	\$45.32	\$11.49	\$23.59	\$0.00	\$80.40
4	80	\$51.79	\$11.49	\$23.59	\$0.00	\$86.87
5	90	\$58.27	\$11.49	\$23.59	\$0.00	\$93.35

Notes:

Apprentice to Journeyworker Ratio:1:3

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$49.81	\$9.65	\$18.22	\$0.00	\$77.68
	12/01/2024	\$51.28	\$9.65	\$18.22	\$0.00	\$79.15
	06/01/2025	\$52.78	\$9.65	\$18.22	\$0.00	\$80.65
	12/01/2025	\$54.28	\$9.65	\$18.22	\$0.00	\$82.15
	06/01/2026	\$55.83	\$9.65	\$18.22	\$0.00	\$83.70
	12/01/2026	\$57.33	\$9.65	\$18.22	\$0.00	\$85.20
	For apprentice rates see "Apprentice- LABORER"					
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.60	\$9.65	\$18.22	\$0.00	\$73.47
	12/01/2024	\$47.07	\$9.65	\$18.22	\$0.00	\$74.94
	06/01/2025	\$48.57	\$9.65	\$18.22	\$0.00	\$76.44
	12/01/2025	\$50.07	\$9.65	\$18.22	\$0.00	\$77.94
	06/01/2026	\$51.62	\$9.65	\$18.22	\$0.00	\$79.49
	12/01/2026	\$53.12	\$9.65	\$18.22	\$0.00	\$80.99
	For apprentice rates see "Apprentice- LABORER"					
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2024	\$45.48	\$9.65	\$18.22	\$0.00	\$73.35
	12/01/2024	\$46.95	\$9.65	\$18.22	\$0.00	\$74.82
	06/01/2025	\$48.45	\$9.65	\$18.22	\$0.00	\$76.32
	12/01/2025	\$49.95	\$9.65	\$18.22	\$0.00	\$77.82
	06/01/2026	\$51.50	\$9.65	\$18.22	\$0.00	\$79.37
	12/01/2026	\$53.00	\$9.65	\$18.22	\$0.00	\$80.87
	For apprentice rates see "Apprentice- LABORER"					
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$55.41	\$15.30	\$16.40	\$0.00	\$87.11
	12/01/2024	\$56.85	\$15.30	\$16.40	\$0.00	\$88.55
	06/01/2025	\$58.13	\$15.30	\$16.40	\$0.00	\$89.83
	12/01/2025	\$59.57	\$15.30	\$16.40	\$0.00	\$91.27
	06/01/2026	\$60.85	\$15.30	\$16.40	\$0.00	\$92.55
	12/01/2026	\$62.29	\$15.30	\$16.40	\$0.00	\$93.99
	For apprentice rates see "Apprentice- OPERATING ENGINEERS"					
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.82	\$15.07	\$18.67	\$0.00	\$74.56
	12/01/2024	\$40.82	\$15.07	\$20.17	\$0.00	\$76.06
	01/01/2025	\$40.82	\$15.57	\$20.17	\$0.00	\$76.56
	06/01/2025	\$41.82	\$15.57	\$20.17	\$0.00	\$77.56
	12/01/2025	\$41.82	\$15.57	\$21.78	\$0.00	\$79.17
	01/01/2026	\$41.82	\$16.17	\$21.78	\$0.00	\$79.77
	06/01/2026	\$42.82	\$16.17	\$21.78	\$0.00	\$80.77
	12/01/2026	\$42.82	\$16.17	\$23.52	\$0.00	\$82.51
	01/01/2027	\$42.82	\$16.77	\$23.52	\$0.00	\$83.11
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	06/01/2024	\$57.71	\$9.65	\$19.00	\$0.00	\$86.36
	12/01/2024	\$59.18	\$9.65	\$19.00	\$0.00	\$87.83
	06/01/2025	\$60.68	\$9.65	\$19.00	\$0.00	\$89.33
	12/01/2025	\$62.18	\$9.65	\$19.00	\$0.00	\$90.83
	06/01/2026	\$63.73	\$9.65	\$19.00	\$0.00	\$92.38
	12/01/2026	\$65.23	\$9.65	\$19.00	\$0.00	\$93.88
	For apprentice rates see "Apprentice- LABORER"					

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	06/01/2024	\$59.71	\$9.65	\$19.00	\$0.00	\$88.36
	12/01/2024	\$61.18	\$9.65	\$19.00	\$0.00	\$89.83
	06/01/2025	\$62.68	\$9.65	\$19.00	\$0.00	\$91.33
	12/01/2025	\$64.18	\$9.65	\$19.00	\$0.00	\$92.83
	06/01/2026	\$65.73	\$9.65	\$19.00	\$0.00	\$94.38
	12/01/2026	\$67.23	\$9.65	\$19.00	\$0.00	\$95.88
	For apprentice rates see "Apprentice- LABORER"					
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2024	\$49.78	\$9.65	\$19.00	\$0.00	\$78.43
	12/01/2024	\$51.25	\$9.65	\$19.00	\$0.00	\$79.90
	06/01/2025	\$52.75	\$9.65	\$19.00	\$0.00	\$81.40
	12/01/2025	\$54.25	\$9.65	\$19.00	\$0.00	\$82.90
	06/01/2026	\$55.80	\$9.65	\$19.00	\$0.00	\$84.45
	12/01/2026	\$57.30	\$9.65	\$19.00	\$0.00	\$85.95
	For apprentice rates see "Apprentice- LABORER"					
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2024	\$51.78	\$9.65	\$19.00	\$0.00	\$80.43
	12/01/2024	\$53.25	\$9.65	\$19.00	\$0.00	\$81.90
	06/01/2025	\$54.75	\$9.65	\$19.00	\$0.00	\$83.40
	12/01/2025	\$56.25	\$9.65	\$19.00	\$0.00	\$84.90
	06/01/2026	\$57.80	\$9.65	\$19.00	\$0.00	\$86.45
	12/01/2026	\$59.30	\$9.65	\$19.00	\$0.00	\$87.95
	For apprentice rates see "Apprentice- LABORER"					
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2024	\$40.24	\$15.07	\$18.67	\$0.00	\$73.98
	12/01/2024	\$40.24	\$15.07	\$20.17	\$0.00	\$75.48
	01/01/2025	\$40.24	\$15.57	\$20.17	\$0.00	\$75.98
	06/01/2025	\$41.24	\$15.57	\$20.17	\$0.00	\$76.98
	12/01/2025	\$41.24	\$15.57	\$21.78	\$0.00	\$78.59
	01/01/2026	\$41.24	\$16.17	\$21.78	\$0.00	\$79.19
	06/01/2026	\$42.24	\$16.17	\$21.78	\$0.00	\$80.19
	12/01/2026	\$42.24	\$16.17	\$23.52	\$0.00	\$81.93
	01/01/2027	\$42.24	\$16.77	\$23.52	\$0.00	\$82.53
VOICE-DATA-VIDEO TECHNICIAN <i>ELECTRICIANS LOCAL 96</i>	09/01/2024	\$35.29	\$13.99	\$17.57	\$0.00	\$66.85
	09/07/2025	\$36.12	\$14.98	\$17.91	\$0.00	\$69.01
	09/06/2026	\$37.04	\$15.96	\$18.27	\$0.00	\$71.27

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - VOICE-DATA-VIDEO TECHNICIAN - Local 96

Effective Date - 09/01/2024

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.65	\$13.99	\$4.41	\$0.00	\$36.05
2	55	\$19.41	\$13.99	\$4.46	\$0.00	\$37.86
3	60	\$21.17	\$13.99	\$17.15	\$0.00	\$52.31
4	65	\$22.94	\$13.99	\$17.20	\$0.00	\$54.13
5	70	\$24.70	\$13.99	\$17.25	\$0.00	\$55.94
6	75	\$26.47	\$13.99	\$17.30	\$0.00	\$57.76
7	80	\$28.23	\$13.99	\$17.36	\$0.00	\$59.58
8	85	\$30.00	\$13.99	\$17.41	\$0.00	\$61.40

Effective Date - 09/07/2025

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.06	\$14.98	\$4.51	\$0.00	\$37.55
2	55	\$19.87	\$14.98	\$4.57	\$0.00	\$39.42
3	60	\$21.67	\$14.98	\$17.48	\$0.00	\$54.13
4	65	\$23.48	\$14.98	\$17.53	\$0.00	\$55.99
5	70	\$25.28	\$14.98	\$17.59	\$0.00	\$57.85
6	75	\$27.09	\$14.98	\$17.64	\$0.00	\$59.71
7	80	\$28.90	\$14.98	\$17.70	\$0.00	\$61.58
8	85	\$30.70	\$14.98	\$17.75	\$0.00	\$63.43

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR LABORERS - ZONE 2	06/01/2024	\$39.28	\$9.65	\$18.40	\$0.00	\$67.33
	12/01/2024	\$40.61	\$9.65	\$18.40	\$0.00	\$68.66
	06/01/2025	\$42.00	\$9.65	\$18.40	\$0.00	\$70.05
	12/01/2025	\$43.38	\$9.65	\$18.40	\$0.00	\$71.43
	06/01/2026	\$44.82	\$9.65	\$18.40	\$0.00	\$72.87
	12/01/2026	\$46.26	\$9.65	\$18.40	\$0.00	\$74.31
	06/01/2027	\$47.71	\$9.65	\$18.40	\$0.00	\$75.76
	12/01/2027	\$49.16	\$9.65	\$18.40	\$0.00	\$77.21
	06/01/2028	\$50.66	\$9.65	\$18.40	\$0.00	\$78.71
	12/01/2028	\$52.16	\$9.65	\$18.40	\$0.00	\$80.21

For apprentice rates see "Apprentice- LABORER"

WAGON DRILL OPERATOR (HEAVY & HIGHWAY) LABORERS - ZONE 2 (HEAVY & HIGHWAY)	06/01/2024	\$38.78	\$9.65	\$17.80	\$0.00	\$66.23
	12/01/2024	\$40.11	\$9.65	\$17.80	\$0.00	\$67.56
	06/01/2025	\$41.50	\$9.65	\$17.80	\$0.00	\$68.95
	12/01/2025	\$42.88	\$9.65	\$17.80	\$0.00	\$70.33
	06/01/2026	\$44.32	\$9.65	\$17.80	\$0.00	\$71.77
	12/01/2026	\$45.76	\$9.65	\$17.80	\$0.00	\$73.21

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2024	\$56.03	\$15.30	\$16.40	\$0.00	\$87.73
	12/01/2024	\$57.48	\$15.30	\$16.40	\$0.00	\$89.18
	06/01/2025	\$58.78	\$15.30	\$16.40	\$0.00	\$90.48
	12/01/2025	\$60.23	\$15.30	\$16.40	\$0.00	\$91.93
	06/01/2026	\$61.53	\$15.30	\$16.40	\$0.00	\$93.23
	12/01/2026	\$62.98	\$15.30	\$16.40	\$0.00	\$94.68

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

WATER METER INSTALLER <i>PLUMBERS LOCAL 4</i>	09/01/2024	\$55.00	\$9.90	\$17.77	\$0.00	\$82.67
	03/01/2025	\$56.40	\$9.90	\$17.77	\$0.00	\$84.07
	09/01/2025	\$57.80	\$9.90	\$17.77	\$0.00	\$85.47
	03/01/2026	\$59.20	\$9.90	\$17.77	\$0.00	\$86.87

For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

SPECIAL PROVISIONS

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2022 MassDOT Highway Division Standard Specifications for Highways and Bridges*, the *English Supplemental Specifications*, the *2017 MassDOT Highway Division Construction Standard Details*; the *2020 MassDOT LRFD Bridge Manual*; the *1990 Standard Drawings for Signs and Supports*; the *1990 Standard Drawings for Signs and Supports*; the *2009 Manual on Uniform Traffic Control Devices (MUTCD)* with *Massachusetts Amendments* and the *Standard Municipal Traffic Code*; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; the latest edition of *American Standard for Nursery Stock*; the Plans and these Special Provisions.

The existing culvert at approximately 119 Fitzpatrick Road in Grafton, MA will be demolished and replaced with a three-sided precast concrete box culvert supported on spread footings. There will be adjacent precast concrete wingwalls at all four corners of the proposed culvert. The proposed culvert and spread footings shall be contractor designed in accordance with these special provisions. There will be new guardrail installed over the culvert and at all four bridge approaches with compliant end treatments, as required. The road will be closed during construction and the contractor shall be responsible for providing all necessary signage and barricades required by the traffic management Plans. The work to be done under this contract includes all design, equipment, materials, labor, and incidentals required to complete all work shown on the Plans.

CONTRACTOR QUESTIONS AND ADDENDUM ACKNOWLEDGEMENTS

Prospective bidders are required to submit all questions to the Engineer by Thursday, December 12, 2024 at 12:00 P.M. Any questions received after this time will not be considered for review by the Town or the Engineer.

MASSHIGHWAY TO MASSDOT NAME CHANGE

The following definitions in Section 100 of the Standard Specifications for Highways and Bridges are revised as follows:

(Amend definition of Department)

- 1.17 –DepartmentEffective November 1, 2009, St. 2009, c. 25 abolishes the Massachusetts Department of Highways and all assets, liabilities, and obligations become those of the Massachusetts Department of Transportation (MassDOT). Anywhere in this contract the terms Commission, Commonwealth, Department of Public Works, Department, Massachusetts Highway Department, MassHighway, Party of the First Part, or any other term intending to mean the former Massachusetts Department of Highways is used, it shall be interpreted to mean MassDOT or applicable employee of MassDOT unless the context clearly requires otherwise. Furthermore, MassDOT by operation of law inherited all rights and obligations pursuant to any contract, and therefore parties to this contract hereby acknowledge and agree that its terms shall be liberally construed and interpreted to

maintain the rights and obligations of MassDOT. Furthermore, the parties hereby acknowledge and agree that the transfer of all rights and obligations from the Massachusetts Department of Highways to MassDOT shall not have the effect of altering or eliminating any provision of this contract in a manner that inures to the detriment of MassDOT.

(Add a definition for MassDOT)

1.46 – MassDOT The Massachusetts Department of Transportation, a body politic and corporate, under St. 2009, c. 25 “An Act Modernizing the Transportation Systems of the Commonwealth”, as amended.

SUBSECTION 4.04 CHANGED CONDITIONS.

This Subsection is revised by deleting the two sequential paragraphs near the end that begin “The Contractor shall be stopped...” and “Any unit item price determined ...” (1/6/2006).

ARCHITECTURAL ACCESS BOARD TOLERANCES

The Contractor is hereby notified that they are ultimately responsible for constructing all project elements in strict compliance with the current AAB/ADA rules, regulations and standards. All construction elements in this project associated with sidewalks, walkways, wheelchair ramps and curb cuts are controlled by 521CMR - Rules and Regulations of the Architectural Access Board (AAB). The AAB Rules and Regulations specify maximum slopes and minimum dimensions required for construction acceptance. There is no tolerance allowed for slopes greater than the maximum slope nor for dimensions less than the minimum dimensions. Contractors shall establish grade elevations at all wheelchair ramp locations and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans). All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked and checked prior to placing cement concrete. All grade changes are to be made at joints.

MATERIAL TESTING

The Contractor shall obtain the services of a qualified material testing company to provide in-situ compaction, concrete, and other material testing as ordered by the Resident Engineer. No separate payment will be made, and all costs associated with material testing shall be considered incidental to various contract items.

MOBILIZATION

The unit bid price for Mobilization (Item 748.) shall not exceed 3% of the contract bid total, exclusive of this item. Failure to observe this requirement could result in rejection of the bid.

SUBSECTION 8.06 LIMITATIONS OF OPERATIONS

Add/amend the following at the end of the Section:

WORK SCHEDULE

This contract contains the following work restrictions:

No work shall be done on this Contract on Saturdays, Sundays, on holidays or on the day before or after the day after a long weekend that involves a holiday without prior approval of the Engineer.

Work on this project is restricted to a normal 8-hour, 5-day week, between 7:00 AM to 5:00 PM, with the Prime Contractor and all Subcontractors working on the same shift. The Contractor shall give notice to the Engineer at least 48 hours in advance of beginning any work affecting the public use of the roadway, other than the closure for the detour.

PROPERTY BOUNDS

The Contractor shall exercise due care when working around all property bounds, which are to remain. Should any damage to a bound result from the actions of the Contractor, the bound shall be replaced and/or realigned by the Contractor as directed by the Engineer. No further compensation will be due to the Contractor for the materials and labor required to re-establish the bound in its proper position.

DESIGNER/PROJECT MANAGER

DESIGNER
TEC, Inc.
Greg Gaudreau, P.E.
978-794-1792

PROTECTION OF UNDERGROUND FACILITIES

The Contractor's attention is directed to the necessity of making his own investigation in order to assure that no damage to existing structures, drainage lines, traffic signal conduits, etcetera, will occur.

The Contractor shall notify Massachusetts DIG SAFE and procure a Dig Safe Number for each location prior to disturbing existing ground in any way. The telephone number of the Dig Safe Call Center is 811 or 1-888-344-7233.

TRAFFIC CONTROL

A traffic detour is shown on these plans. This detour shall be closely coordinated with the Town of Grafton. The Contractor shall give the Town 3-weeks' notice prior to implementing the detour. The Contractor shall install Variable Message Boards in plain view for traffic traveling each direction 2 weeks prior to the implementation of the detour (considered incidental to Item 852.).

PUBLIC SAFETY AND CONVENIENCE

(Supplementing Subsection 7.09)

The Contractor shall without additional compensation be required to provide safe and convenient access to all abutters during the prosecution of the work, except for such periods at such locations as may be authorized in writing by the Engineer.

NOTICE TO OWNERS OF UTILITIES

(Supplementing Subsection 7.13)

Written notice shall be given by the Contractor to all public service corporations or municipal and State officials owning or having charge of publicly or privately owned utilities of his intention to commence operations affecting such utilities at least one week in advance of the commencement of such operations. The Contractor shall, at the same time, file a copy of such notice with the Resident Engineer. The Contractor's attention is further directed to the requirements of work in the immediate vicinity of certain underground structures and poles herein included in these Special Provisions.

A list of public and private utilities can be found on the MassDOT Highway Division website at: <http://www.massdot.state.ma.us/> Select Quick Links → Doing Business with us → Design/Engineering → Utility Contacts → District 4 → (GRAFTON), and then locate the utility. The Contractor shall inform the following officials in each area that he is assigned to work: Superintendent, DPW, Superintendent, Water & Sewer Department, Police and Fire Departments.

CONSTRUCTION SPECIFICATIONS

Please refer to the MassDOT *Standard Specifications for Highways and Bridges* dated 2022 for standard items. The following items are not standard and are provided to supplement the contract.

- Item 120. – Earth Excavation
- Item 120.1 – Unclassified Excavation
- Item 402. – Dense Graded Crushed Stone for Sub-Base
- Item 630.2 – Highway Guard Removed and Discarded
- Item 691. – Balance Stone Wall Removed and Rebuilt
- Item 697.2 – Floating Silt Fence
- Item 698.1 – Geotextile Fabric for Stabilization
- Item 698.4 – Geotextile Fabric for Permanent Erosion Control
- Item 755.35 – Inland Wetland Replication Area
- Item 755.75 – Wetland Scientist
- Item 755.76 – Wetland Monitoring Reports
- Item 767.121 – Sediment Control Barrier
- Item 983.521 – Streambed Restoration
- Item 986.2 – Modified Rockfill
- Item 991.1 – Control of Water, Structure No. G-08-061 (C97)
- Item 995.01 – Bridge Structure, Bridge No. G-08-061 (C97)

ITEM 120.

EARTH EXCAVATION

CUBIC YARD

GENERAL

The work under this item shall conform to the relevant provisions of Sections 101 and 120 of the Standard Specifications and the following:

The work shall include the excavation of material which is otherwise not classified and paid for under another item and as directed by the Resident Engineer.

METHOD OF MEASUREMENT

Item 120. Earth Excavation shall be measured per CUBIC YARD in the original position by the cross-section method or by such other method as the Resident Engineer may determine.

BASIS OF PAYMENT

Item 120. Earth Excavation shall be paid at the Contract unit price for CUBIC YARD of excavation, which price shall include all labor and material required to perform the work.

No separate payment shall be made for the off-site disposal of all existing material unsuitable for reuse in the proposed work, but all costs in connection therewith shall be included in the price bid for earth excavation.

ITEM 120.1

UNCLASSIFIED EXCAVATION

CUBIC YARD

GENERAL

The work under this item shall conform to Section 120 of the Standard Specifications and the following:

The excavation required to remove existing walls of brick, cement concrete (reinforced or non-reinforced, granite, or stone, and existing pavements of hot mix asphalt, cement concrete (reinforced or non-reinforced, brick, or cobblestone that measure less than 1 cubic yard and do not require blasting or power tools (such as jackhammers, etc.) for removal shall be included under this item.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 120.1 Unclassified Excavation shall be measured per CUBIC YARD of excavation.

BASIS OF PAYEMENT

Item 120.1 Unclassified Excavation shall be paid at the Contract unit price per CUBIC YARD of excavation, which price shall include all labor and material required to perform the work.

No separate payment shall be made for the off-site disposal of all existing material unsuitable for reuse in the proposed work, but all costs in connection therewith shall be included in the price bid for earth excavation.

ITEM 402.

**DENSE GRADED CRUSHED STONE FOR SUB-
BASE**

CUBIC YARD

GENERAL

Work under this Item shall conform to the relevant provisions of Section 402 of the MassDOT Standard Specifications and the following:

CONSTRUCTION METHODS

The Dense Graded Crushed Stone shall be placed in successive layers not more than 6 inches in depth, each layer thoroughly compacted by a method approved by the Resident Engineer.

METHOD OF MEASUREMENT

Item 402. Dense Graded Crushed Stone for Sub-Base shall be measured by the CUBIC YARD, complete-in-place and approved.

BASIS OF PAYMENT

Item 402. Dense Graded Crushed Stone for Sub-Base shall be paid for at the Contract unit price per CUBIC YARD which price shall constitute full compensation for furnishing all labor, including handwork, tools, equipment, materials, supplies, transportation, installation, and all other incidentals necessary to complete the work.

ITEM 630.2

HIGHWAY GUARD REMOVED AND DISCARDED

FOOT

GENERAL

The work under this Item shall conform to Section 630 of the Standard Specifications and the following:

The work under this Item shall include the removal of existing steel highway guard at the locations shown on the plans and as directed by the Engineer.

The steel rails, posts, and all hardware shall be discarded by the contractor as part of this item. All rails, posts and/or hardware designated to be discarded shall be carefully removed, transported and discarded in accordance with all applicable regulations.

METHOD OF MEASUREMENT

Item 630.2 Highway Guard Removed and Discarded shall be measured by the FOOT of railing removed.

BASIS OF PAYMENT

Item 630.2 Highway Guard Removed and Discarded shall be paid at the Contract unit price per FOOT, which price shall include all labor, equipment, materials and all incidental costs required to complete the work.

ITEM 691

**BALANCE STONE WALL REMOVED AND
REBUILT**

FOOT

GENERAL

The work under this Item shall conform to Section 690 of the Standard Specifications and the following:

The work under this Item shall include the removal and rebuilding of the existing stone wall adjacent to the road northwest of the proposed structure and as directed by the Engineer.

MATERIALS

The stone shall consist of those present in the wall and its foundation and such new stones as may be required.

CONSTRUCTION

All stones from the present walls to be rebuilt, shall be removed and used to rebuild the new wall in addition to furnishing such new stones as may be necessary to provide rebuilt walls of uniform appearances and cross-sectional dimension throughout their length.

METHOD OF MEASUREMENT

Item 691 Balance Stone Wall Removed and Rebuilt shall be measured by the FOOT in-place and shall be the length of balance stone walls rebuilt.

BASIS OF PAYMENT

Item 691 Balance Stone Walls Removed and Rebuilt shall be paid at the Contract unit price per FOOT, complete in place.

ITEM 697.2

FLOATING SILT FENCE

FOOT

GENERAL

Work under this Item shall conform to the relevant provisions of Section 670 of the Standard Specifications and the following:

Work under this Item shall include installation, maintenance, and removal of a temporary floating silt fence to prevent any sediment disturbed during construction from reaching adjacent waterways and to prevent any further sediment dispersion into Cronin Brook. The fence shall be installed downstream of the existing culvert, as shown on the Plans.

MATERIALS

Floating silt fence shall be made of a woven polypropylene with a minimum 200 lb. tensile strength. The Contractor shall submit to the Engineer, for review and approval, product specifications and technical data provided by the manufacturer, prior to installation. The fence shall be continuously weighted at the bottom to maintain a vertical submerged position. Anchors shall be placed at both ends of the curtain and at intermediate locations, as necessary, to hold the fence securely in place. The fence shall be installed to withstand the forces of the flow of the waterway.

INSTALLATION

Floating silt fence shall be installed before construction begins and earth is disturbed. Silt fences shall be inspected and approved by the Town of Grafton Conservation Commission after installation and prior to commencement of further construction activities.

The Contractor shall inspect silt fence weekly to ensure continuous effectiveness. The Contractor shall always maintain the intent of the fence by making any/all necessary adjustments, should the need arise. If any part of the fence becomes damaged or dislodged, construction activities shall be halted until all deficiencies are corrected by the Contractor with no additional compensation. The floating silt fence shall be removed after all construction activities are completed and in such a way that no collected sediment is dispersed into waterways.

METHOD OF MEASUREMENT

Item 697.2 Floating Silt Fence shall be measured per FOOT installed.

BASIS OF PAYMENT

Item 697.2 Floating Silt Fence shall be paid for at the Contract unit price per FOOT installed. This item shall include full compensation for all labor, equipment, maintenance, materials, and incidentals required to complete the work for the duration of the Contract.

ITEM 698.1**GEOTEXTILE FABRIC FOR STABILIZATION****SQUARE YARD****GENERAL**

The work under this Item shall conform to the Standard Specifications of Section M9.50.0 for the intended application, and the following:

The work under this item shall consist of furnishing and placing of geotextile fabric for stabilization under the crushed stone beneath the precast box culvert and wingwall footings as shown on the Plans and as directed by the Engineer.

The geotextile fabric shall be handled and installed per the manufacturer's recommendations.

MATERIALS

Filter fabric shall be a material suitable for the intended applications and shall be selected from the most current version of the Qualified Construction Materials List (QCML) for Geotextile Fabrics found at:

<https://www.mass.gov/service-details/qualified-construction-materials-list>

METHODS

Geotextile shall be placed in direct contact with soils without wrinkles or folds and shall be anchored on a smooth graded surface approved by the Engineer. The geotextile shall be placed in such a manner that placement of the overlaying materials will not excessively stretch or tear it.

Adjacent geotextile sheets shall be joined by either sewing or overlapping. At roll ends, overlapped seams shall overlap a minimum of 12 inches, except when placed under water, where they shall overlap a minimum of 3 feet. Adjacent rolls shall overlap a minimum of 12 inches.

Care shall be taken during the placement of crushed stone to avoid stretching and subsequent tearing of the geotextile. Stones shall not be dropped from a height exceeding 3 feet.

Field monitoring shall be performed to verify that the crushed stone placement does not damage the geotextile.

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and AASHTO M 288 and to the satisfaction of the Engineer or it shall be replaced at the Contractor's expense.

METHOD OF MEASUREMENT

Item 698.1 Geotextile Fabric for Stabilization shall be measured by the SQUARE YARD furnished and installed. Overlapping for seams and joints shall be measured as one layer of fabric.

BASIS OF PAYMENT

Item 698.1 Geotextile Fabric for Stabilization shall be paid for at the contract unit bid price per SQUARE YARD furnished and installed. This item shall include full compensation for all labor, materials, equipment, and incidental costs required to complete the work.

ITEM 698.4**GEOTEXTILE FABRIC FOR PERMANENT
EROSION CONTROL****SQUARE YARD****GENERAL**

The work to be performed under this Item shall conform to the relevant provisions of Section M9.50.0 and AASHTO M 288 for the intended application, and the following:

The work under this Item includes the furnishing and installation of geotextile fabric for proposed riprap and rockfill slopes in accordance with the details shown on the Plans at locations shown on the Plans, and as required by the Engineer.

MATERIAL

Filter fabric shall be selected from the most current version of the Qualified Construction Materials List (QCML) for Geotextile Fabrics found at:

<https://www.mass.gov/service-details/qualified-construction-materials-list>

The geotextile fabric shall conform with AASHTO M 288, Class 1, for fabric used for permanent erosion control. Construction and installation shall be in accordance with AASHTO M 288 including Appendix A and the following:

METHODS

Atmospheric exposure of the geotextile fabric to the elements following lay down shall be limited to a maximum of 14 days.

For seams that are sewn in the field, the Contractor shall provide at least a six-foot length of sample sewn seam for the approval of the Engineer before the geotextile fabric is installed. The seams sewn for sampling shall be sewn using the same type of equipment and procedures as will be used for the production seams. If seams are sewn in both the machine and cross machine direction, samples of seams for both directions shall be provided. The seam assembly description shall be submitted by the Contractor along with the seam samples. This description shall include the seam type, stitch type, sewing thread, and stitch density. If the Contractor elects to sew seams instead of overlap, colored thread must be used.

Geotextile shall be placed in direct contact with soils without wrinkles or folds and shall be anchored on a smooth graded surface approved by the Engineer. The geotextile shall be placed in such a manner that placement of the overlaying materials will not excessively stretch or tear it.

Adjacent geotextile sheets shall be joined by either sewing or overlapping. At roll ends, overlapped seams shall overlap a minimum of 12 inches, except when placed under water, where they shall overlap a minimum of 3 feet. Adjacent rolls shall overlap a minimum of 12 inches.

Care shall be taken during the placement of crushed stone and riprap to avoid stretching and subsequent tearing of the geotextile. Stones shall not be dropped from a height exceeding 3 feet.

Field monitoring shall be performed to verify that the crushed stone and riprap placement does not damage the geotextile.

ITEM 698.4 (CONTINUED)

Any section of fabric that is damaged shall be repaired in accordance with the manufacturer's requirements and AASHTO M 288 and to the satisfaction of the Engineer or it shall be replaced at the Contractor's expense.

If during construction, including any time prior to final acceptance of the project by MassDOT, the slope shall exhibit signs of failure, the slope shall be repaired and the geotextile fabric reinstalled or replaced by the Contractor, as required by the Engineer, at Contractor's expense.

METHOD OF MEASUREMENT

Item 698.4 Geotextile Fabric for Permanent Erosion Control shall be measured per SQUARE YARD furnished and installed. Overlapping for seams and joints shall be measured as one layer of fabric.

BASIS OF PAYMENT

Item 698.4 Geotextile Fabric for Permanent Erosion Control shall be paid for at the contract unit bid price per SQUARE YARD for work which shall include, but not limited to, all labor, tools, equipment, materials, and appurtenance necessary and incidental to complete the work described under this Item.

ITEM 755.35

INLAND WETLAND REPLICATION AREA

LUMP SUM

GENERAL

The work under this item shall conform to the relevant provisions of Subsections 120, 770, 771 of the Standard Specifications and the following:

Work under this item shall include furnishing material and the construction and maintenance of inland wetland replication areas as shown on the drawings and as required by the Engineer. Inland Wetland Replication Area shall hereafter be referred to as Replication Area. All work shall be in coordination with an approved Wetland Specialist.

Replication Area shall be constructed after the bridge construction is completed unless otherwise approved by the Engineer, specified herein, or specified in permit conditions and approvals. Construction schedule shall be appropriate to planting and seeding season (see below). Changes to this schedule will require written approval from the Engineer.

DESCRIPTION OF WORK

Construction of the Replication Area shall be completed as shown on the drawings at the following location:

Area/s A at Station: 100+85, 25' LT to 100+95, 80' LT Area = 220 sf.

Replication Area shall be constructed to meet the requirements of all associated permits and certifications, including relevant performance standards of the Massachusetts Wetlands Protection Act (MGL C. 131, s40), Section 401 Water Quality Certification, and Section 404, U.S. Army Corps of Engineers Permit.

The Contractor is responsible for protection and preservation of natural areas adjacent to the Replication Area both within and outside the project limits and for the duration of the Contract. Damage to soils or vegetation due to sedimentation, compaction, trampling, vehicles, storage of materials, or other negligence shall be repaired to the satisfaction of the Engineer and at the Contractor's expense.

The Wetland Specialist overseeing the wetland construction work shall not be from the same company as that planting, seeding, or participating in any aspect of the wetland construction.

SUBMITTALS – DOCUMENTS

Request for Conditional Acceptance: As specified below, a letter requesting Conditional Acceptance of the work and the site conditions shall be submitted to the Engineer.

Request for Certificate of Compliance (Partial or Full): As specified below, shall be submitted to the Engineer for distribution to appropriate regulatory agencies.

Request for Final Acceptance: As specified below, a letter requesting Final Acceptance of the work and the site conditions shall be submitted to the Engineer.

Monitoring Reports: Reports shall be submitted to the Engineer as specified below. Reports shall be compensated under Item 755.76.

ITEM 755.35 (CONTINUED)

SUBMITTALS - MATERIAL

Soil and Amendments

No soil, compost, or other soil amendment imported to the work site shall contain seeds, roots, stems, or other viable parts of invasive plants.

At least sixty (60) days prior to installation, the Contractor shall submit for approval all sources of soil and amendments, including compost, prior to ordering. Off-site sources shall be identified and available for inspection by the Wetland Specialist prior to transport of material to the site to verify that they are likely to be free of invasive plant species, including all viable plant parts.

Samples of tested and approved wetland soil and soil amendments for soil texture, organic carbon content or other routine soil analysis parameters (e.g., pH, Cation Exchange Capacity, Percent Base Saturation) and Soil Organic Matter Analysis will be required if requested by the Engineer. The grab samples shall be collected by the Contractor or Wetland Specialist from multiple representative locations in the wetland topsoil mix following the "UMass Soil and Plant Tissue Testing Laboratory Sampling and Collection Protocols" (or equivalent certification paperwork provided by the soil supplier). The lab analysis shall be provided to the Engineer along with written certification from the Contractor or Wetland Specialist that the wetland topsoil was collected per the referenced protocol and meets the desired specification. The analysis and written certification of same shall be provided to the Engineer prior to placing the wetland topsoil in the Replication Area.

Seed Mix

Certificate of Materials from the supplier shall be submitted 30 days prior to seeding and must be approved prior to ordering materials. Seed species listed on the certificate shall include ecotype region (i.e., *Asclepias incarnata*, PA Ecotype).

Seed Tag from the bag of seed used shall be submitted to the Engineer at the time of seeding. Seed tag shall include ecotype region and species, shall match the Certificate of Materials, include the name of the supplier, and date material was sent.

Bill of Lading or Notarized Certificate of Compliance from the Supplier serving as proof of purchase shall be submitted if requested by the Engineer. Document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag.

Plant Certification

Plant Certification shall be per the applicable requirements of Section 771, PLANTING TREES, SHRUBS AND GROUND COVER, of the latest edition of the Standard Specifications. The nursery source shall certify the provenance or origin of all plants.

Other Material: Submittals shall be per the respective item.

ITEM 755.35 (CONTINUED)

MATERIALS

Sediment Control Barrier and Erosion Control Measures

Compost filter tube control barriers shall be per Item 767.121.

Coir Log sediment barrier shall be made from coir fiber, bound by coir twine and be free of synthetic netting or chemical additives. Coir logs shall have an installed functional longevity of 2-5 years, be composed of 100% Coir 6.37 lbs/ft³, and be able to absorb 150-200% water by weight without experiencing physical alterations. Coir log sediment barrier shall be paid for Item 755.35.

Temporary erosion control for disturbed areas adjacent to wetland shall be compost blanket, jute mesh, or seeding with an appropriate and approved mix

Sediment and erosion controls shall be compensated under the respective items.

Wetland Soil

Wetland soil for the Replication Area may be either soil excavated from impacted wetland area or manufactured soil.

If using soil from the impacted wetland area, soil shall be handled such that the original soil structure is preserved and shall not be compacted, screened, or otherwise processed. Wetland soil from the impacted wetland that is infested with invasive plant species shall not be used in the Replication Area, unless approved by the Wetland Specialist. To the extent possible, that infested soil shall be disposed of within the project limits in an upland area or buried at least three feet deep.

Manufactured soil suitable for wetlands shall consist of on-site borrow from the proposed replication site (if approved by the Wetland Specialist) thoroughly mixed with compost to achieve a target organic carbon content of 10-12% by weight. Compost to soil ratio shall be 1:1 by volume. Off-site borrow may be used for mixing if approved in advance by the Engineer.

No soil or soil amendment shall be brought on site without approval of the material source by the Wetland Specialist and the Engineer. Soils used in the replacement area shall be free of rocks greater than 4 inches in diameter.

Plants

Plant material shall conform to the applicable requirements of Section 771, PLANTING TREES, SHRUBS AND GROUND COVER, of the latest edition of the Standard Specifications and as amended below.

Plants shall be native species, not cultivars. To the extent possible, plants shall originate from the applicable EPA Level III Ecoregion.

Plant species and sizes to be included in the Replication Area shall be as specified on the plans.

ITEM 755.35 (CONTINUED)

Requests for substitutions shall be submitted in writing to the Engineer for review by the Wetland Specialist, MassDOT Landscape Architect, and, if required, the relevant regulatory agency at least thirty (30) days prior to planting. All proposed substitutes shall be in conformance with the requirements herein and suitable for the site conditions.

Transplanting and plant material collected from the wild is prohibited unless approved in writing by the Engineer. Plants shall be selected from certified nurseries that have been inspected by state and/or federal agencies.

Seed Mix

Seeding shall conform to the Standard Specifications Subsection M6, ROADSIDE DEVELOPMENT MATERIALS.

Conservation Seed Mix – Shade Tolerant Mix with Annual Rye

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS by Weight</u>
Grass			
	Elymus virginicus	Virginia Wild Rye	20.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	20.00%
	Festuca rubra	Creeping Red Fescue	18.00%
	Elymus riparius	Riverbank Wild Rye	12.00%
	Lolium multiflorum	Annual Ryegrass	12.00%
	Agrostis perennans	Upland Bentgrass	5.00%
	Carex vulpinoidea	Fox Sedge	3.00%
			90.00%
Herb/Forb			
	Chamaecrista fasciculata	Partridge Pea	4.00%
	Rudbeckia hirta - VT ecotype	Black-eyed Susan - VT ecotype	3.00%
	Penstemon digitalis	Beard-tongue	1.00%
	Aster prenanthoides	Zig Zag Aster	0.50%
	Aster laevis	Smooth Aster	0.50%
	Aster divaricatus	White Wood Aster	0.50%
	Solidago nemoralis	Grey Goldenrod	0.50%
			<hr/>
			10.00%
			<hr/>
			100.00%

Seeding Rate:

Apply this mix at 30 lbs PLS/acre.
No cover crop.

ITEM 755.35 (CONTINUED)

Wetland Seed Mix – Part Shade

	<u>Botanical Name</u>	<u>Common Name</u>	<u>% PLS by Weight</u>
Grass	Carex vulpinoidea	Fox Sedge	32.50%
	Elymus virginicus	Virginia Wildrye	20.00%
	Carex scoparia	Broom sedge	15.00%
	Carex lurida	Shallow Sedge	12.40%
	Cinna arundinacea	Sweet Woodreed	7.00%
	Juncus effuses	Soft Rush	3.00%
	Sparganium americanum	Eastern Bur Reed	1.00%
	Carex intumescens	Bladder Sedge	1.00%
	Scirpus cyperinus	Woolgrass	0.50%
			92.40%
Herb/Forb	Verbena hastata	Blue Vervain	4.00%
	Helipis helianthoides	Oxeye Sunflower	2.00%
	Eupatorium perfoliatum	Boneset	0.50%
	Vernonia noveboracensis	New York Ironweed	0.50%
	Lobelia siphilitica	Great Blue Lobelia	0.30%
	Penthorum sedoides	Ditch Stonecrop	0.30%
			<hr/> 7.60%
			<hr/> 100.00%

Seeding Rate:

Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre. Fertilizers shall not be used.

Water

The Contractor shall provide water and all equipment required at no extra cost. Water shall be suitable for irrigation and free from ingredients harmful to plants and wildlife. Water from the adjacent water bodies or waterways shall not be utilized. It is the Contractor's responsibility to correct injury or damage due to the lack of water, too much water, or use of contaminated water.

Mulch/Topdressing for Seeding

Hydromulch shall be per the manufacturer's recommendations and shall be wood fiber or straw mulch only. Compost topdressing, if used, shall meet the material and submittal requirements of that Item and shall be applied as specified below. Mulch or compost topdressing for seeding shall be incidental to this item.

ITEM 755.35 (CONTINUED)

CONSTRUCTION METHODS & SEQUENCE

SITE PROTECTION MEASURES

Minimizing Damage

The Contractor shall plan and execute operations in a manner minimizing the amount of excavated and exposed fill or other foreign materials that could be washed or otherwise carried into Replication Area and nearby resource areas.

Construction of and access to the Replication Area shall minimize damage to existing vegetation and soils as specified herein. Damage to soils or vegetation shall be repaired to the satisfaction of the Engineer and at the Contractor's expense. If required for soil remediation, tilling and the addition of compost shall be at the Contractor's expense.

The Contractor shall use boards, mats, or other approved material as necessary, to protect existing and/or new wetlands from compaction due to heavy foot traffic or if equipment is required to travel over wetland soil. All labor and materials required for protection and preservation of site shall be incidental to this item.

Stockpiling of Soil

Stockpiling of soil, including hydric soil for replication, shall be outside the wetland resource area and at least 100 feet from the edge of the wetland unless approved otherwise by the Engineer. Stockpiled soils shall be securely stabilized and contained. In the event that there is excess borrow, it shall be disposed of under Excavation, Item 120.1.

Sediment Barriers

Placement: Sediment barriers shall be installed along the downslope perimeter of the Replication Area beginning and ending in the surrounding upland so that no excavated material or disturbed soil can enter adjacent wetlands or waters. Where construction work is immediately upgradient of the wetland, barriers shall be located so as to protect the Replication Area until slopes are stabilized. Sediment barriers shall be in place and approved by the Engineer prior to excavation work. No work shall take place outside the barriers.

Maintenance: The Contractor shall ensure that all sediment barriers function as intended and at all times per the specifications of those respective items.

Existing Trees to Remain

Tree protection shall be per the relevant specifications and as shown on the plans or as required by the Engineer. To protect root systems of existing trees to remain, the limits of the Replication Area may be adjusted, but the total area of replication required by the permits shall not be reduced. Access route may be adjusted as required.

ITEM 755.35 (CONTINUED)

Trees to be retained as snags (upright dead or dying trees left for wildlife habitat) within or adjacent to the Replication Area shall be as shown on the plans or as directed by the Wetland Specialist or Landscape Architect during the initial site walk. Trees to remain as snags shall be clearly marked prior to clearing. Trees that pose a potential fall hazard (i.e., are near a roadway) should have limbs and trunk cut such that the tree does not pose a fall hazard.

Coarse woody debris in the form of cut trees, stumps, logs, and brush shall be incorporated as shown on the plans or as directed by the Wetland Specialist or Landscape Architect. On site material shall be selected and marked by the Wetland Specialist, retained on the project site, and placed as specified below under Incorporation of Coarse Woody Debris.

All trees, stumps, or brush not specified to remain shall be removed and shall not be stockpiled in the wetland resource areas while awaiting disposal.

Work shall be coordinated with Clearing or Tree Removal Item and compensated under that Item.

PRE-WETLAND CONSTRUCTION SITE WALK

Delineating the Replication Area and Access Route. The Contractor shall stake out the Replication Area boundaries and the intended access route and set grade stakes for approval by the Wetland Specialist and Engineer. Following staking and demarcation of areas, the Engineer and Wetland Specialist shall approve or modify as necessary the limits of work, the access route, final location and configuration of replication, grade stake elevations, proposed location of sediment barriers, and review proposed construction methods.

As part of the delineation and approval process, the Wetland Specialist shall mark trees to be converted to snags, select coarse woody debris to be retained for re-use, and select rocks or other elements to be used for habitat features.

Invasive Plants: As part of the initial site walk, the wetland to be impacted and the proposed replication site shall be inspected for the presence of invasive plants. If invasive plants are found they shall be addressed as described herein under Invasive Plants.

SOIL WORK

Final grades in the Replication Area shall meet the target elevations as shown on the Plans or as adjusted by the Wetland Specialist. If adjustments are required, a Request for Information (RFI) shall be submitted to the Engineer for approval. Adjustments shall be documented and included in the As-Built plans (if required) and/or other applicable required documents.

Excavation & Grading

When required by permits, the Wetland Specialist shall notify MADEP at least 72 hours prior to excavation.

ITEM 755.35 (CONTINUED)

Excavate replication area as shown on the drawings or to a depth of 12 inches if no depth is shown. Where replication area is adjacent to existing wetland, finish grade of replication shall match existing.

Prior to placement of backfill, scarify subgrade to a depth of 4 to 6 inches.

Soil in the proposed wetland areas that must be removed for grades to conform to the proposed elevations shall be stripped and disposed of, or, if suitable for reuse, be stockpiled in an approved location. Stockpiled soils shall be kept wet and not allowed to dry out. Procedures for maintaining appropriate moisture levels shall be documented by the Wetland Specialist and provided to the Engineer and the Contractor.

Placement of Wetland Soil

Following excavation and scarification and grading of sub-grade, and after the sub-grade elevations are approved by the Wetland Specialist, suitable soil previously removed or manufactured soil shall be spread over the proposed wetland areas as shown on the plans and as directed by the Wetland Specialist.

Vehicles used to transport soil from offsite shall be washed or cleaned with air pressure to prevent exotic or invasive seeds or root fragments from contaminating the replication area.

Final Grading

The finished grade of the Replication Area shall be at an elevation that will provide a hydrologic connection between the Replication Area and adjacent resource areas. The hydrologic connection should be in keeping with restoring the intended function of the replacement wetland. The Contractor shall verify that this elevation is not at a level that could negatively alter the hydrology of an adjacent wetland. Microtopography in the form of hummocks, pits and mounds shall be as shown on the plans or as adjusted by the Wetland Specialist. Final elevations and grading of wetland soil shall be approved by the Wetland Specialist and the Engineer.

To avoid compaction once soil has been placed, no heavy equipment shall travel across placed soil and no work shall occur in wet or moist soil. Soil that is compacted due to construction activities shall be replaced with soil as specified herein and at the Contractor's expense.

RESTORING VEGETATION

Incorporation of Coarse Woody Material

If specified within this Contract or if directed by the Wetland Specialist or Landscape Architect during the initial site walk, woody debris shall be incorporated into the Replication Area and/or adjacent upland buffer. Material shall be placed as shown on the plans or as directed following placement of wetland soil and prior to application of compost and/or seed. Woody material shall cover a minimum of 5-20 percent of the Replication Area, depending on whether it is a meadow or woodland wetland and how much wood is available from construction clearing. Where trees are cut for construction purposes, logs of a minimum length of 8 feet must comprise a minimum of 50% of the woody material left on site. Brush shall be included along with logs and stumps as directed. Woody material shall be placed in a deliberate and naturalistic manner.

ITEM 755.35 (CONTINUED)

Planting

Following placement of wetland soil and approval of final grade and conditions, Replication Area shall be planted. Planting shall conform to SECTION 771 PLANTING TREES, SHRUBS AND GROUND COVER of the Division I Standard Specifications and as amended below.

Planting Season shall be May 15-June 15 and September 1-November 1 unless approved following written request from the Contractor. Prior to planting, the Wetland Specialist shall approve the condition of the plant material and the method of installation and shall oversee the planting work. Replication Area shall be planted in the dry and according to the planting details within the range of target elevations and at the spacing shown on the Plans or, if spacing is not indicated on the Plans, at the direction of the Wetland Specialist. Unless otherwise noted on the Plans, final plant locations shall be determined on site and located with regard to expected hydrology, plant growth characteristics, habitat desired, and water protection.

Plant material shall be installed as soon as possible after delivery. Plants stored on-site prior to installation shall be stored in the shade and watered twice daily up until time of installation. Plants showing signs of stress or compromised health may be rejected by the Engineer or Wetland Specialist with replacement at the Contractor's expense.

Plant material shall be furnished and installed as indicated including all labor, materials, plants, equipment, incidentals, re-setting of plants (frost heaves, etc.) irrigation, re-planting and clean up. If previously approved species

Seeding

Following placement of wetland soil and planting (if included), the Replication Area shall be seeded using one of the following methods:

- Hand broadcast seed and straw mulch.
- Seeding with hydromulch per the Standard Specifications and per the manufacturer's directions.
- Hand broadcast seed with compost topdressing pneumatically applied at the same time to ensure light cover of soil topdressing over seed.

If required, seeding limits for different seed mixes shall be determined by the Wetland Specialist.

PLANT ESTABLISHMENT AND INVASIVE MANAGEMENT

Plants shall be watered as necessary to maintain healthy establishment. Plants that fail by September 1 after spring planting or by May 15 after fall planting shall be replaced within the immediate or next planting period and at the Contractor's expense.

Seeding that fails to established shall be over-seeded as required by the Engineer. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding. Weed control is incidental to this item.

Invasive Plants: Corrective measures shall be taken to remove or treat invasive plant species in the Replication Areas. Invasive plants shall include those listed as invasive by Massachusetts Invasive Plant Advisory Group (MIPAG) and the US Army Corp of Engineer's New England District's Compensatory Mitigation Guidance.

ITEM 755.35 (CONTINUED)

If chemical treatment of invasive plants is necessary, the strategy for treatment shall be as determined under Item 102.3 Invasive Plant Management Strategy. That strategy shall be coordinated with the Wetland Specialist and all applicable permits and permitting agencies. Chemical application under 102.33 Invasive Plant Management On-site shall be compensated under that Item and shall be for the duration of the contract only.

CONDITIONAL ACCEPTANCE OF WORK

Conditional Acceptance shall indicate approval of the wetland construction work and agreement that work has been done according to plan or modified as approved.

Upon completion of construction, the Contractor shall submit a Request for Conditional Acceptance that includes a brief narrative from the Wetland Scientist demonstrating that the construction work was done according to plans (or how modified) and meets required permit conditions. The narrative shall include photo documentation of pre-construction conditions as well as soil work, planting, and seeding. Seed tags shall be submitted as part of the Request for Conditional Acceptance.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist, and regulatory representative (if required) shall assess the Replication Area and surrounding areas. The following conditions shall be included in the narrative and reviewed as part of the on-site assessment of whether:

- The final finished target elevations have been met and maintained. Areas that are too high or too low should be identified along with suggested corrective measures.
- Hydrology meets performance standards.
- Specified seed mix has been seeded. If inspected 30 or more days after seeding, seeded species in the wetland and adjacent upland shall show signs of good germination and healthy growth.
- Planted woody and herbaceous species meet specifications and are establishing well.
- Soils are stabilized and there is no sediment in the wetland and no channeling of slopes.
- There are no invasive plants visible in the replication area.

Upon approval that the work meets the above conditions, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Replication work is not approved, MassDOT will issue a rejection letter requiring corrective actions. The Wetland Specialist shall recommend corrective actions. Work not approved shall be addressed by the Contractor at no extra cost.

Wetland Specialist shall be compensated under Item 755.75.

Erosion of adjacent slopes or the flow of sediments into the wetland between Conditional and Final Acceptance shall be immediately addressed by the Contractor.

REQUEST FOR CERTIFICATE OF COMPLIANCE

If required, a request for a Certificate of Compliance (Partial or Full) pursuant to the Massachusetts Wetlands Protection Act regulations shall be prepared and submitted to MassDOT within 30 days following Conditional Acceptance.

ITEM 755.35 (CONTINUED)

The Request for Certificate of Compliance shall include the following:

- A brief narrative of the work on company letterhead signed by the Wetland Specialist. Narrative shall be in MS Word document and shall include substantive explanation that demonstrates compliance with EACH relevant permit condition. Narrative shall note variations from the originally permitted design.
- As-built Drawings signed by the Contractor's PE registered in the Commonwealth of Massachusetts. As-built drawings shall show hydrologic conditions, status of plantings and seeding, and shall include a narrative and minimum of 4 photographs documenting site conditions. Plans should note variations from the originally permitted design.

When required, drawings shall meet the Army Corp of Engineer's New England District's Compensatory Replication Guidance, including: scale in the range of 1"=20' to 1" = 100', contours at 1' intervals, spot elevations for intermediate elevations, and polygons outlining each Replication Area, and, as applicable, plant community types. The As-built Drawings shall be provided to the Engineer electronically in Portable Document Format (PDF). If requested by the Engineer, the Drawings shall be provided in printed paper format (11" x 17" sheets, unless otherwise directed). Drawings must be scalable.

- Other documents as required.

FINAL ACCEPTANCE OF WORK

Following one full growing season, the Contractor shall submit a Request for Final Acceptance. Submittal shall include a brief narrative of conditions. Upon receiving the Request, the Engineer, Contractor, Wetland Specialist and regulatory representative (if required) shall assess the Replication Area. Final Acceptance will initiate the start of the Wetland Monitoring Period.

The following conditions shall be inspected and approved for acceptance and payment.

- Hydrology is functioning as intended.
- Seeded species are establishing well and cover 95 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered the wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.
- Silt fence and non-biodegradable sediment barrier materials have been removed.

If the mitigation work does not meet the above condition and is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions. Work not approved will be addressed by the Contractor at no extra cost.

Wetland Specialist shall be compensated under Item 755.75.

ITEM 755.35 (CONTINUED)

MONITORING REPORTS FOR REGULATORY COMPLIANCE

Post wetland construction Monitoring Reports shall be completed and submitted by the Wetland Specialist as specified and compensated under Item 755.76 Wetland Monitoring Reports.

Generally, the following conditions shall be met upon each inspection:

- Hydrology is functioning as intended.
- Seeded species are establishing well and cover 100 percent of the area, excluding areas of open water areas or planned bare soil.
- No sediments have entered into wetland.
- Adjacent slopes are stabilized with desirable vegetation.
- All planted species (if included) are living and establishing well.
- There are no visible invasive plants.

If, at the end of the required monitoring period, the requirements have not been met and success of the wetland replication area has not been achieved as determined by the Monitoring Reports, the Contractor shall provide corrective measures. All costs associated with corrective measures and plant replacement shall be incidental to this item with no additional compensation.

METHOD OF MEASUREMENT

Item 755.35 Inland Wetland Replication Area shall be measured by LUMP SUM.

BASIS OF PAYMENT

Item 755.35 Inland Wetland Replication Area shall be paid for at the contract unit bid price per Lump Sum, which price shall include all labor, materials, equipment, submittals, maintenance, all required soil, site preparation, grading, wetland seeding, planting, mulching, watering, monitoring wells, registered surveyor, as-built plans, Request for Certificate of Compliance, and all incidental costs necessary to complete the work as required.

Payment shall be as follows:

- 60% upon Conditional Acceptance.
- 20% after receipt and acceptance of Certificate of Compliance by the Engineer and once all permit construction requirements have been met and approved.
- 20% upon Final Acceptance.

Excavation will be paid under Item 120.1

Sediment Control Barrier will be paid under Item 767.121

Wetland Specialist will be paid under Item 755.75

No separate payment will be made for the placement of logs as shown on the plans or as required by the Engineer and all work associated therewith shall be considered incidental to this item.

ITEM 755.75**WETLAND SCIENTIST****HOOR**

Work under this Item shall be for services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications hereafter referred to as the Wetland Specialist. Wetland Specialist shall demonstrate knowledge and expertise to coordinate and oversee all work associated with all wetland mitigation, as defined herein, as shown on the Plans, as required by permits, and as specified under Item 755.35 Inland Wetland Replication Area.

“Wetland Mitigation” shall be used herein for applicable wetland work, whether Wetland Replication (creation of a new wetland) or Wetland Restoration (restoration after temporary impacts).

Regulatory monitoring reports following Final Acceptance of the Wetland Mitigation shall be per Item 755.76, Wetland Monitoring Reports.

For all onsite work, the Wetland Specialist shall sign in and sign out with the Engineer.

The Wetland Specialist shall not be from the same company as the company responsible for planting, seeding, and/or maintaining the wetland.

QUALIFICATIONS

The Wetland Specialist shall have a minimum of five (5) years of experience with construction and monitoring of wetland mitigation areas similar in size, type, and complexity to the Contract mitigation. When required by permits, ten (10) years of experience may be required. The Wetland Specialist shall be thoroughly versed in the Commonwealth of Massachusetts Wetlands Protection Act (MGL C.131, s.40), U.S. Army Corps of Engineers New England District Compensatory Mitigation Guidance, and all other relevant regulations of the Massachusetts Department of Environmental Protection and the U.S. Army Corps of Engineers New England District.

Within sixty (60) days following the Notice to Proceed, the Contractor shall provide proof of qualifications for the Wetland Specialist to the Engineer for approval. Submittals shall include, but not be limited to, the following:

- Resume of the individual on-site implementing the Wetland Specialist work. If the Wetland Specialist changes over the course of the project, the new individual shall submit resume and qualifications for approval 30 days prior to doing any work on-site.
- Resume of any personnel working on-site in place of the Wetland Specialist. Individual shall be approved prior to work on-site.
- Narrative describing the company, its expertise, technical qualifications and experience with wetland construction.
- At least three (3) references from prior work of a similar nature completed in the last five (5) years and by the individuals who will perform the work. Provide contact information for each reference including address, phone number and email.
- A summary of each reference project including nature of the work, project size, dates, and period of construction and monitoring, methodologies used, and summary of success (or not) in terms of meeting performance objectives. Summary shall include a minimum of one before and one after photo for each project.

ITEM 755.75 (CONTINUED)

SUBMITTALS – DOCUMENTATION AND REPORTS

Wetland Construction Oversight

Wetland Specialist shall provide documentation of pre-existing conditions and wetland construction as specified below and as part of fulfilling the Scope of Work. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- ***Site Walk Prior to Disturbance and Construction of Wetland:*** Provide brief assessment with photos, including documentation of the existing wetlands to be impacted, proposed wetland replication, restoration site(s) if applicable, and reference/model wetland areas (typically an adjacent undisturbed wetland or the existing wetland to be impacted).
- ***Excavation and Grading:*** Documentation shall include minimum of two photos of the excavated wetland and two photos after final grading prior to planting and seeding. For restoration areas, photos shall show soil preparation (i.e, tilling and grading), if applicable.
- ***Planting and Seeding:*** Provide assessment and photos of vegetation upon completion of planting and seeding work.

Wetland construction documentation and reports shall be submitted with Request for Conditional Acceptance and for the Order of Conditions, Water Quality Certifications, and other regulatory permits as required.

Requests for Acceptance of Work & Regulatory Compliance

The Wetland Specialist shall submit the following documents as specified herein and under Item 755.35 .

- Request for Conditional Acceptance.
- Request for Certificate of Compliance (Partial or Full) when applicable.
- Request for Final Acceptance.

SCOPE OF WORK

In the event of discrepancies with the applicable permits, the Wetland Specialist shall submit a Request for Information (RFI) to the Engineer.

General

The Wetland Specialist shall be responsible for the following:

- Review and have a comprehensive knowledge of the environmental permits relevant to the specific mitigation work being done so as to ensure compliance throughout the duration of the contract.
- Identify and inform the Contractor and Engineer of unique site conditions which may require adjustments to the schedule, design, or construction methods. For example, wildlife nesting, illegal dumping, or rare species.
- Identify and inform the Contractor and Engineer of any sediment or erosion control problems observed within mitigation areas.
- Advise so as to avoid impacts to adjacent areas and regulated wetland resources.
- Participate in necessary meetings as required by permits and when requested by the Engineer.

ITEM 755.75 (CONTINUED)

Inspections & Construction Oversight

The Wetland Specialist shall be responsible for oversight and approval of, but not limited to, the following:

- Pre-Construction Site Walk
 - Following surveying, flagging, and staking of all relevant boundaries and elevations by the Contractor, the Wetland Specialist shall walk the site with the Engineer and the Contractor to review existing and proposed conditions, recommend changes if necessary, and approve the following: location and boundaries of Replication Area, target elevations and grades, location of tree protection associated with the Mitigation Area, and limits of clearing for Replication Area and access route.
 - Select and mark snags, logs, and woody material to be retained for incorporation into the Wetland Mitigation, as appropriate.
 - Note invasive plants in and adjacent to Wetland Mitigation.
- Excavation, Soil Placement, Grading for Replication Areas
 - Approve excavated depth and grading for appropriate wetland hydrology, subsoil preparation, and finished grade of placed wetland soil. If grades need to be adjusted, submit an RFI to the Engineer.
 - If requested by the Engineer, the Wetland Specialist shall inspect stockpiled wetland soil for moisture content and signs of undesirable weeds.
 - Adjust grades as required and approve microtopography.
- Re-vegetation of Mitigation Area(s)
 - Locate woody material to be re-used.
 - Verify seed used complies with specifications and site conditions, determine limits for wetland seeding based on elevations, approve seeding and mulching methods, and collect seed tags to submit with Request for Conditional Acceptance.
 - Review planting methods (if applicable) prior to installation and oversee layout of plants.

Conditional Acceptance

Upon completion of construction of the wetland, as part of the Request for Conditional Acceptance, the Wetland Specialist shall provide a brief narrative demonstrating that the wetland construction work was done according to plans (or how modified) and meets the conditions required for acceptance as specified under Item 755.35. Submittal shall include a report and photo documentation of pre-construction conditions, construction work, seeding, planting, and other work as specified under the Wetland Mitigation items.

Upon receipt of a Request for Conditional Acceptance, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under Item 775.35.

Upon approval, MassDOT will issue a letter of Conditional Acceptance. If the Wetland Mitigation work is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

ITEM 755.75 (CONTINUED)

Request for Certificate of Compliance

If required, a Request for Certificate of Compliance shall be prepared and submitted to Engineer immediately following Conditional Acceptance. Request shall be as specified under Item 755.35.

Request for Final Acceptance

Following one full growing season, the Wetland Specialist shall provide a brief narrative of the status of the Wetland Mitigation to be submitted with the Request for Final Acceptance.

Upon receipt of the Request, the Engineer, the Wetland Specialist and regulatory representative (if required) shall assess the Wetland Mitigation and surrounding area to ensure that it meets the conditions specified under Item 755.35.

If the Wetland Mitigation is not approved, MassDOT will issue a rejection letter requiring corrective action. The Wetland Specialist shall recommend corrective actions.

METHOD OF MEASUREMENT

Item 755.75 Wetland Specialist shall be measured per hour for on-site service provided by the Wetland Specialist.

Work shall include all inspections, photos, submittals, and associated tasks for construction and restoration oversight, narratives for Conditional and Final Acceptance, Request for Certificate of Compliance (Partial or Full) if required, documentation required for permits, and all other work specified above. Payment shall not include travel time or time spent off-site on reports. Decimal Pay Limits will be 0.25 hours.

BASIS OF PAYMENT

Item 755.75 Wetland Specialist shall be paid at the Contractor bid price for each hour, or fraction thereof, spent on-site to perform the work as described above. Reports and photo documentation are required for payment.

Post wetland construction reports shall be per Item 755.76, Wetland Monitoring Reports

ITEM 755.76**WETLAND MONITORING REPORTS****LUMP SUM**

Work under this item shall be for the submittal of Wetland Monitoring Reports following the completion of wetland construction and shall include all inspections, photos, and other work required to complete those reports as specified herein and under Item 755.35 Inland Wetland Replication Area (hereafter referred to as 755.35).

The Contractor shall retain the services of a Wetland Scientist, Wetland Ecologist, Restoration Ecologist, or other professional with similar qualifications, hereafter referred to as the Wetland Specialist, to complete the Wetland Monitoring reports. Wetland Specialist shall meet requirements specified under Item 755.75 Wetland Specialist.

All on-site Wetland Specialist services required to complete the construction and revegetation of the wetland replication, including preparation and submission of monitoring reports during construction, shall be per Item 755.75 Wetland Specialist.

SCOPE OF WORK**Post-Construction Wetland Monitoring Reports**

Final Acceptance of the wetland construction work, as specified under item 755.35 shall initiate the beginning of the Monitoring Period.

Inspections and reports shall be performed to ensure compliance with mitigation requirements defined under Item 755.35 and with all applicable environmental permits. Monitoring reports shall cover the following:

- Identification of all plant species present
- Percent cover for each plant species and overall percent surface area cover by indigenous wetland plant species for replication area and upland
- Description of the viability, health, and vigor of installed plants as well as volunteer plant species within the replication areas
- Description of remedial measures taken to ensure criteria are met
- Depth to apparent water table and/or depth of surface inundation, both as measured from the soil surface.
- A conclusion regarding the success of the wetland mitigation area relative to the performance standards at 310 CMR 10.55(4)(b) (unless varied), the design plans, and performance criteria established by MADEP in the variance conditions (when applicable), and a recommendation for a corrective plan of action if needed

Reports shall be submitted to the Engineer as a digital copy in Portable Document Format (PDF). Hard copies shall be provided as requested by the Engineer. All reports shall be marked with the applicable permit numbers and identifying information as required in the permits.

Spring Reports, when required, shall be submitted to the Engineer by July 1 for dispersal to the appropriate permitting agencies.

End of Year Reports (which may serve as the Fall Report) shall be based on inspections that occur prior to October 15th. Reports shall be submitted to the Engineer no later than November 1 of each year.

ITEM 755.76 (CONTINUED)

Monitoring Reports shall be as follows for 2 years:

- MassDEP:WQC 2 spring inspections and 2 fall inspections.
- Conservation Commission: 2 spring inspections and 2 fall inspections

METHOD OF MEASUREMENT

Item 755.76 Wetland Monitoring Reports shall be measured on a LUMP SUM basis.

BASIS OF PAYMENT

Item 755.76 Wetland Monitoring Reports and associated inspections shall be paid for at the contract unit bid price per LUMP SUM and shall include all labor, materials, equipment, and all incidental costs required to complete the work. LUMP SUM will be paid in equal installments of the LUMP SUM divided by the number of reports submitted. Payment shall be upon submittal and acceptance of each report.

ITEM 767.121**SEDIMENT CONTROL BARRIER****FOOT**

The work under this item shall conform to the relevant provisions of Sections 751 and 767 of the Standard Specifications and the following:

This work shall include the furnishing and placement of a sediment control barrier for the purpose of slowing the velocity of and filtering suspended sediments from storm water flow. Control barrier shall be installed prior to disturbing upslope soil. Sediment barrier shall be used as perimeter barriers, to contain stockpile sediments, to break slope length, and to slow or prevent up gradient water from flowing into a work zone.

Sedimentation control shall be a minimum 12-inch diameter compost filter tubes.

With approval from the Engineer the following may be used to control sediments for small, disturbed areas with minimal slope and slope length:

- 9-inch diameter composts filter tubes or fiber logs
- Trenched-in 12-inch diameter straw tubes/wattles
- Straw or straw bales provided that runoff is in the form of sheet flow and not concentrated flows (i.e. channels, swales, gullies, etc.)

Where required by the Engineer, silt fence shall be used in addition to compost filter tubes to contain sediments. Silt fence will be incidental to the item. Where straw bales and silt fence are required by permits, silt fence shall be incidental to the item.

Maintenance of control barriers and removal of accumulated sediment shall be as specified below, as required by the Engineer, and shall conform to the requirements of relevant environmental permits.

Upon completion of work and stabilization of soil, sediment control barriers shall be dismantled and/or removed as specified below for the site context (naturalized or urban). Site shall be restored as specified for specific barrier used.

All non-biodegradable materials, including silt fence, twine, plastic netting, and photodegradable fabric, shall be removed and disposed off-site for all projects.

CONSTRUCTION

Location of sediment barrier shall be based on the site's contours and such that it provides maximum effectiveness. Barriers shall be staked, trenched and/or wedged as specified herein and shall be securely in contact with existing soil such that there is no flow beneath the barrier.

Straw Bales

Straw bales shall conform to the requirements of the Standard Specifications and the following:

Bales should be a minimum size of 12-inch x 16-inch x 36-inches and shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another.

ITEM 767.121 (CONTINUED)

The barrier shall be trenched and backfilled. The trench shall be excavated the width of the bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (filled by wedging) the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least two 1x1 inch diameter by 4-foot oak stakes or 2x2 inch diameter by 4-foot pine stakes driven through the bale. Stakes of other material of equivalent strength may be used if approved by the Engineer.

Straw bales shall be on upslope side of the silt fence unless specified otherwise by the Engineer.

Silt Fence

Silt fence fabric shall be a minimum of 36" in width. Silt fence shall be trenched 8 inches deep and 4 inches wide, or a V-trench on the upslope side of the fence line. The bottom 1 foot of fabric shall be placed in the trench, backfilled, and compacted with earth or gravel.

Stakes shall be driven 16 inches into the ground on the down slope side of the trench. Spacing of stakes for silt fence may range from a minimum of 10 feet apart where low flow is expected to 3-4 feet apart where water may run over the top of the fence. Sagging fabric will require additional staking or other anchoring. Stakes shall be 2x2 inch diameter oak stakes.

Height of silt fence should be appropriate to the steepness and length of the slope and as specified by the manufacturer.

MAINTENANCE

Barriers shall be inspected after each rainfall and at least daily during prolonged rainfall. Contractor shall remove accumulated sediments when they reach half the height of the barrier or sediment fence.

The Contractor shall immediately correct all deficiencies including washouts, overtopping, clogging due to sediment, and erosion. The contractor shall review location of barriers in areas where construction activity causes drainage runoff to ensure that the barriers are properly located for effectiveness. Where deficiencies exist, such as overtopping or wash-out, additional staking or additional barriers shall be installed as required by the Engineer.

At specific locations, such as at gully points, steep slopes, or identified failure points in the sediment capture line, barriers shall be reinforced as required by the Engineer. Such reinforcing shall be incidental to the cost of this item and shall not exceed 10 percent of the overall length of barrier required for the project.

Barriers that are decomposing, cut, or otherwise compromised shall be repaired or replaced as directed by the Engineer. Repair and/or replacement shall be incidental to this item.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed when construction work is complete and when site conditions are sufficiently stable to prevent surface erosion and after receiving permission to do so from the Engineer.

ITEM 767.121 (CONTINUED)

For all instances, all non-biodegradable material, including photo biodegradable fabric, plastic netting, nylon twine, and silt fence shall be removed and disposed off-site by the Contractor regardless of site context.

For naturalized areas, biodegradable, natural fabric and material shall be left in place to decompose on-site unless required otherwise by the Engineer. Compost filter tubes may be left as they are with stakes removed. Straw bales shall be broken down and spread evenly. All nylon or non-biodegradable twine shall be removed along with silt fence. Wooden stakes may be left on site, placed neatly and discretely.

In urban or residential locations where aesthetics is a concern, the following shall apply:

Filter tube fabric shall be cut and removed and compost shall be raked to blend evenly as a soil amendment or mulch and with no areas greater than two inches in depth on soil substrate.

Straw bales shall be removed and disposed off-site by the Contractor. Areas of trenching shall be raked smooth and disturbed soils stabilized with seed matching adjacent grasses with either a lawn or native grass mix.

Silt fence, stakes, and other debris shall be removed and disposed off-site. Site shall look neat and clean upon completion.

Dismantling, removal, and seeding shall be incidental to this item.

METHOD OF MEASUREMENT

Item 767.121 Sediment Control Barrier shall be measured per FOOT furnished and installed.

BASIS OF PAYMENT

Item 767.121 Sediment Control Barrier shall be paid for at the contract unit bid price per FOOT which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of site, silt fence if required, and incidental costs required to complete the work.

ITEM 983.521

STREAMBED RESTORATION

CUBIC YARD

GENERAL

The work to be done under this Item shall conform to the relevant provisions of Section 983 of the Standard Specifications and the following:

The work under this Item shall include installation of angular riprap mixed with natural streambed material to provide passage for aquatic organisms and an upland bank along the face of the new structure for wildlife passage.

MATERIALS

The streambed restoration material shall be comprised of two primary components: natural streambed material and angular riprap.

The natural streambed material shall be that material previously excavated from the surrounding area and stockpiled. The excavation and stockpiling of materials will be paid for under Item 143 – Channel Excavation. If the contractor must bring in non-native material due to shortage, the Engineer shall review and approve all materials to be installed. If additional non-native materials is required due to shortage, it shall be considered incidental to this item.

The angular riprap shall be in accordance with materials specifications M2.02.0 of the Standard Specifications. Riprap must be locked together at the base to resist rolling and sliding.

CONSTRUCTION

The two components shall be pre-blended outside the project area at a volume ratio of 30% natural streambed material and 70% angular riprap. The pre-blending shall be done in a way that will prevent the mass from being contaminated by work-place soils.

The placement of the streambed restoration materials under this Item shall not be placed until the Engineer approves the crushed stone layer along the precast structure. The Contractor shall submit to the Engineer for approval prior to the start of operations, his/her Placement Plan and Method of Placement.

METHOD OF MEASUREMENT

Item 983.521 Streambed Restoration shall be measured by CUBIC YARD placed.

BASIS OF PAYMENT

Item 983.521 Streambed Restoration shall be paid for at the Contract unit price per CUBIC YARD complete and in place which price shall be considered full compensation for all labor, tools, equipment, and materials necessary to rebuild the streambed.

ITEM 986.2

MODIFIED ROCKFILL

CUBIC YARD

GENERAL

The work under this Item shall conform to the applicable provisions of Section 983 of the Standard Specifications as modified by the following:

Modified Rockfill shall be placed as the final surface treatment on backfilled slopes around the new structure and wingwalls at locations as shown on the Plans and as required by the Engineer.

Modified Rockfill shall be placed in a layer thickness of 12 inches, unless otherwise shown on the Plans or as required by the Engineer.

METHOD OF MEASUREMENT

Item 986.2 Modified Rockfill shall be measured by the CUBIC YARD, complete in place.

BASIS OF PAYMENT

Item 986.2 Modified Rockfill shall be paid at the Contract unit price per CUBIC YARD placed and shall include full compensation for all labor, materials, equipment, installation, and any incidental work required to complete the work.

ITEM 991.1**CONTROL OF WATER
STRUCTURE NO. G-08-061(C97)****LUMP SUM**

The work to be done under this Item shall conform to the relevant provisions of Section 140 and consists of the work required for the control of water to remove the existing structure and complete construction of the proposed 3-sided precast concrete culvert in the dry, to the limits shown on the Plans and as specified herein.

It is the responsibility of the Contractor to design the water control structures to be used as part of the dewatering for removal and replacement of the breastwalls. Additionally, as part of the work under this Item, it is the responsibility of the Contractor to determine the need and extent of sand bags, sedimentation basins, dewatering techniques, sedimentation controls, system maintenance, etc. needed to control water and sediment at the site. Construction operations shall be conducted in such a manner as to minimize siltation and prevent contamination of the waterway. The work also includes furnishing, installing, maintaining, and removing Turbidity Curtains (floating silt fences) where required during in-water work under these items that may produce turbidity or sedimentation, in order to avoid or minimize impacts to Essential Fish Habitat (EFH) by preventing construction materials, debris, and sedimentation from entering the waterway and surrounding areas.

The water control structures at locations shall be fully designed by the Contractor. All earth support shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications and MassDOT LRFD Bridge Manual with all interims published as of the bid opening date.

The Contractor is responsible for determining all geotechnical criteria, lateral earth pressures, and hydrostatic pressures associated with the water control structures. Additional lateral earth pressures due to surcharges caused by equipment operation and/or material storage near the water control structures shall be considered and incorporated into the design.

SUBMITTALS

Prior to the start of work, the Contractor shall submit a water control plan to the Engineer for approval. This shall include the actual process of executing the existing structure removal and resetting operations including equipment, design of sandbags / steel sheeting, methods of dewatering, and sedimentation controls.

The Contractor shall submit complete working drawings and computation of his proposed dewatering system with supporting data as necessary to the Engineer for approval in accordance with Subsection 5.02 and the Special Provisions. These drawings shall be accompanied by design calculations. Both shall be certified by a Professional Engineer registered in the Commonwealth of Massachusetts. The Contractor shall make his own evaluation of existing conditions and water flow, and of the effects of his proposed temporary works and construction methods and shall provide in his design for all loads and construction conditions necessary to permit construction of the specified structures while maintaining public safety and protecting complete work and all third-party property from damage resulting from his operation.

ITEM 991.1 (CONTINUED)

METHODS

The system shall be designed so that there are no adverse effects on the adjacent properties. The Control of Water system shall be sized in such a way that the system is overtopped with elevated brook water before any adjacent properties are inundated.

Where sandbags are used, the bags shall not decay nor grip or tear during the installation, its service life within the waterway, or during the removal process. The Contractor shall not disturb the brook bed in order to avoid migration of silts and sands further downstream. All in-brook work required to install, adjust and remove the Control of Water system must be performed by hand or by hoisting equipment positioned upland.

Measures to control the discharge of sediment or pollutants into the water resource areas shall include, but not be limited to the following:

- Site construction areas outside the buffer zones and on relatively flat ground.
- Management of construction operations involving hazardous materials, such as refueling and maintenance of equipment within the resource areas.
- Formulation of contingency plans to control accidental spillage from potentially hazardous materials.
- Installation and continuous maintenance of water control measures throughout the project.
- Treatment of all discharge resulting from dewatering activities through a sedimentation/retention tank to control turbidity. At no time shall the discharge from dewatering activities be directly released into a resource area.
- Perform as much work as possible outside the brook banks.
- Scheduling of work within the resource areas to avoid periods of high flood (e.g. spring floods) and inclement weather.

These measures shall be maintained for the duration of the contract.

The locations of any sedimentation/retention tank will be determined by the Contractor based on the selected methods of construction. Placement of the tank shall be in an upland area that is within the existing right-of-way and temporary easements.

A stilling basin shall be constructed to collect any stream waters able to bypass the diversion system that may enter any work areas. The basin shall be equipped with a pump to convey waters to a sedimentation/retention tank. Water shall be discharged downstream after passing through the stilling basin and sedimentation/retention tank. No waters pumped from the work areas shall be discharged back to the brook until sediment is filtered using the sedimentation/retention tank.

All dewatering and related water control work shall be conducted in such a manner as to prevent siltation or contamination of the waterway. At a minimum, the sedimentation/retention tank shall be constructed of an earthen berm lined with geotextile fabric and surrounded by staked hay bales. The tank shall meet or exceed the following criteria:

ITEM 991.1 (CONTINUED)

- The size and location of the tank shall be determined based on the size of the Contractor's pump and the anticipated groundwater levels.
- The outlet/weir of the sedimentation/retention tank shall not cause erosion of the surrounding area. An approved method of controlling erosion, such as an erosion control blanket, stone, etc., shall be used at the outlet of the tank.
- The Contractor shall not allow any sediment within the sedimentation/retention tank to accumulate to a depth of greater than 12 inches at any point in the tank, nor shall the water level be allowed to rise to a height of more than 24 inches.
- The sedimentation/retention tank shall be designed with a minimum of 18 inches of freeboard, which must be maintained at all times.
- The Contractor shall inspect the sedimentation/retention tank at least daily when in operation.
- Damages shall be repaired immediately.
- The sedimentation/retention outlet shall be cleaned daily.
- The sediments within the sedimentation/retention tank shall be disposed of as approved by the Engineer.

Upon completion of the water control, the materials and equipment used to maintain the cofferdam(s) (if needed) and stilling basin(s) and sedimentation/retention tank (including the temporary riprap for dewatering discharge) shall become the property of the Contractor and shall be removed by the Contractor from the site. The area affected shall be restored to its natural condition in a manner subject to the Engineer's approval.

The Contractor is advised that the effectiveness of the water control method used will vary based on the field conditions and the time at which the actual work is being performed. The Engineer has the right to order the Contractor to stop all excavation operations when in his judgment the Contractor's water control operations are failing to produce adequate results or are posing a threat to the environment.

METHOD OF MEASUREMENT

Item 991.1 Control of Water shall be measured per LUMP SUM.

BASIS OF PAYMENT

Item 991.1 Control of Water shall be paid for at the contract unit bid price per LUMP SUM, which shall include all labor, materials, equipment, engineering, and incidental costs required to complete the work as indicated on the Contract Documents. Any riprap used for dewatering discharge shall be considered incidental to the work and shall be paid for under this Item.

In general, the payment method for Item 991.1 is partial progressive payment of the LUMP SUM contract unit bid price of this Item. The partial payment schedule will be as follows:

- The first payment of Item 991.1 (30% of the LUMP SUM bid price) will be made upon complete installation of Stage 1 of the water control system to the satisfaction and approval of the Engineer.
- The second payment of Item 991.1 (30% of the LUMP SUM bid price) will be made upon complete installation of Stage 2 of the water control system to the satisfaction and approval of the Engineer.

ITEM 991.1 (CONTINUED)

- The final payment of Item 991.1 (40% of the LUMP SUM bid price) will be made upon the satisfactory removal of the water control system after bridge construction is complete.

All adjustments and repositioning of water control shall be considered as included under this Item.

No separate payment will be made for the removal and disposal of the sediment material collected from the dewatering systems, but all costs in connection therewith shall be included in the contract unit bid price.

ITEM 995.01**BRIDGE STRUCTURE, BRIDGE NO. G-08-061(C97)****LUMP SUM**

The work done under this Item shall conform to the applicable portions of Section 995 of the Standard Specifications and the specific requirements stipulated below for component parts of the subject Item. For those component parts where no specific requirement is stipulated, the Standard Specifications shall apply, except for payment.

Work under this Item shall include all materials, equipment, and labor needed for the following:

- Three-sided precast concrete rigid frame culvert and footings
- Precast concrete wingwalls and footings
- Bituminous damp-proofing

The work does not include any items listed separately in the proposal. Payment for materials shown on the Plans as being part of the bridge structure or which may be incidental to its construction and are not specifically included for payment under another Item shall be considered incidental to the work performed under this Item and shall be included in the unit price of the component of which they are a part.

PRECAST CONCRETE ELEMENTS

Work under this heading shall conform to the relevant provisions of Section 901 of the Standard Specifications.

The following concrete mixes shall be used:

5000 PSI, 3/4 INCH, 685 HP CEMENT CONCRETE shall be used for the precast rigid frame culvert, headwalls, wingwalls, and footings.

All concrete produces must be listed on the MassDOT Qualified Construction Material List as an approved producer. Preformed or pre-molded fillers, joint sealers, waterstops, and closed cell foam shall be considered incidental to the work involved in the furnishing and placing of all concrete. All structural concrete shall be placed in the dry.

STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED

The work under this heading shall conform to the relevant provisions of Sections 901 and the relevant provisions of Materials Section M8.01.0 of the Standard Specifications and the following:

Steel Reinforcement for Structures – Epoxy Coated shall be used for all reinforced concrete in the bridge structure.

All reinforcing steel shall be epoxy coated Grade 60 unless otherwise noted on the plans. All accessories to support rebar shall be epoxy coated.

BITUMINOUS DAMP-PROOFING

All work to be done under this heading shall conform to the applicable provisions of Section 970 of the Standard Specifications.

ITEM 995.01 (CONTINUED)

Bituminous Damp-Proofing shall be used to coat the backs and top of the 3-sided precast culvert and the backs of the precast concrete wingwalls.

THREE-SIDED PRECAST CONCRETE CULVERT, PRECAST CONCRETE CULVERT FOOTINGS, PRECAST CONCRETE WINGWALL FOOTINGS, PRECAST CONCRETE WINGWALL STEMS, PRECAST CONCRETE GUARDRAIL TRANSITIONS

A. General.

The work under this Heading consists of fabricating, transporting and installing the three-sided precast concrete culvert, precast concrete culvert footings, precast concrete wingwall footings, precast concrete wingwall stems, precast concrete guardrail transitions, and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The work shall also include the full structural design of the three-sided arch and footings. The work shall conform with the MassDOT Standard, Supplemental, and Interim Specifications and the requirements of the current AASHTO LRFD Bridge Construction Specifications, supplemented by the current relevant provisions of the latest edition of PCI MNL-116 (The Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products), except as noted herein.

QUALITY ASSURANCE

A. General.

Quality Assurance includes all the planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service. It is an all-encompassing term that includes Quality Control (performed by the Fabricator) and Acceptance (performed by the Engineer). Quality Control is the system used by the Contractor and Fabricator to monitor and assess their production processes at the plant facility and installation activities at the project site to ensure that the final product will meet the specified level of quality. Acceptance includes all factors used by the Engineer to determine the corresponding value for the product. Inspection at the plant facility is intended as a means of evaluation of compliance with contract requirements. Contractor and Fabricator Quality Control activities and Engineer Acceptance activities shall remain independent from one another. Engineer Acceptance activities shall not replace Fabricator Quality Control activities.

B. Fabricator Quality Control.

Quality Control shall be performed by the Fabricator to ensure that the product is fabricated in conformance with the specifications herein. The Fabricator shall maintain a Quality Control system to monitor, assess, and adjust placement and fabrication processes to ensure the Precast Concrete Bridge Element(s) meet the specified level of quality, through sufficient Quality Control sampling, testing, inspection, and corrective action (where required). The Fabricator's Quality Control system shall address all key activities during the placement and fabrication and shall be performed in conformance with the Fabricator's NPCA or PCI Certification. Quality Control documentation shall meet the requirements of the *Fabricator Quality Control – Documentation* section below. Upon request, Fabricator Quality Control documentation shall be provided to the Engineer.

1. Plant.

Prior to the fabrication of Precast Concrete Bridge Elements, the Fabricator's precast concrete plant shall obtain the following:

- (a) Certification by the National Precast Concrete Association (NPCA) Plant Certification Program or Precast/Prestressed Concrete Institute (PCI) Plant Certification Program, for the applicable types of Precast Concrete Bridge Element(s) being fabricated

ITEM 995.01 (CONTINUED)

- (b) MassDOT Prequalification
- (c) MassDOT Mix Design Approval

All concrete for a given Precast Concrete Bridge Element shall be produced by a single company and plant, unless otherwise approved by the Engineer.

2. Personnel.

The Fabricator shall provide adequate training for all QC personnel in accordance with NPCA or PCI certification. There shall be sufficient personnel trained and certified to perform the tests listed under Subsection M4.02.13, Part D. At a minimum, the Fabricator's Quality Control Personnel shall maintain the following qualifications and certifications:

- (a) QC Manager with an active NETTCP Field Technician or ACI Concrete Field Testing Technician – Grade I certification or higher, and a minimum of 4 years continuous experience in the manufacture of Precast Concrete Bridge Elements for state transportation departments.
- (b) A Technician/Inspector having the Precast/Prestressed Concrete Institute (PCI) Technician/Inspector Level I or NorthEast Transportation Training and Certification Program (NETTCP) Precast Concrete Inspector, or higher.

The Contractor shall submit to the Engineer a copy of the Fabricator's Quality Control Personnel required qualifications, as specified above.

3. Laboratory.

The Fabricator shall provide a room of sufficient size to house all equipment and to adequately perform all testing. The room shall have either a separate moisture storage room or curing box for concrete cylinders, and it shall be thermostatically controlled to maintain temperatures consistent with AASHTO T 23. It shall include a desk and file cabinet for proper record keeping, and have good lighting and ventilation.

This room shall be kept for testing and quality control and not used for any other purpose. An additional desk and file cabinet shall be provided for exclusive use of the Engineer. No exception from these requirements will be allowed without the express written permission of the Engineer.

4. Testing Equipment.

At a minimum, the Fabricator's plant facility shall have the following testing equipment:

- (a) Air Content Meter Type A or B: AASHTO T 152
- (b) Air Content Meter Volumetric Method: AASHTO T 196 (Required for Lightweight Concrete)
- (c) Slump Cone: AASHTO T 119
- (d) Cylinder Molds AASHTO M 205
- (e) Concrete Testing Machine: AASHTO T 22
- (f) Screening Sieve: AASHTO T 27, AASHTO T 11
- (g) Curing Box: AASHTO T 23
- (h) Spread Test Base Plate for Self-Consolidating Concrete (SCC): ASTM C1611
- (i) All other equipment prescribed by AASHTO and ASTM standards for the tests to be performed by the Fabricator as specified

ITEM 995.01 (CONTINUED)

5. Inspection.

Quality Control personnel shall monitor and inspect the fabrication of each Precast Concrete Bridge Element. Quality Control personnel shall report all inspection activities on Quality Control Inspection Reports and non-conformances on Non-Conformance Reports (NCRs) throughout the entire fabrication process, as specified herein.

6. Temperature Monitoring.

At a minimum, the Fabricator shall monitor, record, and report the temperatures of the form, ambient temperatures surrounding the concrete, and temperatures of the concrete continuously, without interruption as specified below:

- (a) Prior to placement of concrete to verify that $T_i \geq 50^\circ\text{F}$.
- (b) Immediately after placement to verify that $T_i \geq 50^\circ\text{F}$ is maintained.
- (c) Throughout the entire duration of the curing cycle, at regular intervals not to exceed one hour until 100% Design Strength (f'_c) is attained and concrete has cooled to within 40°F of the ambient temperature surrounding the Precast Concrete Bridge Element.

At a minimum, the temperature measuring devices shall record and report the temperature of the concrete to the nearest 2°F . At least two temperature sensors (thermocouples) shall be positioned to record the maximum and minimum anticipated concrete temperatures. The anticipated minimum temperature shall be measured with one or more thermocouples at a distance no greater than 2 inches from the surface of the thinnest section. The anticipated maximum temperature shall be measured with one or more thermocouples at the center of the thickest section. Proposed temperature measurement locations shall be submitted to the Engineer for approval. Temperature recording devices shall be located within the curing enclosure and calibrated as required by PCI MNL-116 Section 4.18.4. Maximum heat increase and cool down rates shall comply with PCI MNL-116, Section 4.19. The Contractor shall furnish temperature logs recorded at a minimum frequency of once per hour to the Inspector as required, with each post-pour QC inspection report.

7. Sampling and Testing.

At a minimum, the Fabricator shall perform random Quality Control sampling and testing as specified in *Table 1: Quality Control Sampling and Testing*. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during fabrication. Test Specimens shall conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60, with the exception of the stripping (80% f'_c) set of cylinders. Stripping (80 % f'_c) cylinders shall be cured in the same location and environment as the Precast Bridge Elements they represent. If approved by the Engineer, compressive strength cylinder match curing equipment, that maintains the same concrete conditions that the corresponding Precast Bridge Element is exposed to, may be utilized in lieu of Stripping (80 % f'_c) field cured cylinders, with the use of thermocouples, controllers, and heaters.

ITEM 995.01 (CONTINUED)

Table 1: Quality Control Sampling and Testing

Quality Characteristic	Test Method	Sample Size	Specification Limit	Lot Size ^(c)	Sublot Size ^(d)	Frequency	Point of Sampling
Slump (in.) ^(a)	AASHTO T 119	Per AASHTO	≤ 8 in. or as approved by the Engineer				
Air Content (%)	AASHTO T 152	Per AASHTO	5% ≤ % ≤ 8%				
Temperature (°F)	AASHTO T 309	Per AASHTO	50°F ≤ °F ≤ 90°F				
Compressive Strength (psi)	AASHTO T 22	Stripping Cylinders: One (1) set of Three (3) 4 x 8 in.	≥ 80% f _c at Stripping				
		7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
	AASHTO T 23	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	≥ 100% f _c at 28 days				
	56-day Cylinders: One (1) set of Three (3) 4 x 8 in.	≥ 100% f _c at 56 days ^(b)					

Notes:

- (a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
- (b) 56-day Compressive Strength test specimens shall require testing only when 28-day Compressive Strength test specimens have failed to meet Design Strength (f_c).
- (c) Lot shall be defined as a specific quantity of material from a single source, produced or placed by the same controlled process.
- (d) Sublot shall be defined as an equal division or part of a Lot from which a sample of material is obtained in order to assess the Quality Characteristics of the Lot.

ITEM 995.01 (CONTINUED)

8. Certificate of Compliance.

The Fabricator shall provide a Certificate of Compliance in accordance with Standard Specifications, Division I, Section 6.01, stating that QC test cylinders have achieved the design strength, f'_c . A Certificate of Compliance shall accompany each shipment and shall be presented to the Engineer or designee upon delivery to the site.

9. Documentation.

At a minimum, the Fabricator shall maintain a filing system for the following QC records and documentation. All QC records and documentation shall be made available to the Engineer upon the request.

- (a) Current MassDOT Approved Mix Design Sheet(s) and Approval Letter(s)
- (b) PCI or NPCA Certification
- (c) Current Qualifications and Certifications for QC Manager(s) and QC Technician(s)
- (d) Most current set of Approved Shop Drawings
- (e) Approved Placement, Finishing and Curing Plan
- (f) Approved Dunnage Plan
- (g) Fabricator Certificate of Compliance for each fabricated Precast Concrete Bridge Element
- (h) Admixture Manufacturer's Certification of Compliance for each approved Admixture
- (i) Completed QC Inspection Report for each fabricated Precast Concrete Bridge Element
- (j) Identification Number for each fabricated Precast Concrete Bridge Element
- (k) Time and date of casting of each fabricated Precast Concrete Bridge Element
- (l) Date of stripping of each fabricated Precast Concrete Bridge Element
- (m) Batch Ticket Printout reporting the quantity of concrete produced for each batch of concrete produced
- (n) Concrete temperature records for each Precast Concrete Bridge Element fabricated
- (o) QC Test Report Forms for each subplot of concrete produced
- (p) Non-Conformance Reports (NCRs)
- (q) Documentation of Repairs (if applicable)

ITEM 995.01 (CONTINUED)

MATERIALS

A. Materials.

Materials shall meet the following specifications (if applicable):

General	M4.00.00
Portland Cement	M4.01.0
Blended Hydraulic Cements	M4.01.1
Fly Ash	M4.01.2
Cement Concrete	M4.02.00
Cement	M4.02.01
Cement Mortar	M4.02.15
Aggregates	M4.02.02
Lightweight Aggregates	M4.02.03
Water	M4.02.04
Cement Concrete Additives	M4.02.05
Proportioning	M4.02.06
Mixing and Delivery	M4.02.10
Test Specimens	M4.02.13
Mortar for Filling Keyways	M4.04.0
Slag	AASHTO M 302
High Performance Cement Concrete	M4.06.1
Self-Consolidating Concrete (SCC)	M4.02.17
Controlled Density Fill – Non-Excavatable	M4.08.0
Reinforcing Bars	M8.01.0
Epoxy Coated Reinforcing Bars	M8.01.7
Galvanized Reinforcing Bars	M8.01.8
Welded Wire Reinforcement	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Lifting Devices	PCI MNL-116
Corrugated Metal Pipe	AASHTO M 36

1. Cement Concrete Mix Design.

The cement concrete shall be comprised of specified proportions of water and MassDOT approved aggregates, cement, supplementary cementitious materials (SCMs), and admixtures to form a homogenous composition. Cement concrete for Precast Concrete Bridge Elements shall meet the requirements of M4.06.1 High Performance Cement Concrete, with the exception that the “Total Cementitious Content” specified shall be considered the “Maximum Allowable Cementitious Content”. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

Prior to production of cement concrete, the Fabricator shall report and submit all proposed mix design formulations and its constituent materials to the Engineer for review and approval. All mix design yields shall be designed for 1.0 cubic yards of concrete, with an allowable tolerance of +/- 1.0 %. All liquids incorporated into the proposed mix design(s) shall include both water and admixtures in the liquid mass calculation.

During production of cement concrete, the Fabricator shall not alter the previously approved mix design formulation or its constituent materials. Proposed alterations in source, type, batch quantity, or gradation to any of the constituent materials of the previously approved mix design formulation shall require a new Mix Design submission to the Engineer for review and approval. Fabrication

ITEM 995.01 (CONTINUED)

shall not occur without prior mix design approval.

2. Vertical Adjustment Assembly.

Vertical Adjustment Assembly details and material requirements shall be as shown on the plans. Alternate devices may be used provided that they are adjustable and can support the anticipated loads. The design of the leveling devices, with necessary calculations, shall be submitted to the Engineer for approval.

3. Grout.

Grout used for shear keys, vertical adjustment assembly voids, and hand holes shall be in accordance with M4.04.0.

4. Reinforcement.

All reinforcing steel shall be epoxy coated Grade 60 unless otherwise noted on the plans. Mechanical reinforcing bar splicers shall be epoxy coated.

5. Threaded Inserts.

Threaded inserts are permissible to facilitate forming the keyway pours. Threaded inserts shall be hot dip galvanized or made of stainless steel. The number of threaded inserts shall be minimized, and the inserts shall not come in contact with the reinforcing steel.

6. Corrugated Metal Pipe.

Corrugated Metal Pipe to be used for forming voids as specified on the plans shall be fabricated from steel and shall have a protective metallic coating of zinc (galvanizing).

CONSTRUCTION METHODS – PLANT FABRICATION

A. Shop Drawings.

Prior to performing any work under this Section, the Contractor shall receive approval for all shop drawings for the Precast Concrete Bridge Element being worked on and any special Contract requirements, provided that a complete shop drawing package is provided. The Contractor shall not order materials or begin work before receiving approved shop drawings. The Engineer will reject Precast Concrete Bridge Elements that deviate from the approved drawings or are fabricated prior to receiving written approval of the shop drawings. The Contractor shall bear full responsibility and costs for all materials ordered or work performed prior to the approval of the shop drawings or written authorization from the Engineer.

Contractor shall submit scaled shop drawings to the Engineer for review and approval. Design calculations for the precast arch and footings shall not be included in the submittal. The Fabricator's name and address shall appear on each sheet.

Resubmittal of "Approved as Noted" shop drawings is not necessary for minor revisions, provided that the correction can be clearly understood and is unambiguous without possibility of misinterpretation. Shop drawings with questions or comments that require a response and/or additional information from the Fabricator must be resubmitted.

Detailed shop drawings shall be prepared in accordance with the relevant provisions of Subsection 5.02 and shall, at a minimum, contain the following:

ITEM 995.01 (CONTINUED)

- (a) Number and type and/or piece mark of the precast concrete bridge element including overall length, width and height.
- (b) Skew angle.
- (c) Location, size and geometry of all steel reinforcement, including mechanical reinforcing bar splicers to be used for connecting Precast Concrete Bridge Elements together in the field.
- (d) Location and details of all inserts, anchors, Vertical Adjustment Assemblies, and any other items required to be cast into the Precast Concrete Bridge Elements (whether detailed on the plans by the Engineer of Record or provided for the Contractor's convenience). Precast Concrete Bridge Elements shall not be fired or drilled into for attachment purposes. All hardware shall be galvanized except as noted.
- (e) Locations and details of the lifting devices, including supporting calculations, type and amount of any additional reinforcing required for lifting. The Fabricator shall design all lifting devices based on the no cracking criteria in Chapter 8 of the PCI Design Handbook (7th edition).
- (f) The minimum compressive strength required prior to handling the precast concrete bridge element.

The shop drawings shall not include procedures for placement, finishing, and curing of concrete. These details shall be included in the Placement, Finishing and Curing Plan that is to be submitted to the Engineer as described under *Placement, Finishing, and Curing Plan*.

B. Fabrication.

All Precast Concrete Bridge Elements shall be fabricated in accordance with the latest edition of PCI MNL-116 as modified herein.

C. Placement, Finishing and Curing Plan.

At least 30 days prior to start of fabrication, the Contractor shall submit the Fabricator's proposed Placement, Finishing and Curing Plan to the Engineer for approval. This shall be an independent submittal, separate from the fabrication shop drawings and design calculations. The Placement, Finishing and Curing Plan shall include the following:

- (a) Method of Mixing
- (b) Method of Placement
- (c) Method of Consolidation
- (d) Method of Finishing
- (e) Method of Initial Curing
- (f) Method of Intermediate Curing
- (g) Method of Final Curing
- (h) Moisture Retention Materials and Equipment (water spray equipment, saturated covers, sheet materials, liquid membrane-forming compounds, accelerated curing equipment, etc.)
- (i) Cylinder Curing Methods, Location, and Environmental Control (temperature, humidity, etc.)
- (j) Temperature Monitoring, Recording, and Reporting

D. Three-Sided Box Culvert and Footings

The Contractor shall submit design computations for the three-sided box culvert and footings to the Engineer for review and approval. The computations shall be prepared in accordance with the latest AASHTO LRFD Bridge Design Specifications, the 2020 MassDOT LRFD Bridge Design Manual, and the Plans using English units and HL-93 live loading. The design computations shall consider all Strength, Extreme Event and Service Limit States as are appropriate for each stage of fabrication, shipment, construction, and for the final in-service condition. Design computations and shop drawings

ITEM 995.01 (CONTINUED)

shall be prepared and stamped by a Professional Engineer licensed to practice in the Commonwealth of Massachusetts. The shop drawings shall be prepared and submitted in accordance with the section, Drawings, above.

The dimensions provided on the plans are shown to establish the size of the proposed opening. The width and thickness of each culvert unit may vary depending upon the manufacturer's specifications provided that the opening size is maintained. The Contractor shall be responsible for modifying the dimensions of the elements to compensate for elastic shortening, shrinkage, grade corrections, and other phenomena that make in-process fabricating dimensions different from those shown on the drawings. Approval of the shop drawings shall not relieve the Contractor from responsibility for the correctness of the dimensions shown.

1. Joints.

The precast reinforced concrete three-sided box culvert shall be produced with grout-filled keyways per the details on the plans, the manufacturer's recommendations, and as approved by the Engineer. The ends shall be manufactured such that when the sections are laid together they will make a continuous line of frames with a smooth interior surface free of appreciable irregularities, and in compliance with the permissible variations.

2. Marking.

The following information shall be clearly marked on the interior of each frame by indentation, waterproof paint, or other approved means:

- (a) Frame span and rise
- (b) Date of manufacture and lot number
- (c) Name and trademark of the manufacturer

E. Reinforcement.

The reinforcing bars shall be installed in accordance with Section 901.62 of the Supplemental Specifications, including tolerances for cover and horizontal spacing of bars. Components of mechanical reinforcing bar splicers shall be set with the tolerances shown on the plans. The reinforcing bars and mechanical reinforcing bar splicers shall be assembled into a rigid cage that will maintain its shape in the form and which will not allow individual reinforcing bars to move during the placement of concrete. This cage shall be secured in the form so that the clearances to all faces of the concrete, as shown on the plans, shall be maintained.

Where reinforcing bars are to protrude from one Precast Concrete Bridge Element in order to mate with reinforcing bar splicers in a second precast concrete element, the fabricator shall set the reinforcing bars and the reinforcing bar splicers with a template in order to ensure proper fit up within the tolerances specified on the plans.

F. Tolerances.

Fabrication shall comply with tolerances specified on the plans. Tolerances for steel reinforcement placement shall be in accordance with 901.62. In the absence of specifications on the plans, tolerances shall comply with the latest version of the PCI MNL 135, Precast Tolerance Manual.

G. Forms.

Concrete shall be cast in rigidly constructed forms, which will maintain the Precast Concrete Bridge Elements within specified tolerances to the shapes, lines and dimensions shown on the approved

ITEM 995.01 (CONTINUED)

fabrication drawings. Forms shall be constructed from flat, smooth, non-absorbent material and shall be sufficiently tight to prevent the leakage of the plastic concrete. When wood forms are used, all faces in contact with the concrete shall be laminated or coated with a non-absorbent material. All worn or damaged forms, which cause irregularities on the concrete surface or damage to the concrete during form removal, shall be repaired or replaced before being reused. Any defects or damage of more than "Category 2, Minor Defects" made to the concrete, due to form work, stripping or handling, shall be subject to repair or rejection, as defined in the *Repairs and Replacement* section. If threaded inserts are cast into the elements for support of formwork, the inserts shall be recessed a minimum of 1 inch and shall be plugged after use with a grout of the same color as that of the precast cement concrete.

H. Mixing of Concrete.

The concrete shall be proportioned and mixed in conformance with the Fabricator's approved mix design and M4.02.10 Mixing and Delivery Fabrication shall not occur without prior mix design approval. The Fabricator shall provide copies of batch tickets to the Engineer.

I. Placement of Concrete.

Prior to the placement of concrete, the temperature of the forms shall be greater than or equal to 50°F. Quality Control inspection shall be performed by the Fabricator as specified in the *Fabricator Quality Control* section. The Fabricator shall verify all materials and equipment required for protecting and curing the concrete are readily available and meet the requirements of the *Final Curing Methods* section below. All items encased in the concrete shall be accurately placed in the position shown on the Plans and firmly held during the placing and setting of the concrete. Clearance from the forms shall be maintained by supports, spacers, or hangers and shall be of approved shape and dimension.

During placement, the concrete shall maintain a concrete temperature range between 50°F and 90°F. The Fabricator shall minimize the time to concrete placement (measured from start of mixing to completion of placement). In no event shall time to placement exceed 90 minutes. The Fabricator shall perform additional Quality Control sampling and testing on concrete that has been retempered with admixtures or hold-back water during the placement of the concrete as specified in the *Fabricator Quality Control* section above. Delays or shutdowns of over 30 minutes shall not be allowed during the continuous filling of individual forms.

J. Consolidation of Concrete.

Suitable means shall be used for placing concrete to prevent segregation or displacement of reinforcing steel or forms. The concrete shall be thoroughly consolidated by external or internal vibrators or a combination of both. Vibrators shall not be used to move concrete within the forms. Vibrators shall be used as specified in 901.63C and as directed by the Engineer. Concrete shall be placed and consolidated in a way that minimizes the presence of surface voids or bug holes on the formed surfaces. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

K. Finishing of Concrete.

The finish of the Precast Concrete Bridge Elements shall be as indicated on the plans. Where Precast Concrete Bridge Elements have keyways for grout or closure pours, the surfaces of these shear keys shall be abrasive blasted prior to shipment. The Fabricator may utilize a surface retarder with water blast, sandblast, or a combination of both to achieve the desired keyway finish. At a minimum, the profile of the keyway surfaces shall be like that of 60 grit sandpaper. The exposed reinforcing steel in the precast slab shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel

ITEM 995.01 (CONTINUED)

reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer.

The Fabricator shall permanently mark each precast concrete bridge element with its type and/or piece mark, date of casting, and supplier identification either by stamp markings in fresh concrete, waterproof paint, or other approved means on a surface that will not be exposed after assembly.

L. Exposed Surfaces of Precast Concrete Bridge Elements.

As soon as conditions permit, before the concrete has fully hardened, all dirt, laitance, and loose aggregate shall be removed from the exposed concrete surfaces. Contractor shall not allow foot traffic on the uncured concrete until it has reached sufficient strength to prevent damage.

M. Exposed Surfaces of Closure Pour Shear Keys.

The closure pour shear key cast in the sides of the beam flanges shall have an exposed aggregate finish. The closure pour reinforcing steel and its coating shall not be damaged by the process for creating the exposed aggregate surface. Fabricator may utilize a surface retarder with water blast, abrasive blast, or a combination of both to achieve the desired shear key finish. The abrasive blast shall use oil free compressed air. The profile of the shear key surfaces shall be like that of 60 grit sandpaper.

N. Initial Curing Methods.

After the placement of concrete and prior to concrete finishing, the Fabricator shall initiate initial curing methods when the concrete surface begins to dry, to reduce moisture loss from the surface. Application of one or more of the following initial curing methods shall occur immediately after the bleed water sheen has disappeared.

1. Fogging.

Fogging nozzles shall atomize water into a fog-like mist. The fog spray shall be directed and remain visibly suspended above the concrete surface, to increase the humidity of the air and reduce the rate of evaporation. Water from fogging shall not be worked into the surface during finishing operations and shall be removed or allowed to evaporate prior to finishing.

2. Liquid-applied Evaporation Reducers

Evaporation reducers shall be sprayed onto the freshly placed concrete surface to produce an effective monomolecular film that reduces the risk of plastic-shrinkage cracking and rate of evaporation of the bleed water from the concrete surface. Evaporation reducers shall be applied in accordance with manufacturer's recommendations.

O. Intermediate Curing Methods.

The Fabricator shall initiate intermediate curing methods if concrete finishing has taken place prior to the concrete reaching final set. The freshly finished concrete surface shall be protected from moisture loss, by the continuation of initial curing methods (fogging and evaporation reducers) until final curing methods are applied or by the use of liquid membrane-forming curing compounds (see *Liquid Membrane-Forming Compounds for Curing* section).

ITEM 995.01 (CONTINUED)

P. Final Curing Methods.

The Fabricator shall initiate and apply final curing methods to the concrete immediately after the following conditions are met:

- (a) Completion of concrete finishing
- (b) Final set of concrete
- (c) Concrete has hardened sufficiently enough to prevent surface damage

During fabrication of Precast Concrete Bridge Elements, the Fabricator shall maintain the required concrete temperature ranges throughout the entire duration of the final curing method cycle as specified herein. Controlled and gradual termination of the final curing method shall occur after all specified conditions are met. The concrete temperature shall be reduced at a rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the final curing method enclosure. The Fabricator shall maintain a minimum concrete temperature of 40°F until 100% f'_c is attained (see *Handling and Storage* section below).

1. Water Spray Curing.

All exposed concrete surfaces shall remain moist with a continuous fine spray of water throughout the entire duration of the final curing method cycle (see *Table 4: Final Curing Method Cycle for Water Spray*).

Table 4: Final Curing Method Cycle for Water Spray

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Five (5) days	≥ 80% f'_c

2. Saturated Covers for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of saturated covers throughout the entire duration of the final curing method cycle (see *Table 5: Final Curing Method Cycle for Saturated Covers*). Saturated covers shall be allowed to dry thoroughly before removal to provide uniform, slow drying of the concrete surface.

Table 5: Final Curing Method Cycle for Saturated Covers

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Three (3) days	≥ 80% f'_c

Saturated covers, such as burlap, cotton mats, and other coverings of absorbent materials shall meet the requirements of AASHTO M 182, Class 3. Saturated covers shall be in good condition, free from holes, tears, or other defects that would render it unsuitable for curing concrete. Saturated covers shall be dried to prevent mildew when storing. Prior to application, saturated covers shall be thoroughly rinsed in water and free of harmful substances that are deleterious or cause discoloration to the concrete. Saturated covers shall have sufficient thickness and proper positioning onto the concrete surface to maximize moisture retention.

ITEM 995.01 (CONTINUED)

Saturated covers shall contain a sufficient amount of moisture to prevent moisture loss from the surface of the concrete. Saturated covers shall be kept continuously moist so that a film of water remains on the concrete surface throughout the entire duration of the final curing method cycle. The Fabricator shall not permit the saturated covers to dry and absorb water from the concrete. Use of polyethylene film (see *Polyethylene Film* section) may be applied over the saturated cover to potentially decrease the need for continuous watering.

3. Sheet Materials for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of curing sheet materials throughout the entire duration of the final curing method cycle (see *Table 6: Final Curing Method Cycle for Curing Sheet Materials*).

Table 6: Final Curing Method Cycle for Sheet Materials

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Three (3) days	≥ 80% f _c

Sheet Materials used for curing, such as polyethylene film, white burlap-polyethylene sheeting, and reinforced paper shall meet the requirements of ASTM C171 and the specifications herein. Sheet materials shall inhibit moisture loss and reduce temperature rise in concrete exposed to radiation from the sun during the final curing method cycle. Adjoining covers shall overlap not less than 12 inches. All edges of the covers shall be secured to maintain a moist environment.

(a) Polyethylene Film.

Polyethylene film shall meet the requirements of ASTM C171, consist of a single sheet manufactured from polyethylene resins, be free of visible defects, and have a uniform appearance. Careful considerations shall be taken by the Fabricator to prevent the film from tearing during storage and application, so as to not disrupt the continuity of the film (polyethylene film reinforced with glass or other fibers is more durable and less likely to be torn). The Fabricator shall monitor the application of the film to prevent uneven spots from appearing (mottling) on the concrete surface, due to variations in temperature, moisture content, or both. The Fabricator shall prevent mottling from occurring on the concrete surface by applying additional water under the film or applying a combination of polyethylene film bonded to absorbent fabric to the concrete surface to retain and evenly distribute the moisture.

Immediately following final finishing, polyethylene film shall be placed over the surface of the fresh concrete surface, so as to not damage the surface of the concrete and shall be placed and weighted so that it remains in contact with the concrete throughout the entire duration of the final curing method cycle. The film shall extend beyond the edges of the concrete surface. The film shall be placed flat on the concrete surface, avoiding wrinkles, to minimize mottling. Edges of adjacent polyethylene film shall overlap a minimum of 6 inches and be tightly sealed with the use of sand, wood planks, pressure-sensitive tape, mastic, or glue to maintain close contact with the concrete surface, retain moisture, and prevent the formation of air pockets throughout the entire duration of the final curing method cycle.

ITEM 995.01 (CONTINUED)

(b) White Burlap-Polyethylene Sheeting

White burlap-polyethylene sheeting shall meet the requirements of ASTM C171, be securely bonded to the burlap so to avoid separation of the materials during handling and curing of the concrete, and be applied in the same manner as the polyethylene film.

(c) Reinforced Impervious Paper.

Reinforced impervious paper shall meet the requirements of ASTM C171, consist of two sheets of kraft paper cemented together with a bituminous adhesive and reinforced with embedded cords or strands of fiber running in both directions, and be white in color. Reinforced impervious paper shall be treated to prevent tearing when wetted and dried.

Reinforced impervious paper can be reused so long as it is effective in retaining moisture on the concrete surface. The Fabricator shall visually inspect the reinforced impervious paper for all holes, tears, and pin holes from deterioration of the paper through repeated use by holding the paper up to the light. The paper shall be discarded and prohibited from use when the moisture is no longer retained.

After the concrete has hardened sufficiently to prevent surface damage, the concrete surface shall be thoroughly wetted prior to the application of the reinforced impervious paper, and be applied in the same manner as the polyethylene film.

4. Liquid Membrane-Forming Compounds for Curing.

All exposed concrete surfaces shall remain moist with a continuous application of liquid membrane-forming compounds throughout the entire duration of the final curing method cycle (see *Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds*).

Table 7: Final Curing Method Cycle for Liquid Membrane-Forming Compounds

Sustained Concrete Temperature	Final Curing Method Cycle Duration	Compressive Strength
50°F ≤ °F ≤ 90°F	≥ Seven (7) days	≥ 80% f _c

Liquid membrane-forming compounds shall meet the requirements of ASTM C 1315, Type I, Class A and shall exhibit specific properties, such as alkali resistance, acid resistance, adhesion-promoting quality, and resistance to degradation by ultraviolet light, in addition to moisture-retention capabilities. Liquid membrane-forming compounds shall consist of waxes, resins, chlorinated rubber, or other materials to reduce evaporation of moisture from concrete. Liquid membrane-forming compounds shall be applied in accordance with the manufacturer's recommendations.

Liquid membrane-forming compounds shall be applied immediately after the disappearance of the surface water sheen following final finishing. All exposed surfaces shall be wetted immediately after form removal and kept moist to prevent absorption of the compound, allowing the curing membrane to remain on the concrete surface for proper membrane moisture retention. The concrete shall reach a uniformly damp appearance with no free water on the surface prior to the application of the compound.

If patching or finishing repairs are to be performed prior to the application of the compound, the

ITEM 995.01 (CONTINUED)

Precast Concrete Bridge Element shall be covered temporarily with saturated covers until the repairs are completed and the compound is applied. Only areas being repaired shall be uncovered during this period. While the saturated covers are removed to facilitate the patching process, the work shall continue uninterrupted. If for any reason the work is interrupted, saturated covers shall be placed onto the uncovered concrete surface, until the work continues and is completed, at which time the curing compound shall be applied to the repaired area.

Careful considerations shall be made by the Fabricator to determine if the evaporation rate is exceeding the rate of bleeding, thus causing the surface to appear dry even though bleeding is still occurring. Under such conditions, the application of liquid membrane-forming compounds to the concrete surface shall be delayed, in order to prevent bleed water from being sealed below the concrete surface and avert map cracking of the membrane films, reduction in moisture-retention capability, and reapplication of the compound. To diagnose and prevent this condition, the Fabricator shall place a transparent plastic sheet over a test area of the uncured and unfinished concrete surface and shall determine if any bleed water accumulates under the plastic.

The compound shall be applied in two applications at right angles to each other to ensure uniform and more complete coverage. On very deeply textured surfaces, the surface area to be treated shall be at least twice the surface area of a troweled or floated surface. In such cases, two separate applications may be needed, each at 200 ft²/gal., with the first being allowed to become tacky before the second is applied.

The curing compound shall be applied by power sprayer, using appropriate wands and nozzles with pressures between 25 and 100 psi. For very small areas such as repairs, the compound shall be applied with a wide, soft-bristled brush or paint roller. The compound shall be stirred or agitated before use and applied uniformly in accordance with the manufacturer's recommended rate. The Fabricator shall verify the application rates are in accordance with the manufacturer's recommended rate.

When the concrete surface is to receive paint, finishes, or toppings that require positive bond to the concrete, it is critical that the curing procedures and subsequent coatings, finishes, or toppings be compatible to achieve the necessary bond.

After the termination of the final curing method cycle has occurred, liquid membrane-forming compounds shall be removed by blast-cleaning from any concrete surface that is to receive paint, finishes, plastic concrete from secondary pour, grout, or any other toppings that require bonding to the concrete surface. These surfaces shall be further blast-cleaned to remove the cement matrix down to exposed aggregate to ensure proper bonding to the material. The method used to remove the curing compound shall not damage the reinforcement and coating. Compounds are prohibited on any concrete surface that will have a penetrating or coating type treatment such as a sealer, stain, or waterproofing membrane applied to it.

5. Accelerated Curing.

Accelerated curing shall use live steam or radiant heat with moisture in accordance with PCI MNL-116 as modified herein. The concrete temperature shall meet the maximum heat increase and cool down rates as specified herein. Concrete temperature monitoring shall meet the requirements of the *Temperature Monitoring* section. Excessive and fluctuating rates of heating and cooling shall be prohibited. The concrete temperature shall not exceed 158°F at any time. The Fabricator shall meet the following accelerated curing sequencing and requirements.

ITEM 995.01 (CONTINUED)

(a) Initial Delay Period.

The initial delay period shall be defined as the duration immediately following the placement of the concrete and the attainment of initial set of the concrete. The Fabricator shall determine the time of initial set in accordance with AASHTO T 197 specifications. Throughout the entire duration of the preset period, initial curing shall be implemented. The temperature increase period (see *Temperature Increase Period* section) shall not occur until initial set of the concrete is attained. During the initial delay period, the concrete temperature shall meet the following requirements:

- i. Concrete temperature rate of increase shall not exceed 10°F per hour.
- ii. Total concrete temperature increase shall not exceed 40°F higher than the placement concrete temperature or 100°F, whichever is less

(b) Temperature Increase Period.

The temperature increase period shall be defined as the duration immediately following the completion of the initial delay period (after initial set) and immediately prior to the start of the constant maximum temperature period. Application of steam to the enclosure shall not occur until the initial delay period is complete. After the initial delay period is complete, all exposed concrete surfaces shall be cured in a moist environment where the concrete temperature increases at a rate not to exceed 36°F per hour.

(c) Constant Maximum Temperature Period.

The constant maximum temperature period shall be defined as the duration immediately following the completion of the temperature increase period and immediately prior to the start of the temperature decrease period. After the temperature increase period is complete, all exposed concrete surfaces shall be cured in a moist environment at a controlled and constant elevated temperature throughout the entire duration of the constant maximum temperature period. Termination of the constant maximum temperature period and the start of the termination decrease period shall occur after all specified conditions are met (see *Table 8: Constant Maximum Temperature Period*).

Table 8: Constant Maximum Temperature Period

Sustained Concrete Temperature	Constant Maximum Temperature Period	Compressive Strength
120°F ≤ °F ≤ 158°F	6 hrs ≤ Time ≤ 48 hrs	≥ 80% f _c

(d) Temperature Decrease Period.

After the constant maximum temperature period is complete, the concrete temperature shall be cured in a moist environment at a controlled and reduced rate not to exceed 36°F per hour until the concrete temperature is within 20°F of the ambient temperature outside of the curing enclosure.

ITEM 995.01 (CONTINUED)

Q. Stripping.

The Fabricator shall not strip forms or handle the Precast Concrete Bridge Element until Quality Control compressive strength cylinders attain a minimum compressive strength of 80% Design Strength (f'_c) or the value indicated on the approved drawings has been achieved. After removal from the form, all exposed concrete surfaces shall continue to be cured in conformance with the *Final Curing Methods* sections until completion.

R. Handling and Storage of Precast Concrete Bridge Elements.

Precast Concrete Bridge Elements may be exposed to temperatures below freezing (32°F) when the chosen curing cycle has been completed, provided that the following conditions are met:

- (a) Precast Concrete Bridge Elements are protected from precipitation with polyethylene curing covers until 100% f'_c is attained
- (b) Precast Concrete Bridge Elements maintain a minimum concrete temperature of 40°F until 100% f'_c is attained

Precast Concrete Bridge Elements damaged during handling and storage will be repaired or replaced at the Engineer's direction at no cost to the Town. Precast Concrete Bridge Elements shall be lifted at the designated points by approved lifting devices embedded in the concrete and in accordance with proper lifting and handling procedures. Storage areas shall be smooth and well compacted to prevent damage due to differential settlement. Precast Concrete Bridge Elements shall be supported on the ground by means of continuous blocking, in accordance with the approved dunnage plan.

Precast Concrete Bridge Elements shall be loaded on a trailer with blocking as described above, in accordance with the approved dunnage plan. Shock-absorbing cushioning material shall be used at all bearing points during transportation of the Precast Concrete Bridge Elements. Blocking shall be provided at all locations of tie-down straps. Precast Concrete Bridge Elements stored prior to shipment shall be inspected by the Contractor prior to being delivered to the site to identify damage that would be cause for repair or rejection.

S. Repairs and Replacement.

In the event defects are identified, they shall be classified in the following categories and a non-conformance report (NCR) shall be filed if required. The NCR shall be submitted to the Engineer for review. Defects in all categories shall be documented by plant Quality Control personnel and made available to the Engineer upon request. Any required repairs shall utilize materials listed on the MassDOT QCML.

Where noted, defects shall be repaired according to the PCI Northeast Region Guidelines for Resolution of Non-Conformances in Precast Concrete Bridge Elements, Report Number PCINE-18-RNPCBE. Please note that reference to PCINE-18-RNPCBE is made for repair details only. In the case of conflicts with this Special Provision, this Special Provision shall govern.

1. Category 1, Surface Defects.

Category 1 defects do not need to be repaired, and an NCR does not need to be filed. Surface defects are defined as the following:

- (a) Surface voids or bug holes that are less than 5/8-inch in diameter and less than 1/4-inch deep, except when classified as Category 4
- (b) Cracks less than or equal to 0.006 inches wide

ITEM 995.01 (CONTINUED)

- (c) Cracks less than or equal to 0.125 inches wide on surfaces that will receive a field-cast concrete overlay

2. Category 2, Minor Defects.

Category 2 defects shall be repaired, but an NCR does not need to be filed. Minor defects are defined as the following:

- (a) Spalls, honeycombing, surface voids that are less than 2 inches deep and have no dimension greater than 12 inches
- (b) Cracks less than or equal to 0.016 inches that will not receive a concrete overlay
- (c) Broken or spalled corners that will be covered by field-cast concrete

Minor defects shall be repaired according to PCINE-18-RNPCBE. Cracks shall be sealed according to the PCI Repair Procedure #14 in PCINE-18-RNPCBE.

3. Category 3, Major Defects.

For Category 3 defects, the Fabricator shall prepare an NCR that documents the defect and describes the proposed repair procedure. The NCR shall be submitted to the Engineer for approval prior to performing the repair. Major defects are defined as the following:

- (a) Spalls, honeycombing and surface voids that are deeper than 2 inches or have any dimension greater than 12 inches, when measured along a straight line
- (b) Concentrated area of defects consisting of four or more Category 2 Defects within a 4-square foot area.
- (c) Exposed reinforcing steel
- (d) Cracks greater than 0.016 inches and less than or equal to 0.060 inches in width that will not receive a concrete overlay
- (e) Bearing area spalls with dimensions not exceeding 3 inches
- (f) Cracks, spalls and honeycombing that will be encased in cast in place concrete need not be repaired, but the limits and location of the defects shall be documented with an NCR

Upon approval, defects and cracks shall be repaired according to PCINE-18-RNPCBE and this specification. All repairs shall be completed at the expense of the Contractor.

4. Category 4, Rejectable Defects.

Rejectable defects as determined by the Engineer may be cause for rejection. Fabricator may submit an NCR with a proposed repair procedure, requesting approval. Some rejectable defects are defined as the following:

- (a) Surface defects on more than 5% of the surface area which will be exposed to view after installation
- (b) Minor defects that in total make up more than 5% of the surface area of the unit
- (c) Cracks greater than 0.060 inches in width except as noted in Category 1
- (d) Elements fabricated outside of the specified tolerances
- (e) MassDOT compressive strength testing that does not meet the specified Design Strength, f'_c

ITEM 995.01 (CONTINUED)

T. Shipping.

Prior to shipment, the Fabricator shall perform the following actions and provide the required documentation to the Engineer:

- (a) Precast Concrete Bridge Elements shall remain at the Fabricator's plant for a minimum of 7 days after cast date.
- (b) QC Inspection Reports shall be signed by the Quality Control Manager and provided to the Engineer.
- (c) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative Sublot shall be generated by the Fabricator and provided to the Engineer.
- (d) Certificate of Compliance shall be generated by the Fabricator as described under the Fabricator Quality Control section and provided to the Engineer.
- (e) All Engineer approved Corrective Actions submitted on the Non-Conformance Reports (NCR), shall be verified to have been completed by the Engineer and Quality Control Manager.
- (f) All NCRs shall be signed off by the Quality Control Manager and the Engineer

U. Delivery.

Upon Delivery, the following documentation shall be provided to the Resident Engineer or designee:

- (a) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative sublot.
- (b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
- (c) QC Inspection Reports signed by the Quality Control Manager.

The Contractor shall inspect Precast Concrete Bridge Elements upon receipt at the site. Precast Concrete Bridge Elements damaged during delivery shall be repaired or replaced at the Engineer's direction at no additional cost.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. General.

All of the Contractor's field personnel involved in the erection and assembly of the Precast Concrete Bridge Elements shall have knowledge of and follow the approved Erection Procedure.

Prior to installation, the following documentation shall be reviewed and confirmed by the Engineer or designee:

- (a) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Precast Concrete Bridge Element's representative sublot.
- (b) Certificate of Compliance generated by the Fabricator as described under the Fabricator Quality Control section.
- (c) QC Inspection Reports signed by the Quality Control Manager.

Field construction staff shall verify that the Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

ITEM 995.01 (CONTINUED)

B. Erection Procedure

Prior to the erection, the Contractor shall submit an Erection Procedure for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Precast Concrete Bridge Elements. The Erection Procedure shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts with working knowledge of the Contractor's equipment, approved shop drawings, and materials to build the bridge. The Erection Procedure shall, at a minimum, include the following:

1. Erection Procedure

The Erection Procedure shall be prepared to conform to the requirements of 960.61, Erection and the applicable sections in Chapter 8 of the PCI Design Handbook (seventh edition) for handling, erection, and bracing requirements. At a minimum, the Erection Procedure shall provide:

- (a) Minimum concrete compressive strength for handling the Precast Concrete Bridge Elements.
- (b) Concrete stresses during handling, transport, and erection.
- (c) Crane capacities, pick radii, sling geometry, and lifting hardware.
- (d) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
- (e) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Precast Concrete Bridge Elements and setting them as shown on the plans.
- (f) Design of crane supports including verification of subgrade for support.
- (g) Location and design of all temporary bracing that will be required during erection.

Non-shrink grout and concrete materials, approved by the Engineer, shall be placed as shown on the plans. Fill joints, keyways, and voids, in strict accordance with the specifications and manufacturer's recommendations and instructions.

For footings once these Precast Concrete Bridge Elements have been set to the correct horizontal and vertical alignment, the void between them and the supporting soil shall be filled with Controlled Density Fill – Non-Excavatable to the limits as shown on the plans. Add additional grout ports in the footings to facilitate the bedding process if required.

Joints shall be filled flush to the top with non-shrink grout, and any vertical misalignment between adjacent elements shall be feathered out on a slope of 1 to 12.

Curing of grout or concrete shall be performed in strict accordance with the specifications and manufacturer's recommendations. Filling shall not be completed in cold weather when either the ambient temperature or the precast member's temperature is below the manufacturer's recommendation. No localized heating of either the precast members or of the air surrounding the element will be permitted in an attempt to reach application temperatures.

If the joints or voids are not filled within five days after the Precast Bridge Elements are erected, the Contractor shall cover and protect the openings from weather and debris until they are filled.

C. Survey and Layout.

Working points, working lines, and benchmark elevations shall be established prior to placement of all elements. The Contractor is responsible for field survey as necessary to complete the work. The Engineer reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

ITEM 995.01 (CONTINUED)

D. Preparation of Closure Pour Keyways.

Immediately prior to erecting the Precast Concrete Bridge Elements, the closure pour shear keys shall be cleaned at the job site of all dust, dirt, carbonation, laitance, and other potentially detrimental materials which may interfere with the bonding of the closure pour concrete and precast concrete using a high-pressure water blast. The exposed reinforcing steel in the precast concrete shall be protected from damage during the cleaning of the keyways. Damaged epoxy coating of steel reinforcement shall be repaired, and the reinforcing steel shall be cleaned as directed by the Engineer. The surfaces of the shear keys shall be wetted so that the surfaces shall have a Saturated Surface Dry (SSD) condition for at least 24 hours prior to the placement of the closure pour concrete.

E. Erection.

The elements shall be placed in the sequence and according to the methods outlined in the Erection Procedure. As the erection proceeds, the Contractor shall constantly monitor the assembly to ensure that the precast concrete bridge element is within proper horizontal and vertical location and tolerances prior to releasing it from the crane and setting the next unit. The Contractor may use shims to maintain proper setting tolerances.

The concrete elements shall be lifted only by the lifting devices, and the utmost care shall be taken to prevent distortion of the elements during handling, transportation, or storage.

Suitable spreaders shall be used during lifting so that only a vertical pull will be made on the lifting device. A non-vertical lifting force may be permitted if prior written approval is given by the Engineer. This approval will be contingent on the Contractor demonstrating by calculations, prepared by a Professional Engineer registered in Massachusetts, that the elements will not be damaged by the non-vertical lifting force and by documentation that the capacity of the lifting devices is adequate for the non-vertical lifting force.

Precast components shall be pre-bed with non-shrink grout thicker than shim stacks prior to placing other precast elements on top of them.

After all Precast Concrete Bridge Elements have been placed, the actual overall dimensions of the structure both horizontal and vertical, as laid out shall not deviate from the nominal dimensions shown on the plans beyond a tolerance of +0 inches and -1 inches. Once the layout of Precast Concrete Bridge Elements has been accepted by the Engineer, the Contractor shall cut all lifting devices off below the surfaces of the elements.

F. Box Culverts, Three-Sided Frames and Arches.

Backfilling operations shall not begin until the following checks have been made:

- (a) The frame to footing key joints are grouted as shown on the plans;
- (b) The joints between exterior frame bridge elements and wingwall stems are complete as shown on the plans;
- (c) All joint seals are properly placed.

ITEM 995.01 (CONTINUED)

Backfill shall be paid for under separate items. The backfilling procedures shall be in accordance with Sections 120, 150, and 170 of the Standard Specifications and Supplemental Specifications modified as follows:

- (a) Fill shall be placed and compacted in layers not exceeding one foot in depth.
- (b) Dumping of fill shall not be allowed any nearer to the structure than 3.25 feet from a vertical plane extending from the back of the footing.
- (c) Backfill shall be placed as symmetrically as possible around the structure with differential depths of backfill on each side of the structure not exceeding 1.5 feet with respect to each other.
- (d) Compaction shall be achieved using hand compaction equipment for all fill within one foot of the structure.
- (e) The bare structure shall not be crossed by any equipment heavier than that specified by the frame manufacturer. All damage resulting from equipment damage shall be rectified to the satisfaction of the Engineer at no cost to the Town.
- (f) Construction equipment will not be permitted atop an uncompleted structure.
- (g) Construction equipment whose weight exceeds the design capacity shall not be permitted atop the completed structure under any circumstances.
- (h) The use of vibratory rollers for compaction purposes will not be permitted.

A representative of the manufacturer shall be on site at the commencement of the installation, at no cost to the Town, to assist the Contractor. The representative shall offer advisory assistance only and shall not supplant the Contractor's representative, or the Engineer.

G. Filling of Blockouts for Lifting Devices and Threaded inserts.

If the blockouts in the Precast Concrete Bridge Elements where the lifting devices were located will be exposed and visible after assembly is complete, the Contractor shall fill these blockouts with Cement Mortar (M4.02.15) or grout.

SCHEDULE OF BASIS FOR PARTIAL PAYMENT

At the time of bid, the Contractor shall submit on his/her proposal form a schedule of unit prices for the major component Sub-Items that make up Item 995.01 as well as his/her total bridge structure Lump Sum cost. The bridge structure Lump Sum breakdown quantities provided in the proposal form are estimated and not guaranteed. The total of all partial payments to the Contractor shall equal the Lump Sum contract price regardless of the accuracy of the quantities furnished by the Contractor for the individual bridge components. The cost of labor and materials for any Item not listed but required to complete the work shall be considered incidental to Item 995.01 and no further compensation will be allowed.

The schedule on the proposal form applies only to Bridge Structure. Payment for similar materials and construction at locations other than at this bridge structure shall not be included under this Item. Sub-Item numbering is presented for information only in coordination with MassDOT Standard Nomenclature.

ITEM 995.01 (CONTINUED)

BRIDGE STRUCTURE NO G-08-061 (C97)

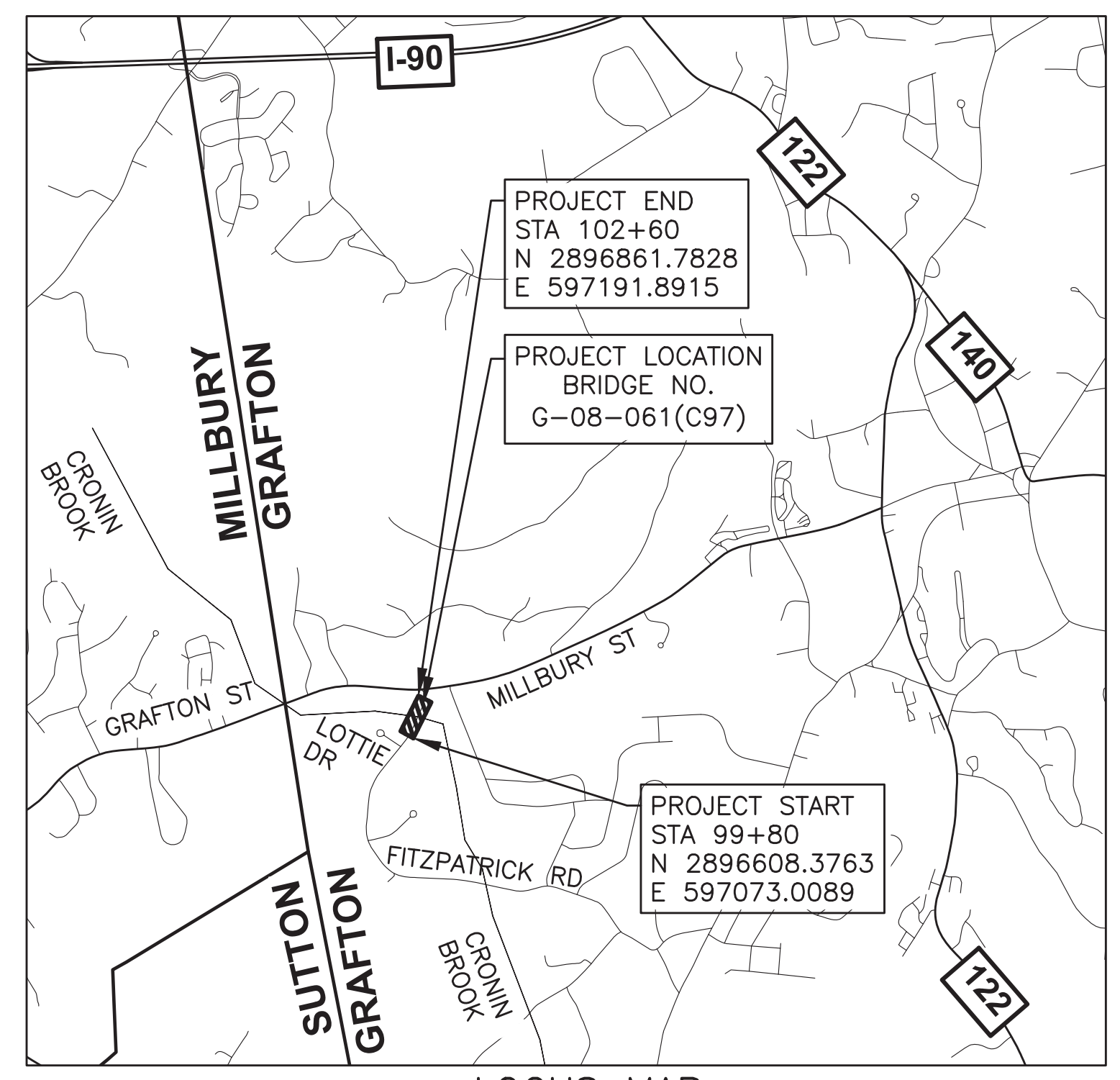
<u>SUB-ITEM NO.</u>	<u>ITEM</u>	<u>QTY.</u>	<u>UNIT</u>	<u>UNIT PRICE</u>	<u>TOTAL</u>
904.3	5000 PSI, ¾", 685 HP CEMENT CONCRETE	270	CY		
910.1	STEEL REINFORCEMENT FOR STRUCTURES – EPOXY COATED	22000	LB		
970	BITUMINOUS DAMP-PROOFING	450	SY		

T1060_FITZPATRICK_KEYPLAN_PROF.DWG MARCH 26, 2022 8:35 AM CHAPTER 85 SUBMISSION

**GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK**

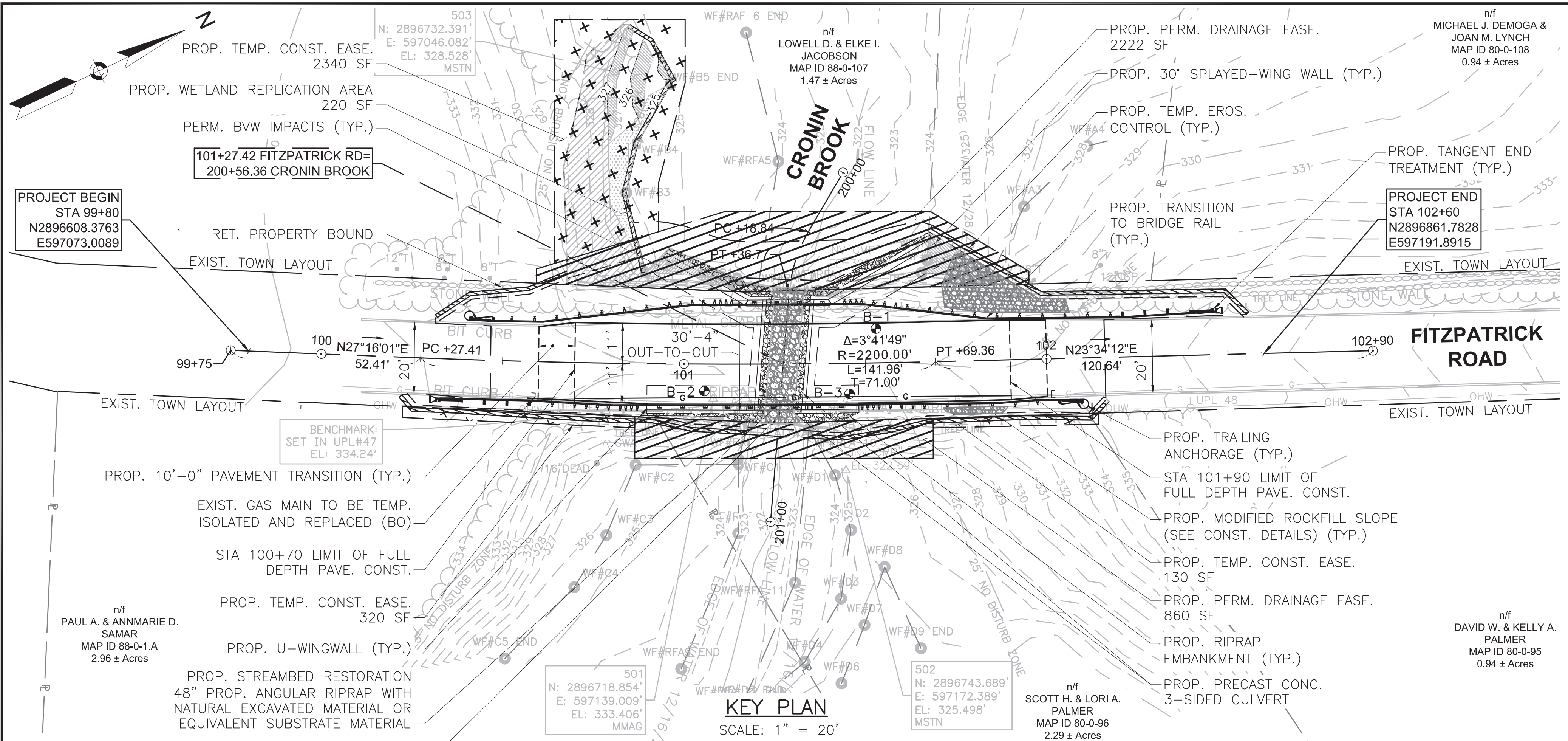
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	1	9
PROJECT FILE NO.		T1060	

KEY PLAN AND PROFILES

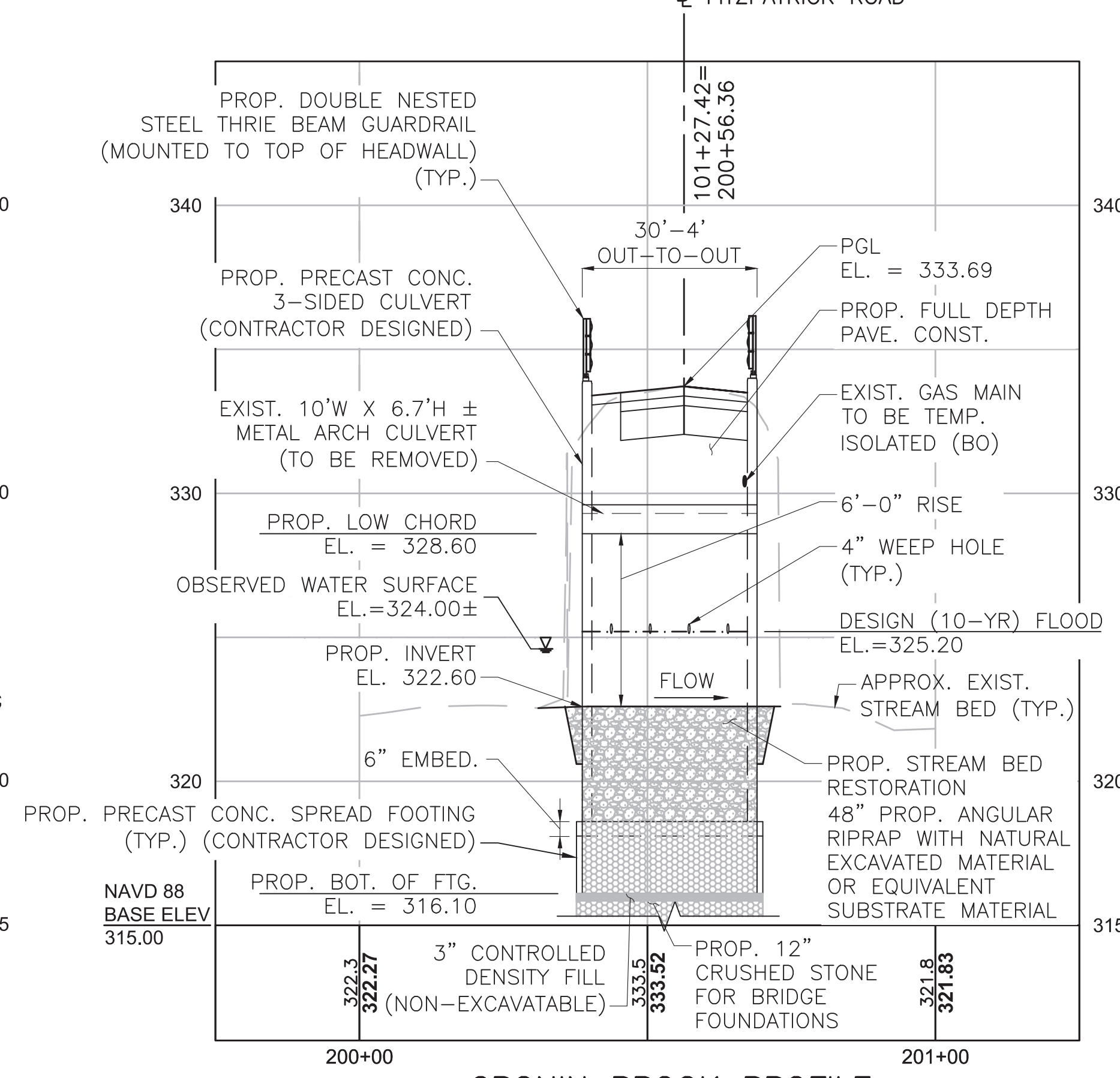
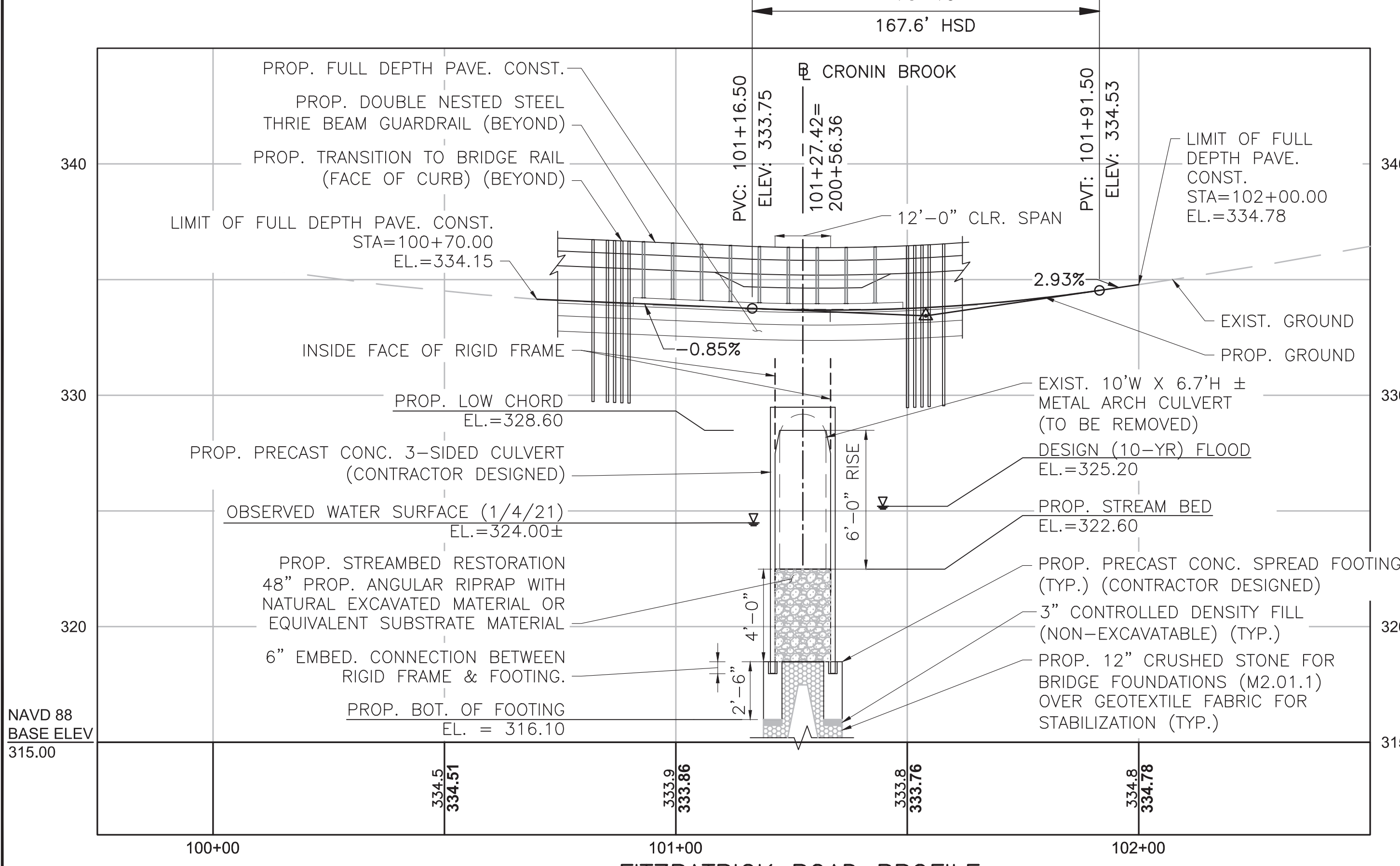


INDEX

SHEET NO.	DESCRIPTION
1	KEY PLAN AND PROFILES
2	GENERAL NOTES
3	BORING LOGS
4	PLAN AND ELEVATIONS
5	CONTROL OF WATER PLAN
6	SUBSTRUCTURE AND FRAME PLAN
7-8	STRUCTURE DETAILS
9	MISCELLANEOUS DETAILS
10	PREFABRICATION TOLERANCES
10A	TTCP (DETOUR PLAN)
10B	TTCP (SIGN AND SUMMARY)



LOW POINT ELEV = 333.68
 LOW POINT STA = 101+33.35
 PVI STA = 101+54.00
 PVI ELEV = 333.43
 A.D. = 3.79%
 K = 19.81
 75' VC



COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

DISTRICT 3 BRIDGE ENGINEER _____ **DATE** _____

3/28/2022 ISSUED FOR CONSTRUCTION

TEC
The Engineering Corp
146 Dascomb Road
Andover, MA 01810
169 Ocean Blvd
Hampton, NH 03842

**PROPOSED CULVERT REPLACEMENT
GRAFTON**
FITZPATRICK ROAD
OVER CRONIN BROOK
TOWN OF GRAFTON
30 PROVIDENCE ROAD
GRAFTON, MA 01519

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH THE 2017 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS, FOR HL-93 LOADING. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH MASSDOT 2022 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

CHAPTER 85 SECTION 35 REVIEW AND APPROVAL:

IN ACCORDANCE AND COMPLIANCE WITH THE REQUIREMENTS OF CHAPTER 85 SECTION 35 OF THE MASSACHUSETTS GENERAL LAWS, THE CONTRACTOR SHALL SUBMIT TO THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION ALL CONSTRUCTION DRAWINGS AND DESIGN CALCULATIONS THAT SHALL BE USED TO FABRICATE AND CONSTRUCT THE STRUCTURE DENOTED ON THESE PLANS FOR REVIEW AND APPROVAL. THIS APPROVAL SHALL CONSTITUTE THE FINAL APPROVAL AS STIPULATED BY CHAPTER 85 SECTION 35 OF THE MASSACHUSETTS GENERAL LAWS.

SURVEY BENCHMARKS:

BMRK
SET IN UPL #47
EL: 334.240'

501:
N: 2896718.854
E: 597139.009
EL: 333.406'

502:
N: 2896743.689
E: 597172.389
EL: 325.498'

503:
N: 2896732.391
E: 597046.082
EL: 328.528'

DATE:

TO BE PLACED ON THE OUTSIDE FACE OF BOTH HEADWALLS. A SHEET SHOWING SIZE AND CHARACTER OF NUMERALS WILL BE FURNISHED. THE DATE USED SHALL BE THE LATEST YEAR OF CONTRACT COMPLETION AS OF THE DATE THE FIRST HEADWALL IS CONSTRUCTED. BOTH HEADWALLS SHALL FEATURE THE SAME DATE.

SURVEY NOTES:

THE HORIZONTAL DATUM FOR THIS SURVEY IS THE MASSACHUSETTS COORDINATE SYSTEM, NAD 1983, MAINLAND ZONE. THE VERTICAL DATUM FOR THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SAID DATUMS WERE ESTABLISHED VIA GPS OBSERVATIONS UTILIZING REALIZATION NAD83(2011) AND GEOID 12A.

THE LIMIT OF BORDERING VEGETATED WETLANDS SHOWN HEREON WAS DELINEATED BY RIMMER ENVIRONMENTAL CONSULTING, LLC. AND FLAGS WERE LOCATED VIA FIELD SURVEY BY BAY COLONY GROUP, INC.

THIS PLAN IS THE RESULT OF AN ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY BAY COLONY GROUP, INC. IN DECEMBER 2020.

ABUTTING PROPERTY LINES HAVE BEEN COMPILED FROM RECORD INFORMATION.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS (A3).

FOUNDATIONS:

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

ANCHOR BOLTS:

ALL ANCHOR BOLTS SHALL BE SET BY TEMPLATE BEFORE THE CONCRETE IS PLACED.

CONCRETE:

PRECAST ELEMENTS:
THE FABRICATOR IS RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF LIFT HOOKS FOR ALL PRECAST ELEMENTS. UNDER NO CIRCUMSTANCES WILL THE REBAR ELEMENTS SHOWN ON THE PLANS BE USED TO LIFT THE PRECAST ELEMENTS. FOR ADDITIONAL REQUIREMENTS, REFER TO THE "PRECAST CONCRETE ELEMENTS" PORTION OF ITEM 995.1 IN THE SPECIAL PROVISIONS.

THE FOLLOWING CONCRETE MIX ARE TO BE USED:
5000 PSI, 3/4 IN, 685 HP: PRECAST CULVERT, PRECAST HEADWALL, PRECAST WINGWALLS, AND PRECAST CULVERT FOOTINGS.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 31 GRADE 60. ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION:	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	19"	23"
2. 12" OF CONCRETE BELOW BAR	20"	25"	30"
3. EPOXY COATED BARS, COVER < 3db, OR CLEAR SPACING < 6db	23"	29"	34"
4. COATED BARS, ALL OTHER CASES	18"	23"	27"
5. CONDITION 2. AND 3.	26"	32"	39"
6. CONDITION 2. AND 4.	24"	30"	36"

IF THE ABOVE BARS ARE SPACED 6" OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

WATERPROOFING:

ALL WATERPROOFING USED ON TOP SLAB OF PRECAST RIGID FRAME SHALL BE BITUMINOUS DAMP-PROOFING. BITUMINOUS DAMP-PROOFING SHALL EXTEND DOWN TO THE BOTTOM OF THE RIGID FRAME LEGS.

EXISTING CONDITIONS:

ALL DIMENSIONS AND DETAILS SHOWN FOR THE EXISTING STRUCTURE ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF, AND NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION OR WORK UNTIL HE/SHE HAS MADE THE REQUIRED MEASUREMENTS ON THE ACTUAL STRUCTURE AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

TRAFFIC:

THE BRIDGE WILL BE CLOSED TO VEHICULAR TRAFFIC DURING ALL PHASES OF DEMOLITION AND CONSTRUCTION. VEHICULAR TRAFFIC WILL BE DETOURED AS SHOWN ON THE PLANS.

UTILITIES:

DURING CONSTRUCTION, THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL UTILITIES THAT ARE TO REMAIN. ALL EXISTING UTILITY POLES AND OVERHEAD WIRES SHALL BE LEFT IN PLACE DURING CONSTRUCTION. ANY TEMPORARY UTILITY SUPPORTS OR UTILITY RELOCATIONS REQUIRED AND SHOWN ON THE CONSTRUCTION DRAWINGS SHALL BE COORDINATED WITH THE ENGINEER.

THE EXISTING GAS LINE SHALL BE TEMPORARILY ISOLATED AND CUT AND CAPPED TO ALLOW FOR CONSTRUCTION OF THE STRUCTURE (CULVERT AND WINGWALLS). AFTER THE STRUCTURES ARE CONSTRUCTED AND BACKFILLED, THE EXISTING GAS LINE SHALL BE RELOCATED TO ITS FINAL POSITION.

APPROACH GUARDRAIL IS IN CLOSE PROXIMITY TO THE EXISTING GAS LINE. THE CONTRACTOR SHALL VERIFY LOCATION AND DEPTH OF EXISTING GAS LINE PRIOR TO DRIVING GUARDRAIL POSTS. IN CASE OF CONFLICT, THE CONTRACTOR SHALL BE PERMITTED TO USE THE DETAIL TITLED "ENCASED POST FOR SHALLOW MOUNT" (400.5.1). THE CONTRACTOR SHALL CONTACT DIGSAFE WHEN LOCATING THE PROPOSED GUARDRAIL POSTS.

CONTROL OF WATER SYSTEM:

CONTROL OF WATER SYSTEM SHALL BE DESIGNED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL, PER ITEM 991.1. THE CONTROL OF WATER SYSTEM SHALL BE DESIGNED USING THE 2-YEAR DESIGN FLOOD EVENT OF 52± CFS. APPROXIMATE LIMITS SHOWN ON THIS PLAN ARE CONCEPTUAL AND THE FINAL LOCATION SHALL BE DETERMINED BY THE CONTRACTOR.

GRAFTON FITZPATRICK RD OVER CRONIN BROOK			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	2	9
PROJECT FILE NO.			T1060

GENERAL NOTES

SEISMIC DESIGN CRITERIA	
DESIGN RETURN PERIOD:	1000
DESIGN SPECTRA	
As	0.104
SDs	0.221
SD1	0.091
SITE CLASS	D
SEISMIC DESIGN CATEGORY (SDC)	A

HYDRAULIC DESIGN DATA	
DRAINAGE AREA (SQ. MILES)	2
DESIGN FLOOD DISCHARGE (C.F.S.)	96
DESIGN FLOOD FREQUENCY (YEARS)	10
DESIGN FLOOD VELOCITY (F.P.S.)	3.5
DESIGN FLOOD ELEVATION (FEET, NAVD)	325.2
BASE (100-YEAR) FLOOD DATA	
BASE FLOOD DISCHARGE (C.F.S.)	165.0
BASE FLOOD ELEVATION (FEET, NAVD)	325.9
DESIGN AND CHECK SCOUR DATA	
DESIGN SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	25
DESIGN FLOOD ABUTMENT SCOUR DEPTH (FEET)	6.4
DESIGN FLOOD PIER SCOUR DEPTH (FEET)	--
CHECK SCOUR FLOOD EVENT RETURN FREQUENCY (YEARS)	50
CHECK FLOOD ABUTMENT SCOUR DEPTH (FEET)	7.1
CHECK FLOOD PIER SCOUR DEPTH (FEET)	--
FLOOD OF RECORD	
DISCHARGE (C.F.S.)	--
FREQUENCY (IF KNOWN, YEARS)	--
MAXIMUM ELEVATION (FEET, NAVD)	--
DATE (MM/YYYY)	--
HISTORY OF ICE FLOES	--
EVIDENCE OF SCOUR AND EROSION	--

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

DISTRCT 3 BRIDGE ENGINEER

DATE

BORING LOG B-1

BORING LOG B-2

BORING LOG B-3

TEST BORING LOG													
MILLER ENGINEERING & TESTING, INC. 100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641		Project: Fitzpatrick Rd. - Cronin Brook				Sheet 1 of 1		Boring No: B-1					
		Grafton, MA				Location: See Plan							
		Project No: 20.230.NH											
		Date Start: 01-07-21											
		Date End: 01-07-21						Approx. Surface Elev: 333 ±					
GROUNDWATER OBSERVATIONS													
		CASING		SAMPLER		Date		Depth		Casing At		Stabilization Period	
Type		HSA		SS		01-07-21		9'		13'		Upon Completion	
Size		2-1/4" ID		1-3/8" ID									
Hammer				140 lbs.									
Fall				30"									
Depth/ Elev.	Cas bl/ft	SAMPLE			BLOWS				Strata Change	Sample Description	Notes		
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"				18-24"	
0	333	-	0.0-0.3	4							4" Asphalt		
		S-1	0.9-2.0	13	7		3/1"	19	18		S-1: Brown, fine to coarse sand, some gravel, trace silt (FILL)		
		S-2	2.0-4.0	24	13	11	14	19	22		S-2: Brown, fine to coarse sand, some gravel, trace silt (L21011A) (FILL)		
		S-3	4.0-6.0	24	7	11	15	17	20		S-3: Brown, fine to coarse sand, little gravel, little silt (FILL)		
5	328	S-4	6.0-7.5	18	6	22	18	12			S-4: Brown, fine to coarse sand, little gravel, little silt (FILL)		
		S-4A	7.5-8.0	6	2				33		S-4A: Dark brown, fine to medium sand, some silt, trace gravel (Organic Layer)		
10	323	S-5	9.0-11.0	24	9	63	42	31	26		S-5: Brown, fine to coarse sand, some gravel, trace silt, wet		
Auger Refusal at 13'													
BORING TERMINATED AT 13 ft													
15	318												
20	313												
25	308												
30	303												
Driller: R. Marcoux		COHESIVE CONSISTENCY (Blows/Foot)				COHESIONLESS (Blows/Foot)				PROPORTIONS USED			
Helper: J. Donahue		0-2 VERY SOFT				0-4 VERY LOOSE				TRACE 0-10%			
Inspector: T. Young		2-4 SOFT				4-10 LOOSE				LITTLE 10-20%			
		4-8 MEDIUM STIFF				10-30 MEDIUM DENSE				SOME 20-35%			
		8-15 STIFF				30-50 DENSE				AND 35-50%			
		15-30 HARD				50+ VERY DENSE							
NOTES: Auger Refusal at 13', moved 5' south. Auger refusal at 10.5'													
REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.													

TEST BORING LOG													
MILLER ENGINEERING & TESTING, INC. 100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641		Project: Fitzpatrick Rd. - Cronin Brook				Sheet 1 of 1		Boring No: B-2					
		Grafton, MA				Location: See Plan							
		Project No: 20.230.NH											
		Date Start: 01-07-21											
		Date End: 01-07-21						Approx. Surface Elev: 333 ±					
GROUNDWATER OBSERVATIONS													
		CASING		SAMPLER		Date		Depth		Casing At		Stabilization Period	
Type		HSA		SS		01-07-21		11'		26'		Upon Completion	
Size		2-1/4" ID		1-3/8" ID									
Hammer				140 lbs.									
Fall				30"									
Depth/ Elev.	Cas bl/ft	SAMPLE			BLOWS				Strata Change	Sample Description	Notes		
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"				18-24"	
0	333	-	0.0-0.3	4							4" Asphalt		
		S-1	0.5-2.0	18	10		21	29	28		S-1: Brown, fine to coarse sand, some gravel, trace silt (FILL)		
		S-2	2.0-4.0	24	9	28	28	55	35		S-2: Brown, fine to coarse sand, some gravel, little silt (FILL)		
		S-3	4.0-6.0	24	9	12	13	9	8		S-3: Brown, fine to coarse sand, some gravel, trace silt (FILL)		
5	328	S-4	6.0-8.0	24	4	7	9	10	10		S-4: Brown, fine to coarse sand, some gravel, trace silt (FILL)		
10	323	S-5	9.0-11.0	24	12	14	16	12	18		S-5: Dark brown, fine sand and organic silt, trace gravel (Organic Layer)		
		S-6	11.0-13.0	24	13	31	23	18	14		S-6: Gray, fine to coarse sand, some gravel, little silt, wet (L21011B)		
15	318	S-7	14.0-16.0	24	7	5	21	13	11		S-7: Brown, fine to coarse sand, some subangular gravel, trace silt, wet		
20	313	S-8	19.0-21.0	24	4	11	22	23	22		S-8: Brown, fine to medium sand, some gravel, some silt, wet (1)		
25	308	S-9	24.0-26.0	24	5	15	13	12	12		S-9: Brown, silt, some fine sand, wet (2)		
BORING TERMINATED AT 26 ft													
Driller: R. Marcoux		COHESIVE CONSISTENCY (Blows/Foot)				COHESIONLESS (Blows/Foot)				PROPORTIONS USED			
Helper: J. Donahue		0-2 VERY SOFT				0-4 VERY LOOSE				TRACE 0-10%			
Inspector: T. Young		2-4 SOFT				4-10 LOOSE				LITTLE 10-20%			
		4-8 MEDIUM STIFF				10-30 MEDIUM DENSE				SOME 20-35%			
		8-15 STIFF				30-50 DENSE				AND 35-50%			
		15-30 HARD				50+ VERY DENSE							
NOTES: (1) Rock in tip of split-spoon. (2) 5' of blow-in, in augers.													
REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.													

TEST BORING LOG													
MILLER ENGINEERING & TESTING, INC. 100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641		Project: Fitzpatrick Rd. - Cronin Brook				Sheet 1 of 1		Boring No: B-3					
		Grafton, MA				Location: See Plan							
		Project No: 20.230.NH											
		Date Start: 01-07-21											
		Date End: 01-07-21						Approx. Surface Elev: 333 ±					
GROUNDWATER OBSERVATIONS													
		CASING		SAMPLER		Date		Depth		Casing At		Stabilization Period	
Type		HSA		SS		01-07-21		11'		18.5'		Upon Completion	
Size		2-1/4" ID		1-3/8" ID									
Hammer				140 lbs.									
Fall				30"									
Depth/ Elev.	Cas bl/ft	SAMPLE			BLOWS				Strata Change	Sample Description	Notes		
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"				18-24"	
0	333	-	0.0-0.3	4							4" Asphalt		
		S-1	0.3-9.0	104							S-1: Black organic silt, trace fine to medium sand, trace gravel (Organic Layer)		
		S-2	11.0-13.0	24	4	18	17	19	30		S-2: Gray, fine to coarse sand, some gravel, little silt, wet		
		S-3	14.0-16.0	24	6	11	22	32	33		S-3: Gray, fine to coarse sand, some gravel, little silt, wet		
5	328												
10	323	S-1	9.0-11.0	24	9	2	3	2	3		S-1: Black organic silt, trace fine to medium sand, trace gravel (Organic Layer)		
15	318	S-2	11.0-13.0	24	4	18	17	19	30		S-2: Gray, fine to coarse sand, some gravel, little silt, wet		
20	313	S-3	14.0-16.0	24	6	11	22	32	33		S-3: Gray, fine to coarse sand, some gravel, little silt, wet		
Auger Refusal at 18.5'													
BORING TERMINATED AT 18.5 ft													
25	308												
30	303												
Driller: R. Marcoux		COHESIVE CONSISTENCY (Blows/Foot)				COHESIONLESS (Blows/Foot)				PROPORTIONS USED			
Helper: J. Donahue		0-2 VERY SOFT				0-4 VERY LOOSE				TRACE 0-10%			
Inspector: T. Young		2-4 SOFT				4-10 LOOSE				LITTLE 10-20%			
		4-8 MEDIUM STIFF				10-30 MEDIUM DENSE				SOME 20-35%			
		8-15 STIFF				30-50 DENSE				AND 35-50%			
		15-30 HARD				50+ VERY DENSE							
NOTES:													
REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.													

EXIST. GROUND SURFACE
EL=333.0±

EXIST. GROUND SURFACE
EL=333.0±

EXIST. GROUND SURFACE
EL=333.0±

OBSERVED GROUNDWATER
(1/7/21)
EL=324.0±

OBSERVED GROUNDWATER
(1/7/21)
EL=322.0±

OBSERVED GROUNDWATER
(1/7/21)
EL=322.0±

PROP. BOT. OF FOOTING
EL=316.10

PROP. BOT. OF FOOTING
EL=316.10

PROP. BOT. OF FOOTING
EL=316.10

BORING NOTES:

- LOCATION OF BORINGS SHOWN ON THE PLAN THUS:
- BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
- WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
- FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 4.25 I.D. HOLLOW STEM AUGER 6" USING A 140 POUND WEIGHT FALLING 30".
- ALL BORINGS WERE MADE IN JANUARY OF 2021 BY MILLER ENGINEERING & TESTING.
- THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

DISTRICT 3 BRIDGE ENGINEER

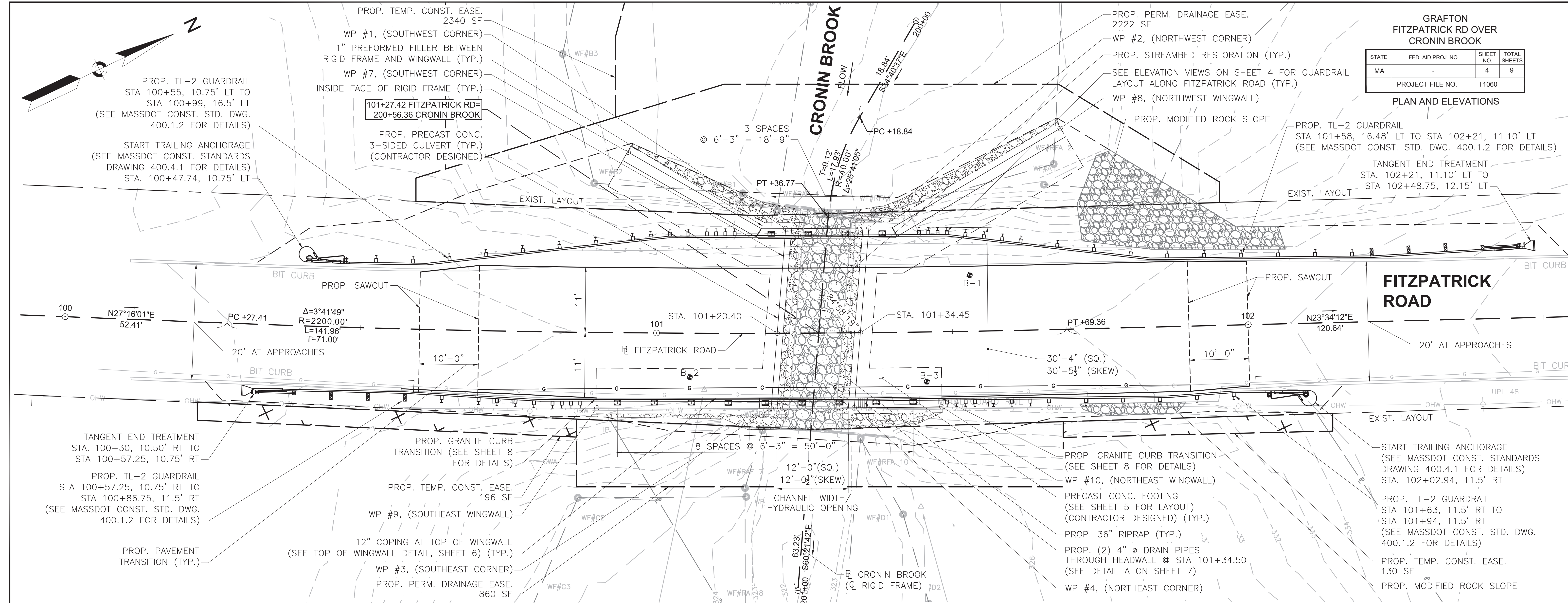
DATE

**GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK**

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	4	9

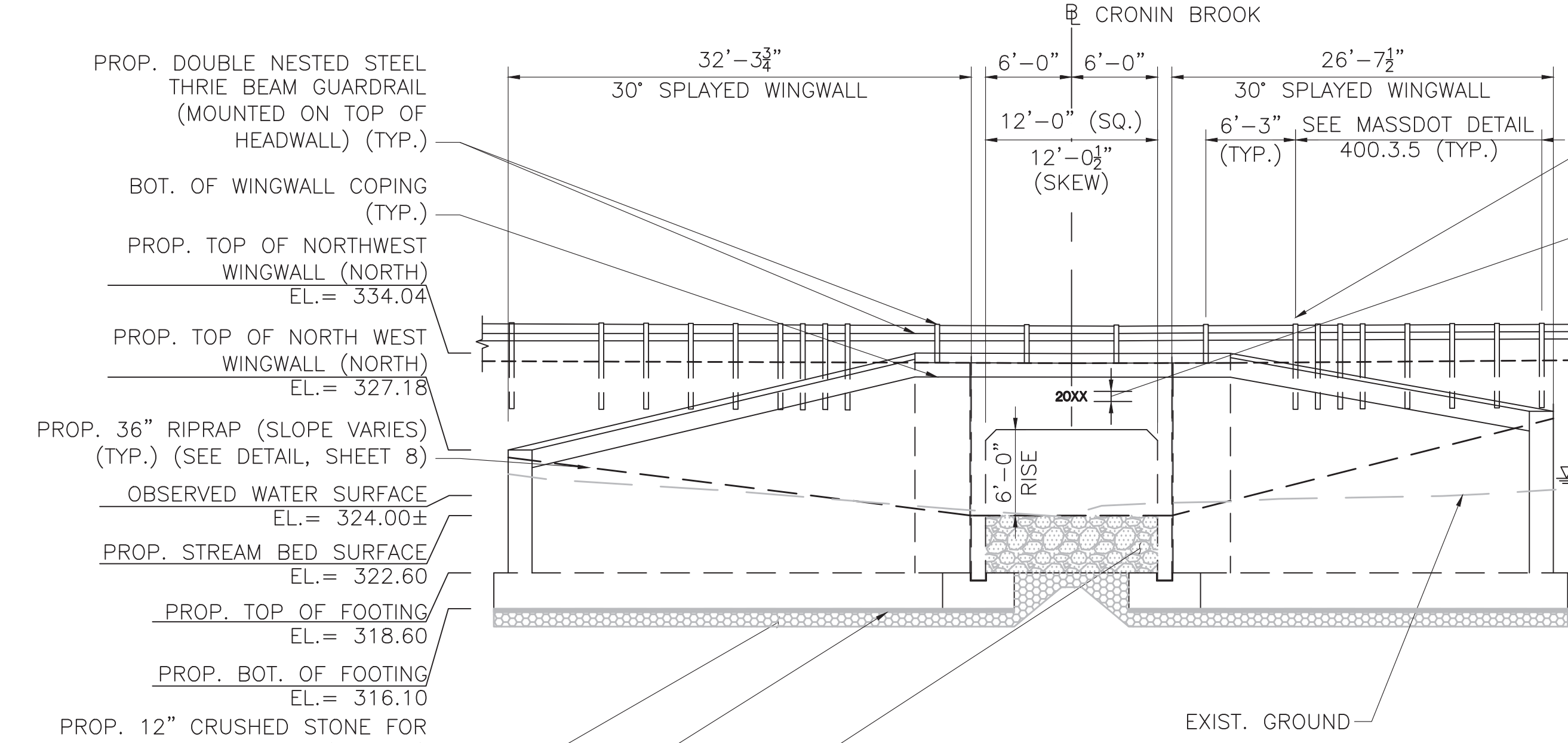
PROJECT FILE NO. T1060

PLAN AND ELEVATIONS



BRIDGE PLAN
SCALE: 1/8" = 1'-0"

NOTE:
WORKING POINTS #5 AND #6 ARE SHOWN ON SHEET 5.



WEST ELEVATION
SCALE: 1/8" = 1'-0"

PROP. DOUBLE NESTED STEEL THRIE BEAM GUARDRAIL (MOUNTED ON TOP OF HEADWALL) (TYP.)

BOT. OF WINGWALL COPING (TYP.)

PROP. TOP OF NORTHWEST WINGWALL (NORTH) EL.= 334.04

PROP. TOP OF NORTH WEST WINGWALL (NORTH) EL.= 327.18

PROP. 36" RIPRAP (SLOPE VARIES) (TYP.) (SEE DETAIL, SHEET 8)

OBSERVED WATER SURFACE EL.= 324.00±

PROP. STREAM BED SURFACE EL.= 322.60

PROP. TOP OF FOOTING EL.= 318.60

PROP. BOT. OF FOOTING EL.= 316.10

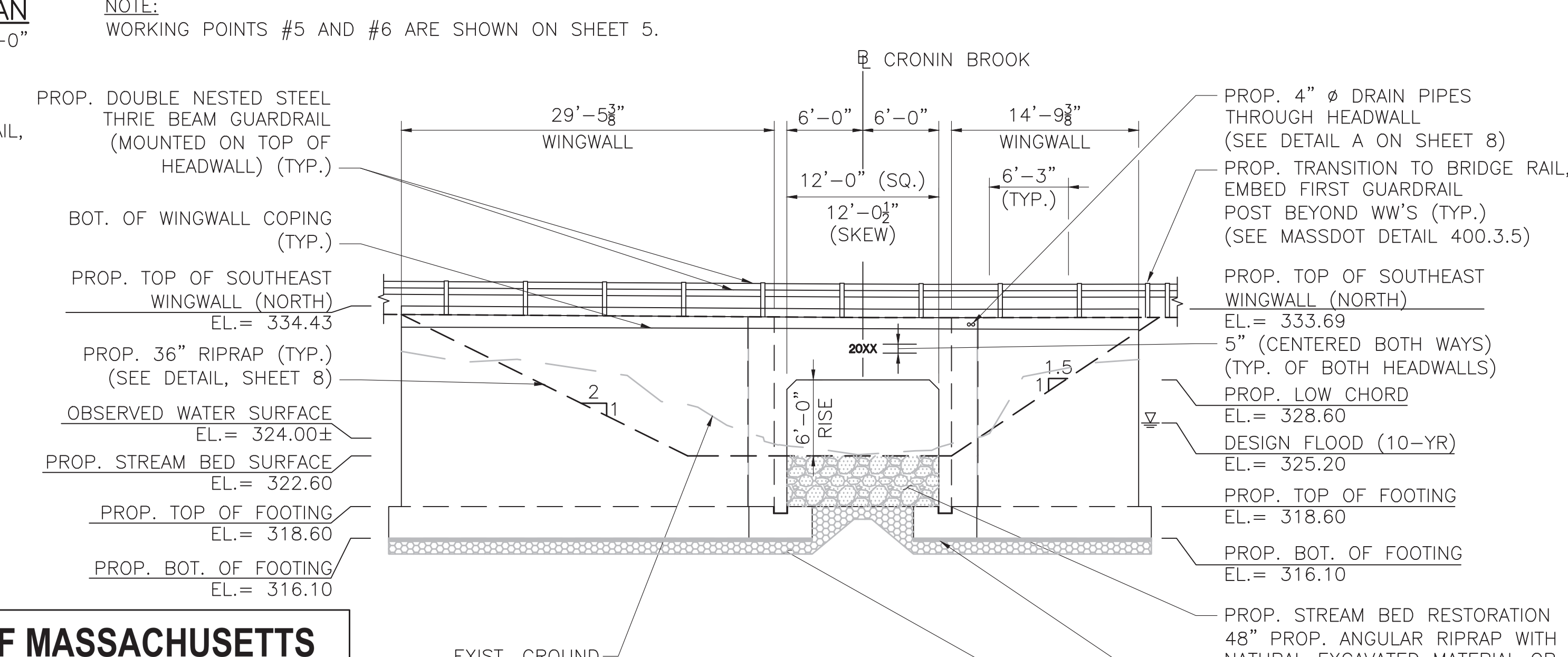
PROP. 12" CRUSHED STONE FOR BRIDGE FOUNDATIONS (M2.01.1) OVER GEOTEXTILE FABRIC FOR STABILIZATION (TYP.)

3" CONTROLLED DENSITY FILL (NON-EXCAVATABLE) (TYP.)

PROP. STREAM BED RESTORATION 48" PROP. ANGULAR RIPRAP WITH NATURAL EXCAVATED MATERIAL OR EQUIVALENT SUBSTRATE MATERIAL

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

DISTRICT 3 BRIDGE ENGINEER _____ DATE _____



EAST ELEVATION
SCALE: 1/8" = 1'-0"

PROP. DOUBLE NESTED STEEL THRIE BEAM GUARDRAIL (MOUNTED ON TOP OF HEADWALL) (TYP.)

BOT. OF WINGWALL COPING (TYP.)

PROP. TOP OF SOUTHEAST WINGWALL (NORTH) EL.= 334.43

PROP. 36" RIPRAP (TYP.) (SEE DETAIL, SHEET 8)

OBSERVED WATER SURFACE EL.= 324.00±

PROP. STREAM BED SURFACE EL.= 322.60

PROP. TOP OF FOOTING EL.= 318.60

PROP. BOT. OF FOOTING EL.= 316.10

PROP. 4" Ø DRAIN PIPES THROUGH HEADWALL (SEE DETAIL A ON SHEET 8)

PROP. TRANSITION TO BRIDGE RAIL, EMBED FIRST GUARDRAIL POST BEYOND WW'S (TYP.) (SEE MASSDOT DETAIL 400.3.5)

PROP. TOP OF SOUTHEAST WINGWALL (NORTH) EL.= 333.69

5" (CENTERED BOTH WAYS) (TYP. OF BOTH HEADWALLS)

PROP. LOW CHORD EL.= 328.60

DESIGN FLOOD (10-YR) EL.= 325.20

PROP. TOP OF FOOTING EL.= 318.60

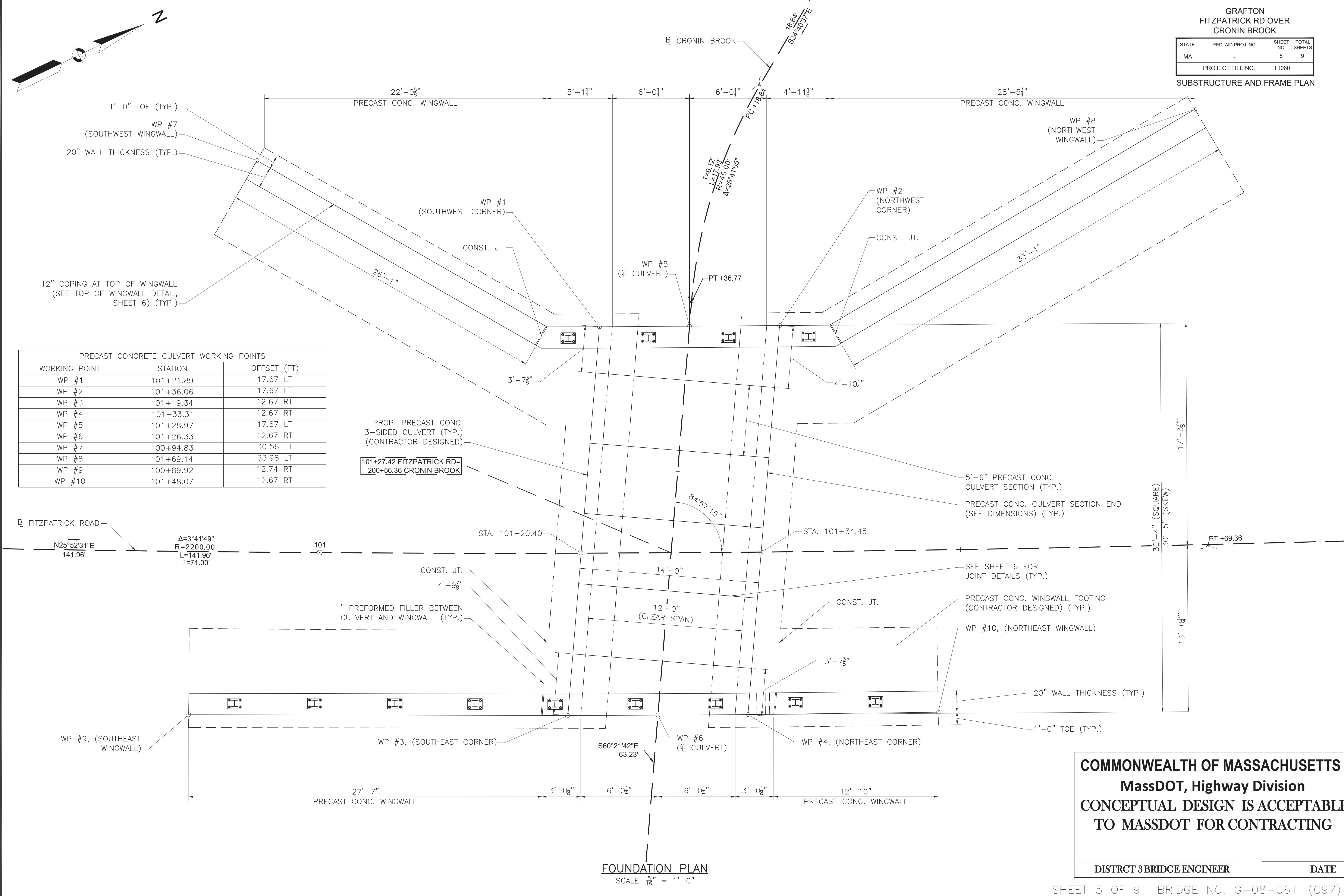
PROP. BOT. OF FOOTING EL.= 316.10

PROP. STREAM BED RESTORATION 48" PROP. ANGULAR RIPRAP WITH NATURAL EXCAVATED MATERIAL OR EQUIVALENT SUBSTRATE MATERIAL

3" CONTROLLED DENSITY FILL (NON-EXCAVATABLE) (TYP.)

PROP. 12" CRUSHED STONE FOR BRIDGE FOUNDATIONS (M2.01.1) OVER GEOTEXTILE FABRIC FOR STABILIZATION (TYP.)

T1060_FITZPATRICK_PLAN&ELEV.DWG Pinned on 28-Mar-2022 8:36 AM MARCH 28, 2022 CHAPTER 85 SUBMISSION



PRECAST CONCRETE CULVERT WORKING POINTS

WORKING POINT	STATION	OFFSET (FT)
WP #1	101+21.89	17.67 LT
WP #2	101+36.06	17.67 LT
WP #3	101+19.34	12.67 RT
WP #4	101+33.31	12.67 RT
WP #5	101+28.97	17.67 LT
WP #6	101+26.33	12.67 RT
WP #7	100+94.83	30.56 LT
WP #8	101+69.14	33.98 LT
WP #9	100+89.92	12.74 RT
WP #10	101+48.07	12.67 RT

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

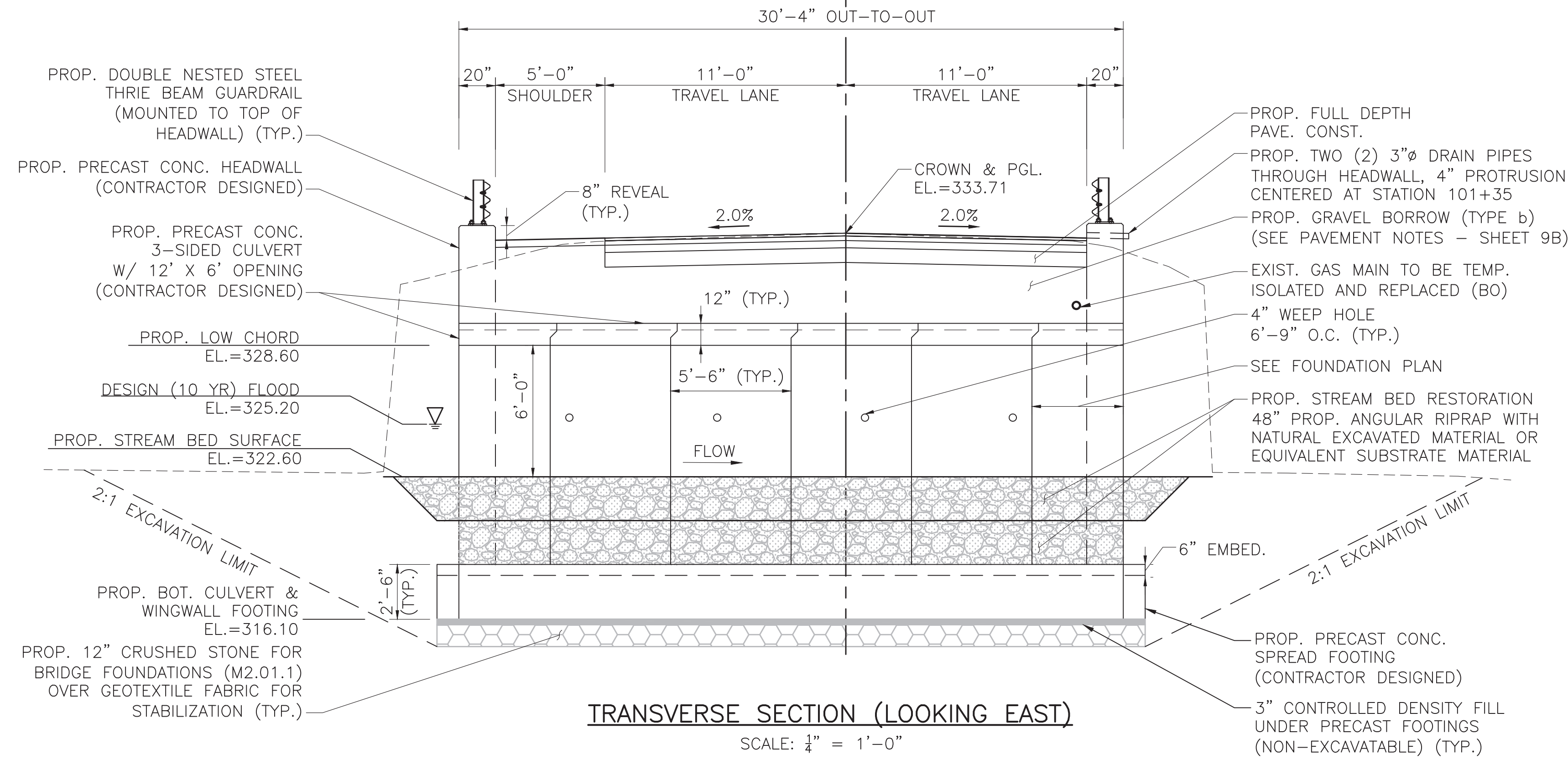
DISTRICT 3 BRIDGE ENGINEER _____ DATE _____

FOUNDATION PLAN
SCALE: 5/16" = 1'-0"

T1060_FITZPATRICK_(FOUNDATION PLAN).DWG Picked on: 28-Mar-2022 8:36 AM MARCH 28, 2022 CHAPTER 85 SUBMISSION

NOTE:
THE PGL. ELEVATION OF 333.71 WAS MEASURED AT STATION 101+27.42.

FITZPATRICK ROAD



TRANSVERSE SECTION (LOOKING EAST)

SCALE: 1/4" = 1'-0"

TRANSVERSE SECTION NOTES:

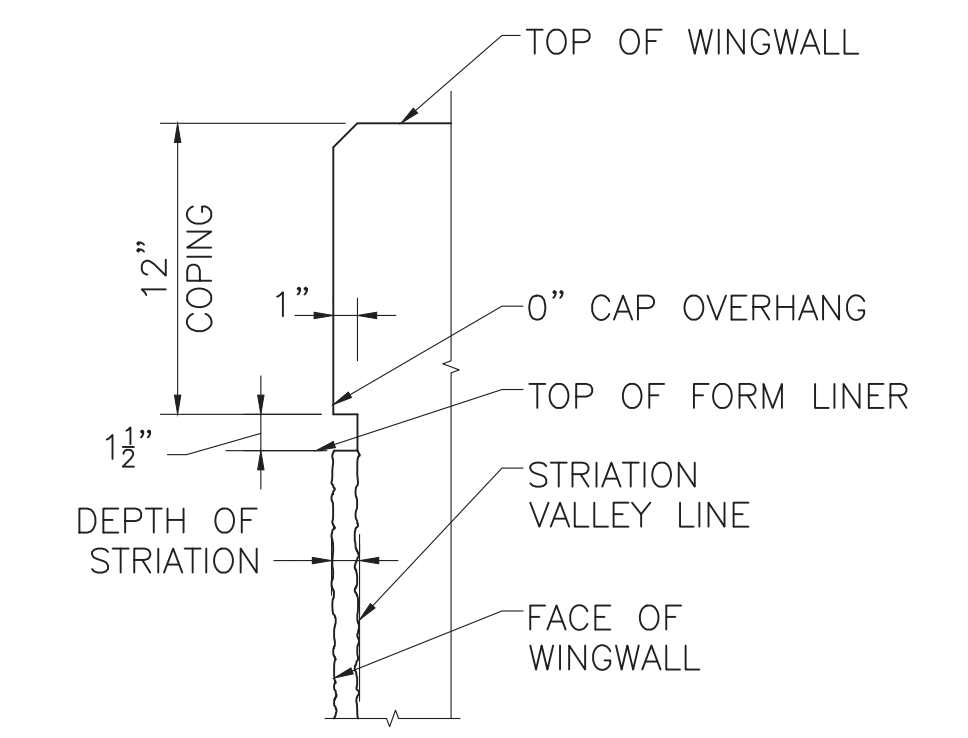
- EXISTING CULVERT AND HEADWALLS NOT SHOWN FOR CLARITY. CONTRACTOR IS RESPONSIBLE FOR DEMOLITION OF ALL EXISTING CULVERT INFRASTRUCTURE.
- CONTRACTOR SHALL SMOOTHLY TRANSITION ALL PROPOSED ELEMENTS INTO THE EXISTING APPROACHES AND EMBANKMENT SLOPES.

PRECAST CONCRETE CULVERT NOTES:

- CONTRACTOR SHALL SUBMIT PRECAST CONCRETE 3-SIDED CULVERT, FOOTING, AND HEADWALL DESIGN CALCULATIONS AND SHOP DRAWINGS SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS FOR APPROVAL PRIOR TO FABRICATION. HEADWALL SHALL BE DESIGNED TO RESIST AASHTO TL-2 GUARDRAIL CRASH LOADING. PRESCRIBED HYDRAULIC OPENING (6'X12') SHALL BE MAINTAINED.
- ALL PRECAST ELEMENTS, CULVERT AND FOOTING, CONCRETE SHALL BE 5000PSI, 3/4", 685 HP CEMENT CONCRETE.
- THE CONTRACTOR SHALL APPROVE ALL ELEVATIONS AND DIMENSIONS OF THE SHOP DRAWINGS PRIOR TO FABRICATION. SHOP DRAWINGS AND CALCULATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.
- REINFORCEMENT SHALL BE PLACED WITH A MINIMUM OF 1 1/2" COVER. TRANSVERSE REINFORCEMENT SHALL BE PLACED NORMAL TO THE R OF FITZPATRICK STREET.
- ALL PRECAST REINFORCEMENT SHOWN IS CONCEPTUAL FOR BIDDING PURPOSES. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AS PART OF THE SHOP DRAWINGS.
- DESIGN SHALL BE IN ACCORDANCE WITH THE 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND THE MASSDOT LRFD BRIDGE MANUAL PART 1 CHAPTER 3 FOR HL-93 LOADING.
- A FACTORED BEARING RESISTANCE OF 7.0 KSF AND SERVICE BEARING RESISTANCE OF 9.1 KSF SHALL BE USED IN THE DESIGN OF THE CULVERT FOOTING BASED ON A MINIMUM FOOTING WIDTH OF 5- FEET. THE LRFD STRENGTH AND SERVICE LIMIT FACTORS OF 0.45 AND 1.00 WERE USED, RESPECTIVELY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUBGRADE PREPARATION. AN ENGINEER WILL BE ON-SITE TO VERIFY THAT THE DESIGN BEARING CAPACITY SHALL BE ACHIEVED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THIS BEARING CAPACITY CANNOT BE MET.

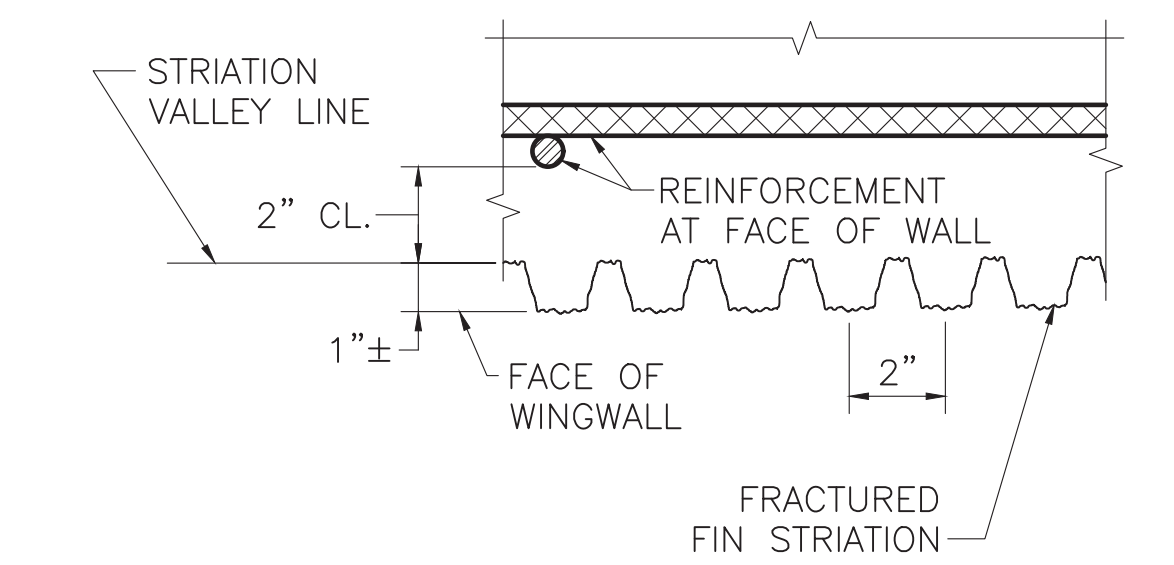
GRAFTON FITZPATRICK RD OVER CRONIN BROOK			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	6	9
PROJECT FILE NO.			T1060

STRUCTURE DETAILS - 1 OF 3



TOP OF WINGWALL DETAIL

SCALE: N.T.S.

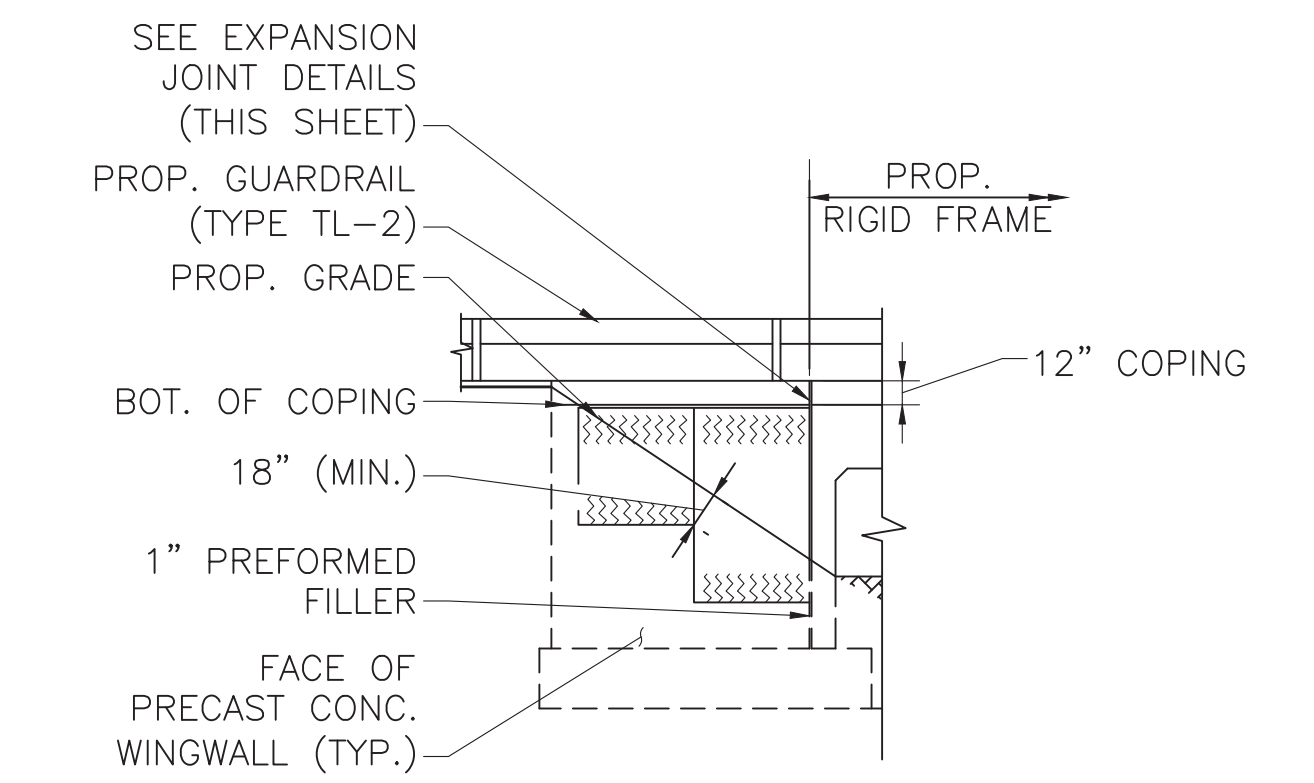


NOTES:

- THE CONTRACTOR SHALL MAKE SURE THAT THE STRIATION FINS ARE PLUMB AND LINED UP VERTICALLY FROM PANEL TO PANEL FOR THE FULL HEIGHT OF THE WALL.
- THE HORIZONTAL JOINT MAY BE OMITTED IF THE CONTRACTOR CAN DEMONSTRATE THAT THE FORM LINER PANELS CAN BE INSTALLED END TO END WITHOUT CREATING A VISIBLE SEAM IN THE FINAL CAST CONCRETE.
- STRIATION DETAILS SHALL ONLY BE INCORPORATED ON THE WINGWALLS.

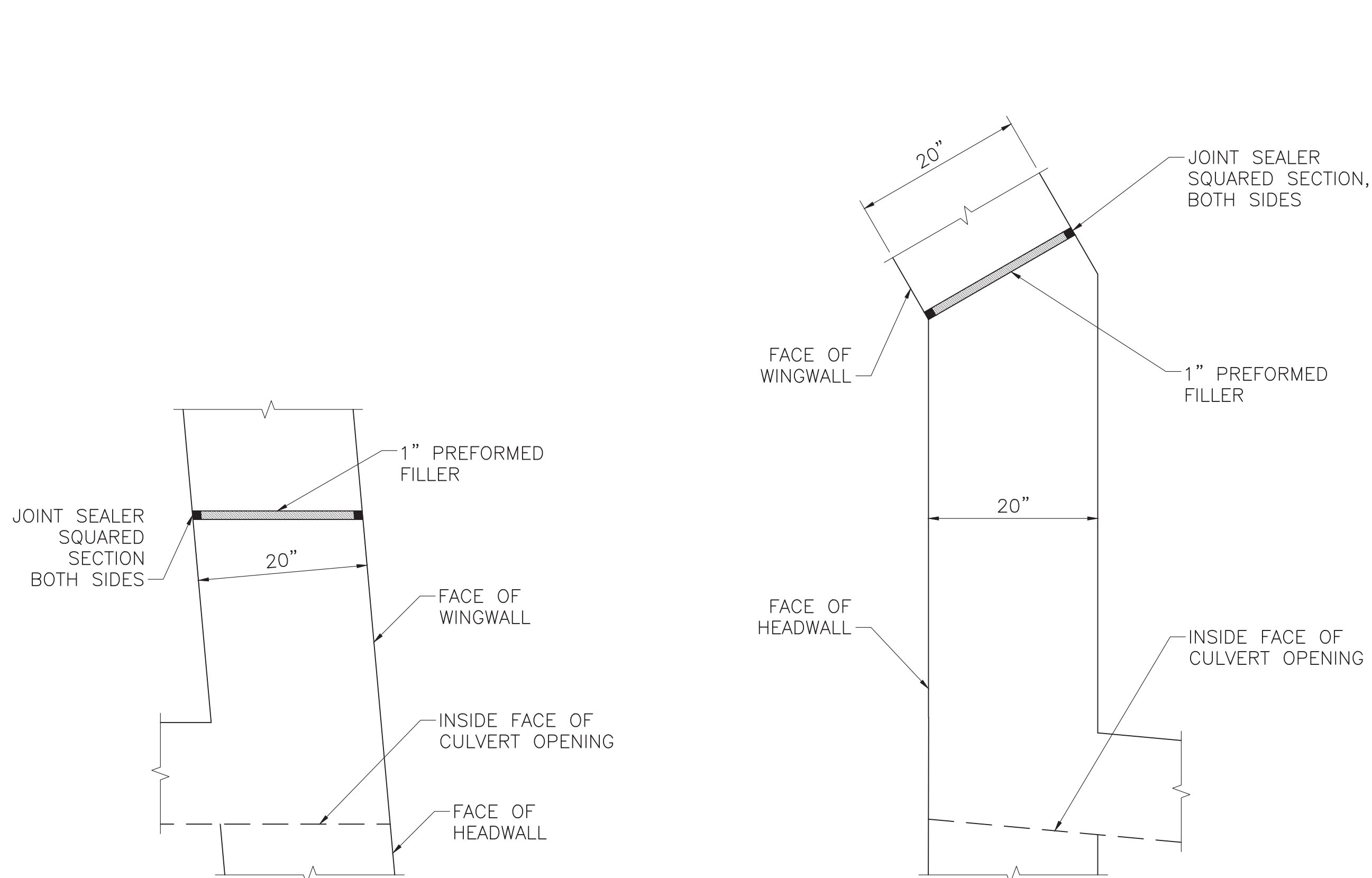
TYPICAL STRIATION DETAIL

SCALE: 3" = 1'-0"



WINGWALL STRIATION - ELEVATION

SCALE: 1/8" = 1'-0"



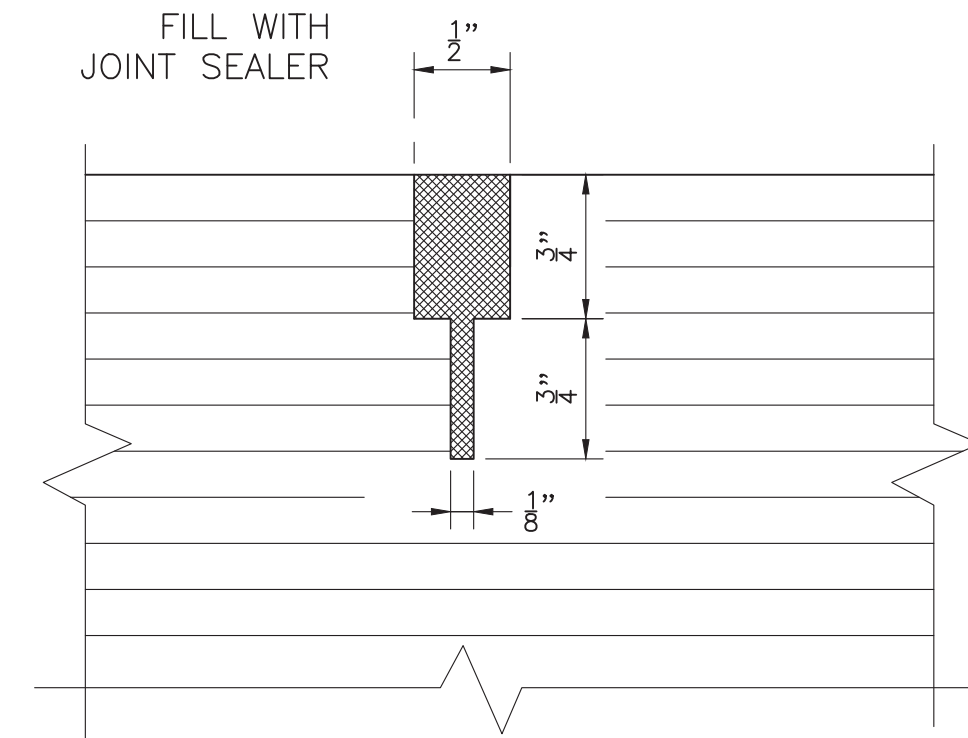
U-WINGWALL JOINT PLAN

SPLAYED WINGWALL JOINT PLAN

NOTE:
REINFORCEMENT NOT SHOWN FOR CLARITY.

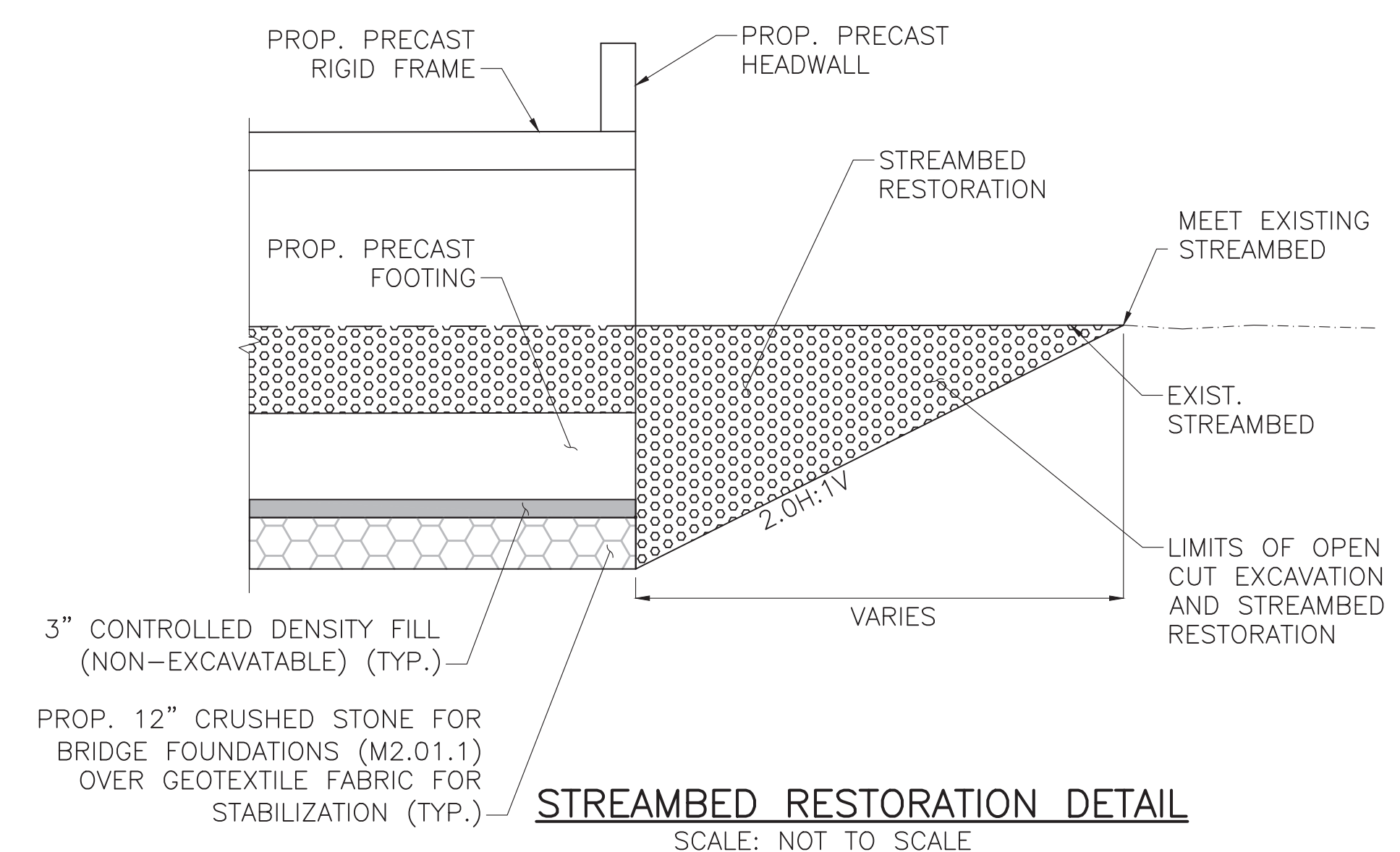
EXPANSION JOINT DETAILS

SCALE: 1" = 1'-0"



PAVEMENT SAWCUT DETAIL

FULL SIZE



STREAMBED RESTORATION DETAIL

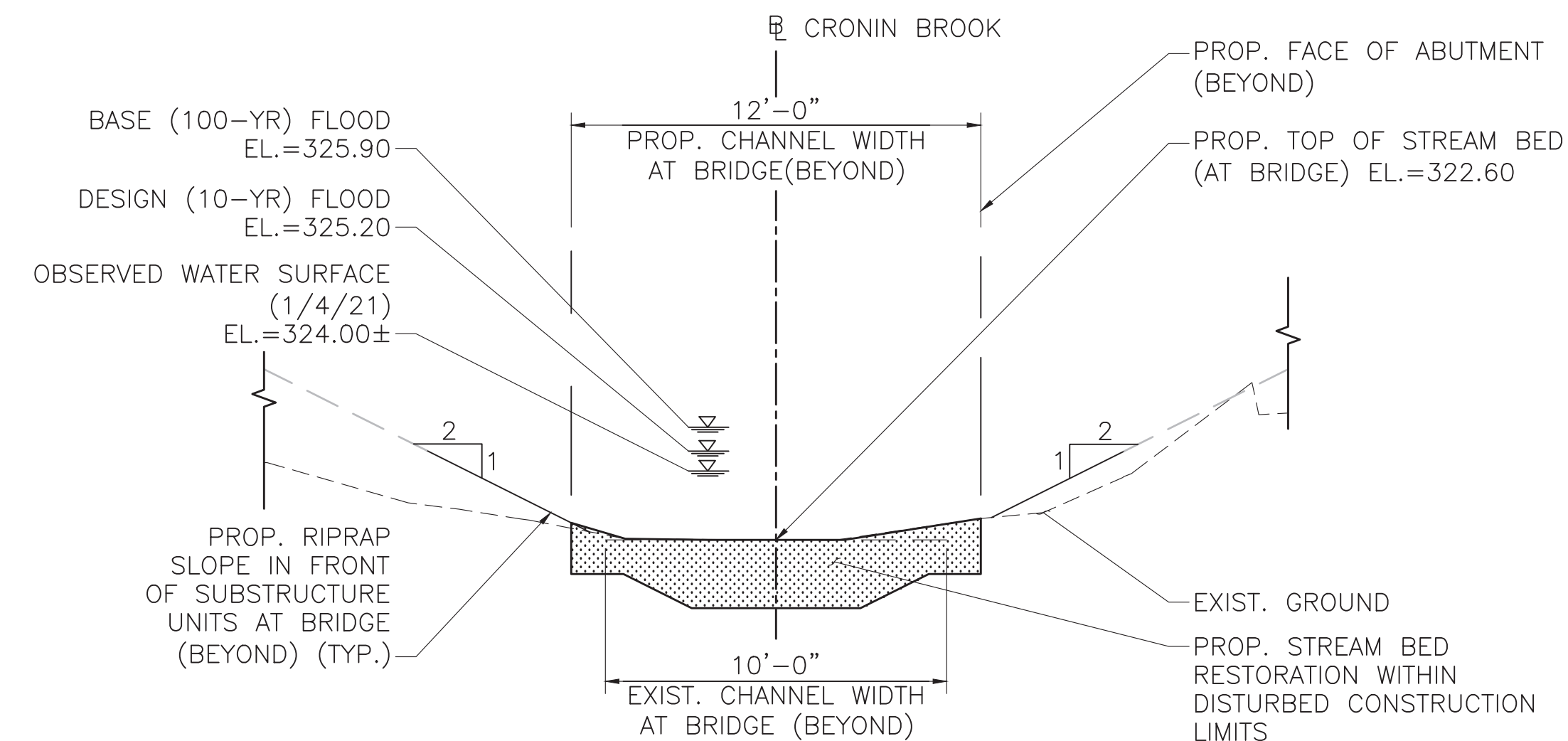
SCALE: NOT TO SCALE

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

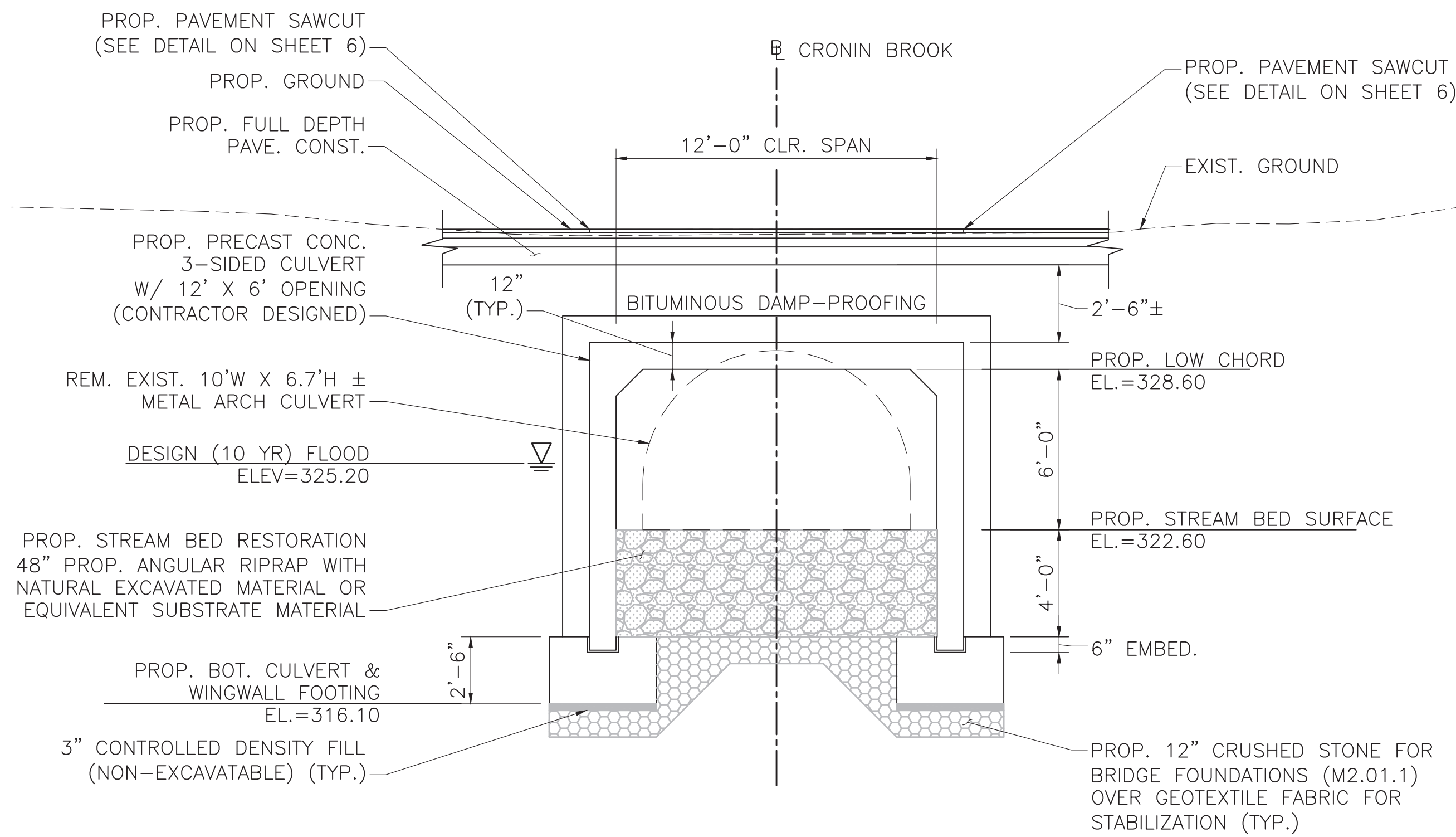
DISTRICT 3 BRIDGE ENGINEER _____ DATE _____

T1060_FITZPATRICK_(STRUCTURE DETAILS).DWG Picked on: 28-Mar-2022 8:36 AM MARCH 26, 2022 CHAPTER 65 SUBMISSION

GRAFTON FITZPATRICK RD OVER CRONIN BROOK			
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	7	9
PROJECT FILE NO.		T1060	
STRUCTURE DETAILS - 2 OF 3			

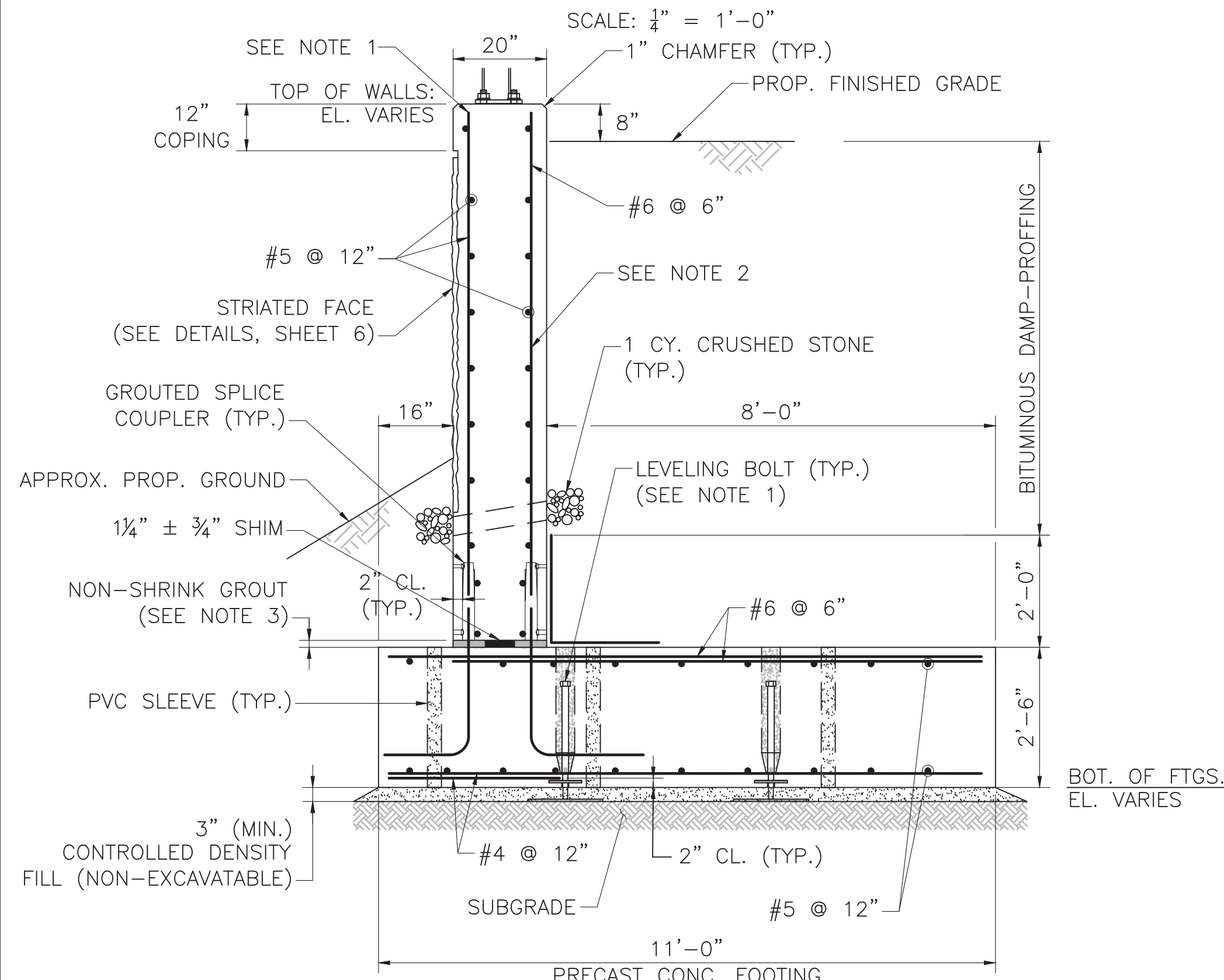


CHANNEL APPROACH SECTION
SCALE: 1/2" = 1'-0"



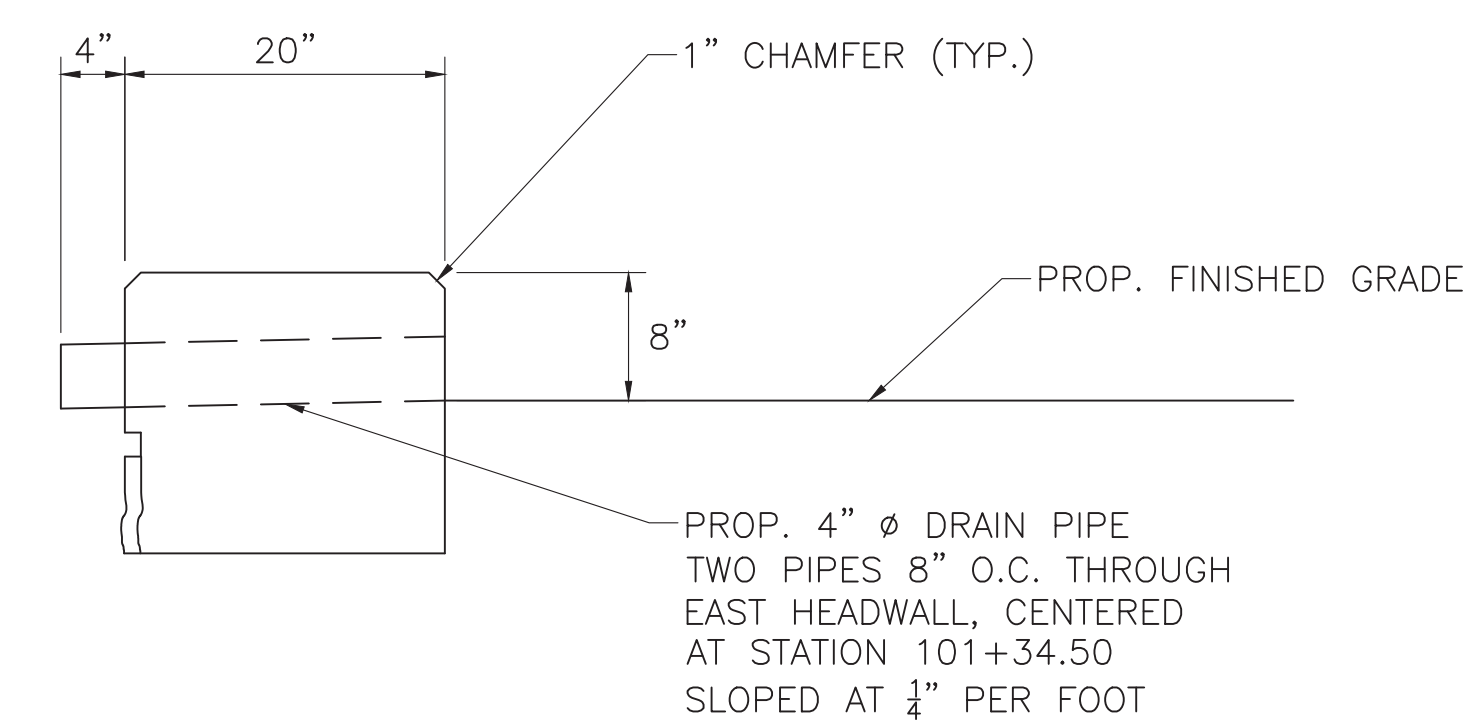
LONGITUDINAL SECTION (AT FITZPATRICK ROAD)
SCALE: 1/2" = 1'-0"

NOTE:
SEE NOTE 7 OF THE PRECAST CONCRETE CULVERT NOTES FROM SHEET 6 FOR THE FACTORED BEARING CAPACITY OF THE STRUCTURE.

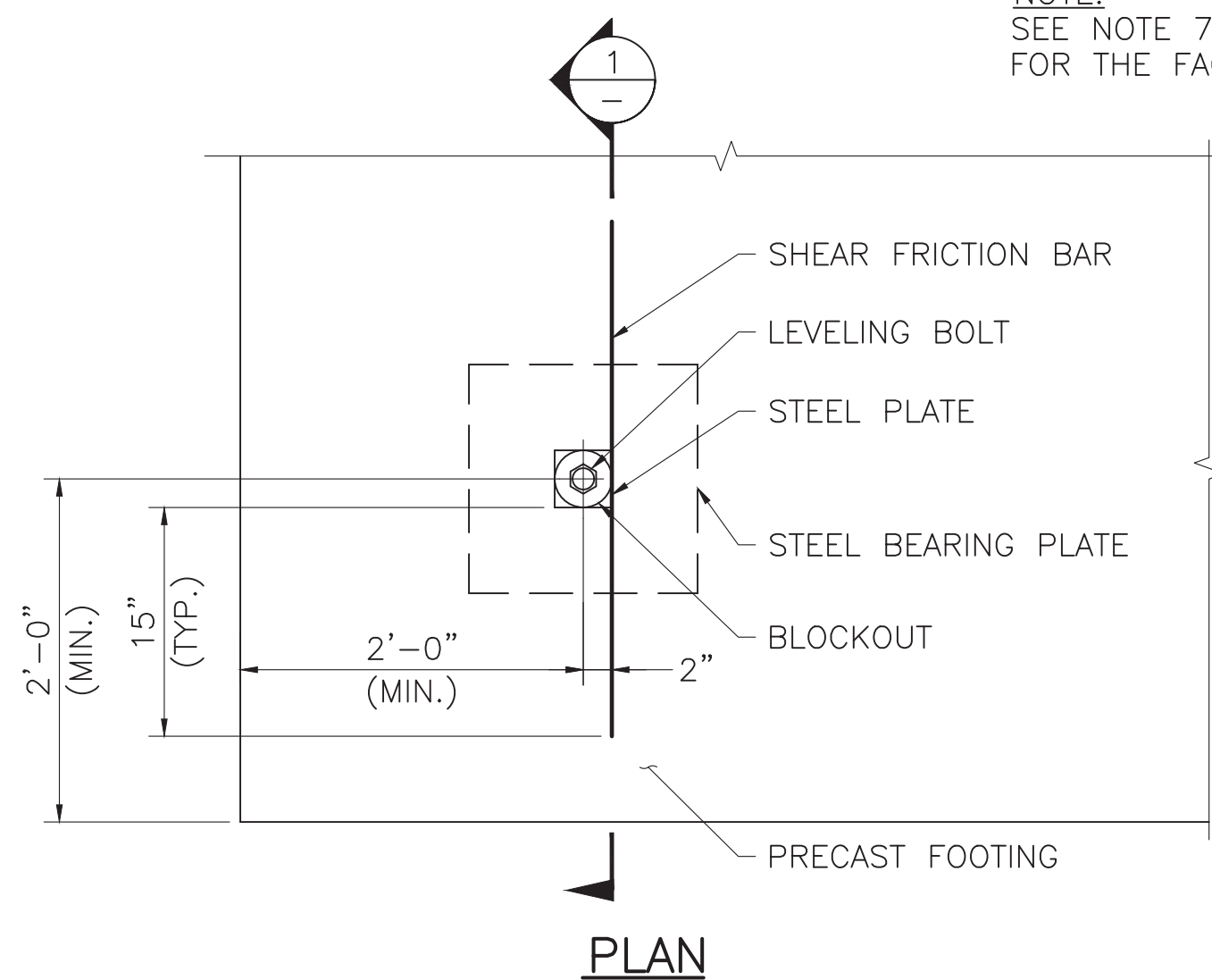


PRECAST WINGWALL SECTION
SCALE: 1/2" = 1'-0"

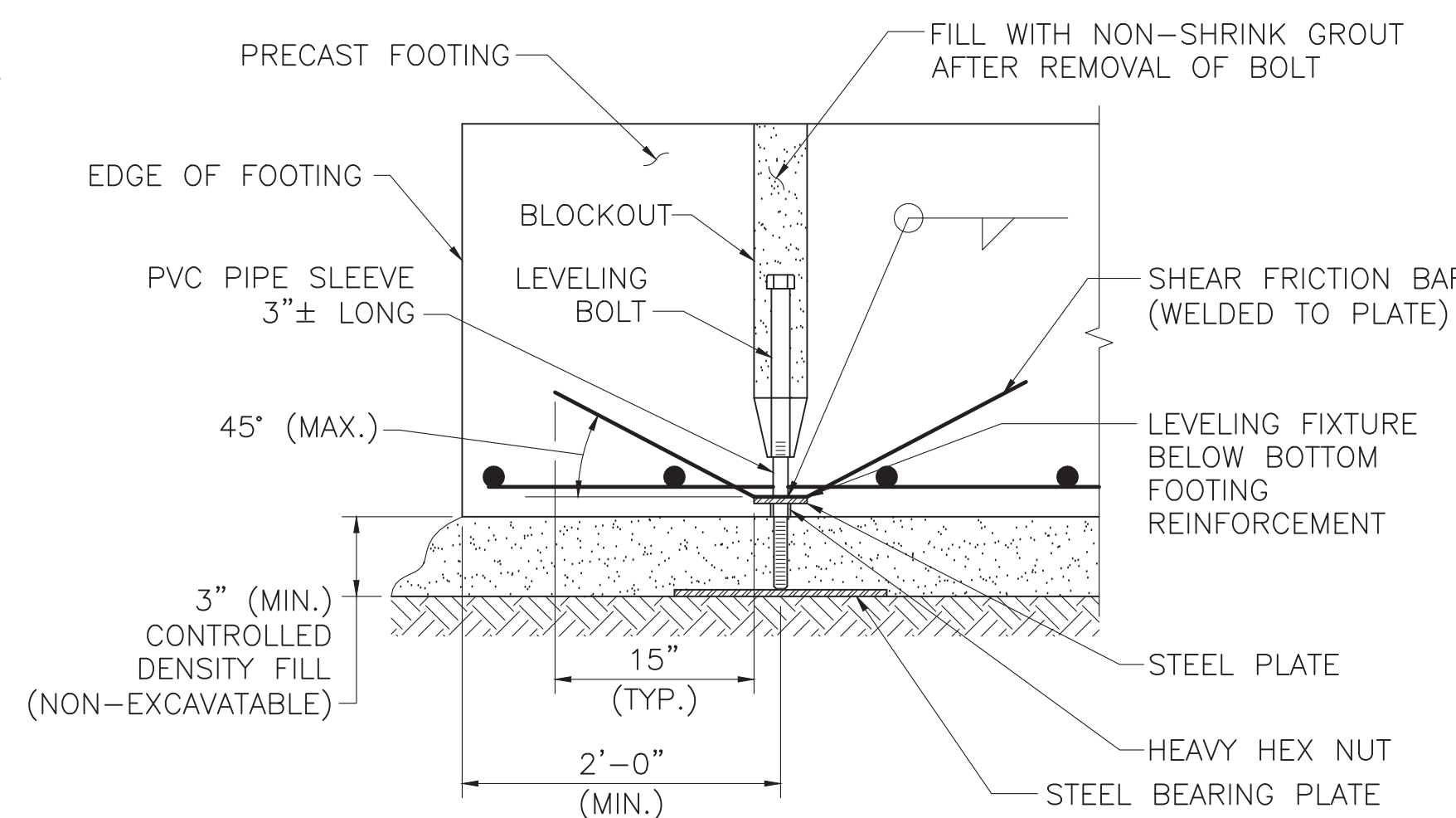
- NOTES:
1. PRECASTER TO COORDINATE LOCATION OF REINFORCEMENT WITH GUARDRAIL ANCHORAGE.
 2. CONCRETE DIMENSIONS AND STEEL REINFORCEMENT SHOWN IS CONCEPTUAL ONLY. FINAL DIMENSIONS AND STEEL REINFORCEMENT SHALL BE BY PRECASTER.
 3. PRE-BED PRECAST ELEMENT WITH NON-SHRINK GROUT WITH THICKNESS MORE THAN SHIM STACK.



DETAIL A - WINGWALL ROAD DRAIN PIPES
SCALE: 1" = 1'-0"

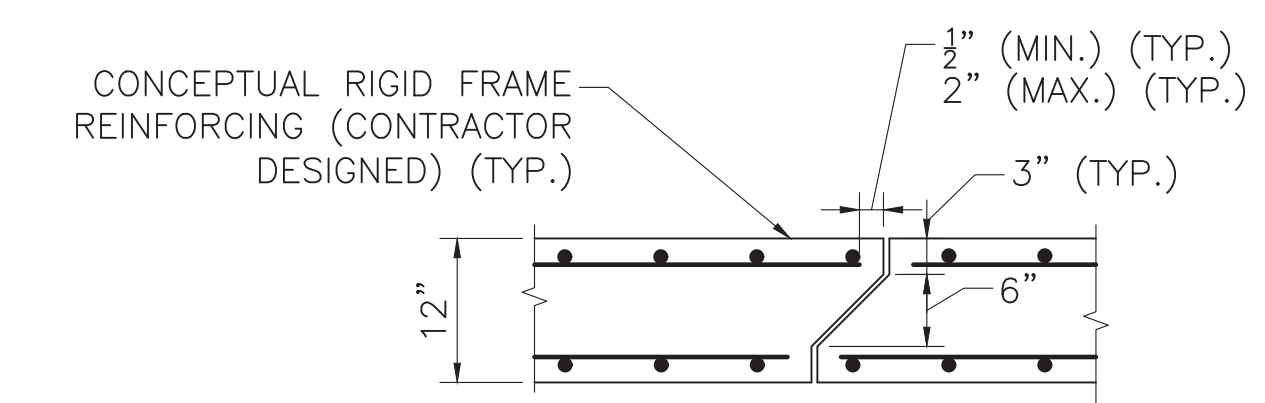
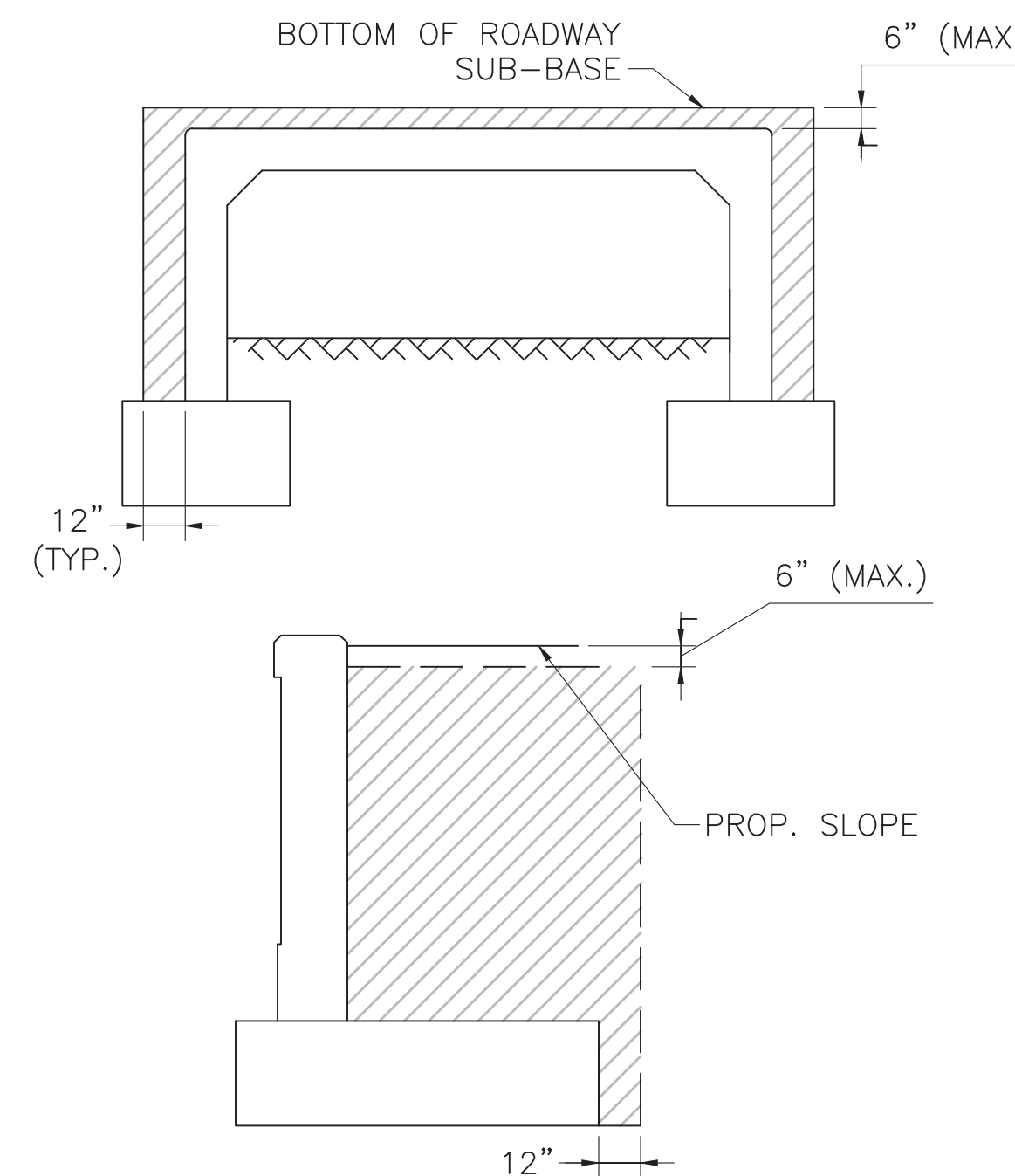


PLAN



SECTION 1

LEVELING BOLT ASSEMBLY
SCALE: 1" = 1'-0"



NOTE:
JOINT DIMENSIONS ARE CONCEPTUAL AND SHALL BE CONFIRMED BY THE PRECASTER.

CULVERT JOINT DETAIL
SCALE: 3/4" = 1'-0"

- NOTES:
1. HATCHED AREAS INDICATE THE LIMIT OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES.
 2. THE BACKFILL PLACED AROUND THE STRUCTURE SHALL BE DEPOSITED ON BOTH SIDES TO APPROXIMATELY THE SAME ELEVATION AT THE SAME TIME.

LIMITS OF GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES
SCALE: 1/4" = 1'-0"

WINGWALL CONSTRUCTION NOTES:

1. CONTRACTOR SHALL SUBMIT PRECAST CONCRETE WINGWALL AND FOOTING DESIGN CALCULATIONS, INCLUDING DESIGN FOR AASHTO TL-2 CRASH LOADING, AND SHOP DRAWINGS SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS FOR APPROVAL PRIOR TO FABRICATION.
2. BITUMINOUS DAMP-PROOFING OR OTHER WATERPROOFING PROTECTIVE COURSE, SHALL BE APPLIED TO THE BACK OF THE STEM AS SPECIFIED IN MASSDOT STANDARD SPECIFICATIONS.
3. 4"Ø WEEP HOLES AT FIFTH POINTS OF WALL LENGTHS (JUST ABOVE PROTECTIVE COURSE). PROVIDE 1 CUBIC YARD OF CRUSHED STONE AT EACH END OF WEEP HOLE.
4. ALL WINGWALL CONCRETE SHALL BE 5000 PSI, 3/4" IN, 685 HP CEMENT CONCRETE.
5. THE FACTORED BEARING RESISTANCE = 4.0 KSF BASED ON A MINIMUM FOOTING WIDTH OF 5- FEET. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.
6. PRE-BED PRECAST ELEMENT WITH NON-SHRINK GROUT WITH THICKNESS MORE THAN SHIM STACK.
7. THE CONTRACTOR SHALL DETERMINE THE SIZE AND SPACING OF THE GROUT PORTS BASED ON THE CDF'S FLOW PROPERTIES AND THE SIZE OF THE FOOTING.

CULVERT CONSTRUCTION NOTES:

1. THE FACTORED BEARING RESISTANCE = 4.0 KSF BASED ON A MINIMUM FOOTING WIDTH OF 5- FEET. FACTORED BEARING RESISTANCE IS THE PRODUCT OF THE NOMINAL BEARING RESISTANCE AND A RESISTANCE FACTOR OF 0.45.
2. TRANSVERSE REINFORCING SHALL BE PLACED NORMAL TO THE Ø OF THE CULVERT.
3. ALL PRECAST CONCRETE SHALL BE 5,000 PSI, 3/4"-IN, 685 HP CEMENT CONCRETE.

LEVELING BOLT ASSEMBLY NOTES:

1. THE LEVELING BOLT ASSEMBLY SHOWN IS SCHEMATIC. DESIGN OF THE LEVELING BOLT ASSEMBLY SHALL BE PERFORMED BY THE CONTRACTOR AND SUBMITTED WITH THE ASSEMBLY PLAN TO THE ENGINEER FOR APPROVAL.
2. BOLT SHALL BE REMOVED AFTER THE CONTROLLED DENSITY FILL (NON-EXCAVATABLE) HAS SET.
3. STEEL PLATES SHALL BE AASHTO M 270 GRADE 36 UNCOATED STEEL.
4. BOLTS SHALL BE H.S. AASHTO M 164 AND UNCOATED.
5. REINFORCEMENT SHALL BE WELDABLE LOW-ALLOW ASTM A 706 BARS.
6. GREASE OF OIL NUT AND BOLT THREADS TO FACILITATE LEVELING AND REMOVAL.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

DISTRICT 3 BRIDGE ENGINEER

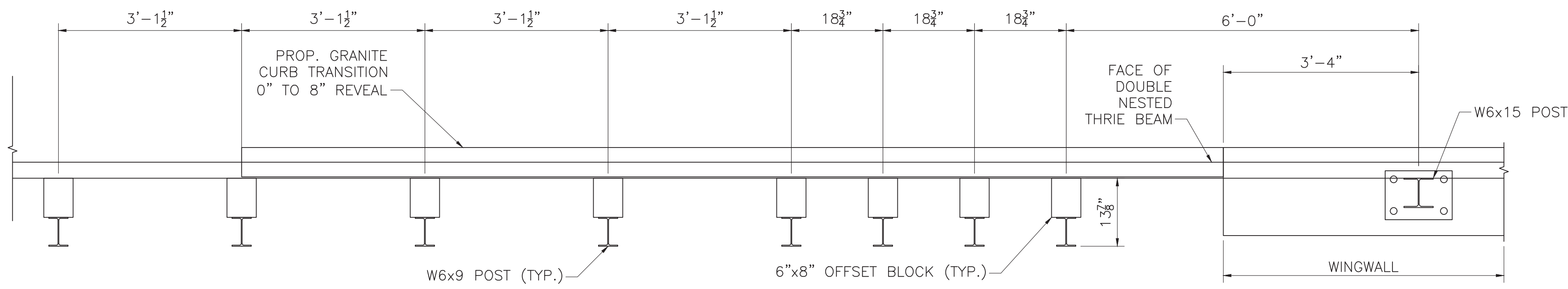
DATE

T1060_FITZPATRICK_(STRUCTURE DETAILS).DWG PLOTTED ON 28-MAR-2022 8:36 AM MARCH 28, 2022 CHAPTER 85 SUBMISSION

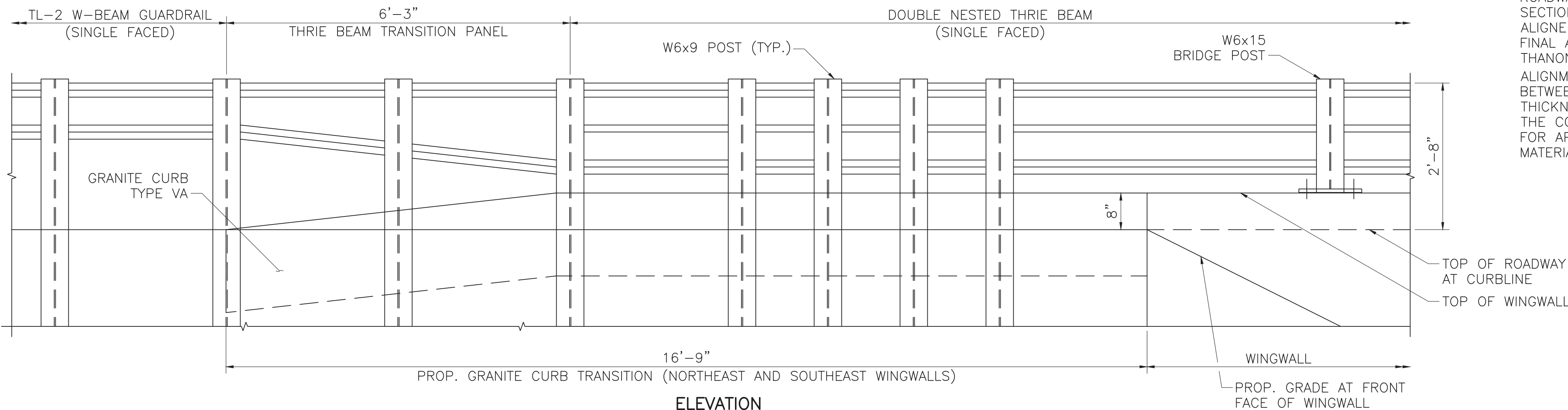
GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	8	9
PROJECT FILE NO.		T1060	

STRUCTURE DETAILS - 3 OF 3



PLAN



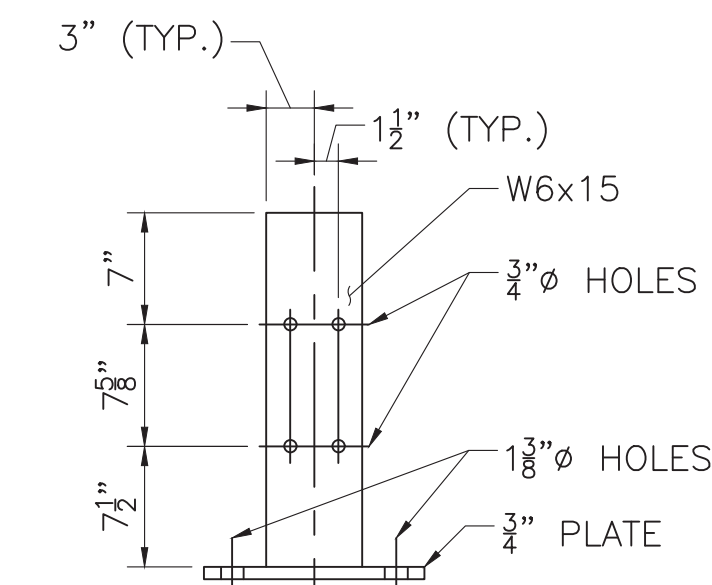
ELEVATION

TRANSITION DETAILS

SCALE: 3/4" = 1'-0"

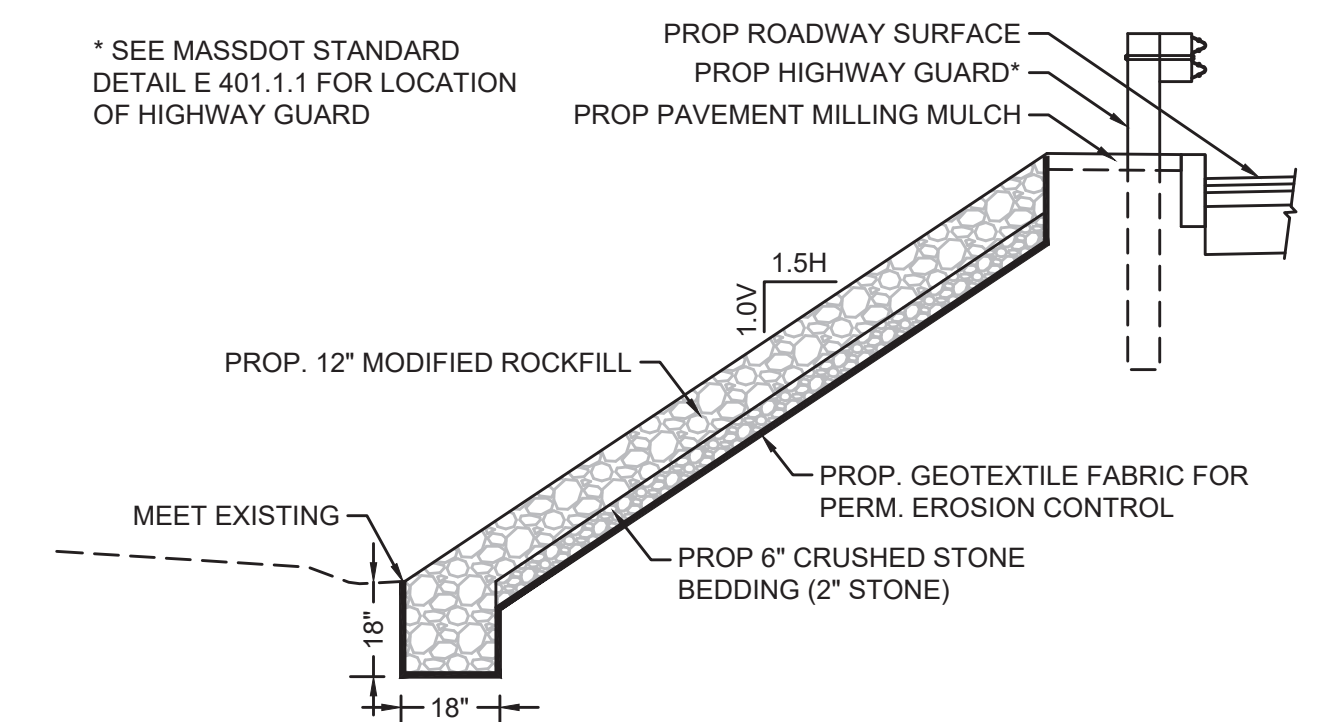
THRIE BEAM NOTES:

1. ALL STEEL CONNECTING BOLTS AND FASTENERS FOR POSTS SHALL CONFORM TO ASTM A325 TYPE III. ANCHOR BOLTS SHALL CONFORM TO ASTM F1554, GRADE 105.
2. RAIL POSTS AND ANCHOR PLATES SHALL BE SEATED ON MOLDED FABRIC BEARING PADS OR HALF PADS MAY BE USED IN SHIMMING FOR ALIGNMENT.
3. RAIL POSTS SHALL BE SET PERPENDICULAR TO ROADWAY PROFILE GRADE AND VERTICALLY IN CROSS SECTION, EXCEPT THAT THE RAIL POSTS SHALL BE ALIGNED BY THE USE OF SHIMS SO THAT IN THE FINAL ADJUSTMENT NO PART SHALL DEVIATE MORE THAN ONE HALF INCH FROM TRUE HORIZONTAL ALIGNMENT. THE SHIMS SHALL BE 3"x1 1/2" AND PLACED BETWEEN THE POST AND THE THRIE BEAM RAIL. THE THICKNESS OF THE SHIMS SHALL BE DETERMINED BY THE CONTRACTOR AND SHOWN IN THE SHOP DRAWINGS FOR APPROVAL BY THE ENGINEER BEFORE ORDERING MATERIAL FOR THIS WORK.
4. MINIMUM LENGTH OF THE THRIE BEAM SECTIONS IS EQUAL TO TWO POST SPACES.
5. THRIE BEAM GUARDRAIL STEEL SHALL BE GALVANIZED AND CONFORM TO THE AASHTO M180, CLASS B, TYPE IV AND SHALL BE 10 GAGE THICK. USE OF 12 GAGE THICK THRIE BEAM IS EXPRESSLY FORBIDDEN.
6. POSTS, HAND RAIL STEEL, ANCHOR PLATES AND BASE PLATES SHALL BE FABRICATED FROM STEEL CONFORMING TO AASHTO M270 GRADE 50 STEEL. ALL STEEL TO BE GALVANIZED.
7. SPECIAL DRILLING OF THE THRIE BEAM MAY BE REQUIRED AT THE SPLICES. ALL DRILLING DETAILS ARE TO BE SHOWN ON THE SHOP DRAWINGS.
8. PLACE A REFLECTORIZED DELINEATOR IN THE UPPER VALLEY OF THRIE BEAM EVERY THIRD POST.
9. DETAILS ARE SHOWN FOR THE STEEL THRIE BEAM HIGHWAY GUARD TO BE INSTALLED ALONG THE HEADWALL AND WINGWALLS.



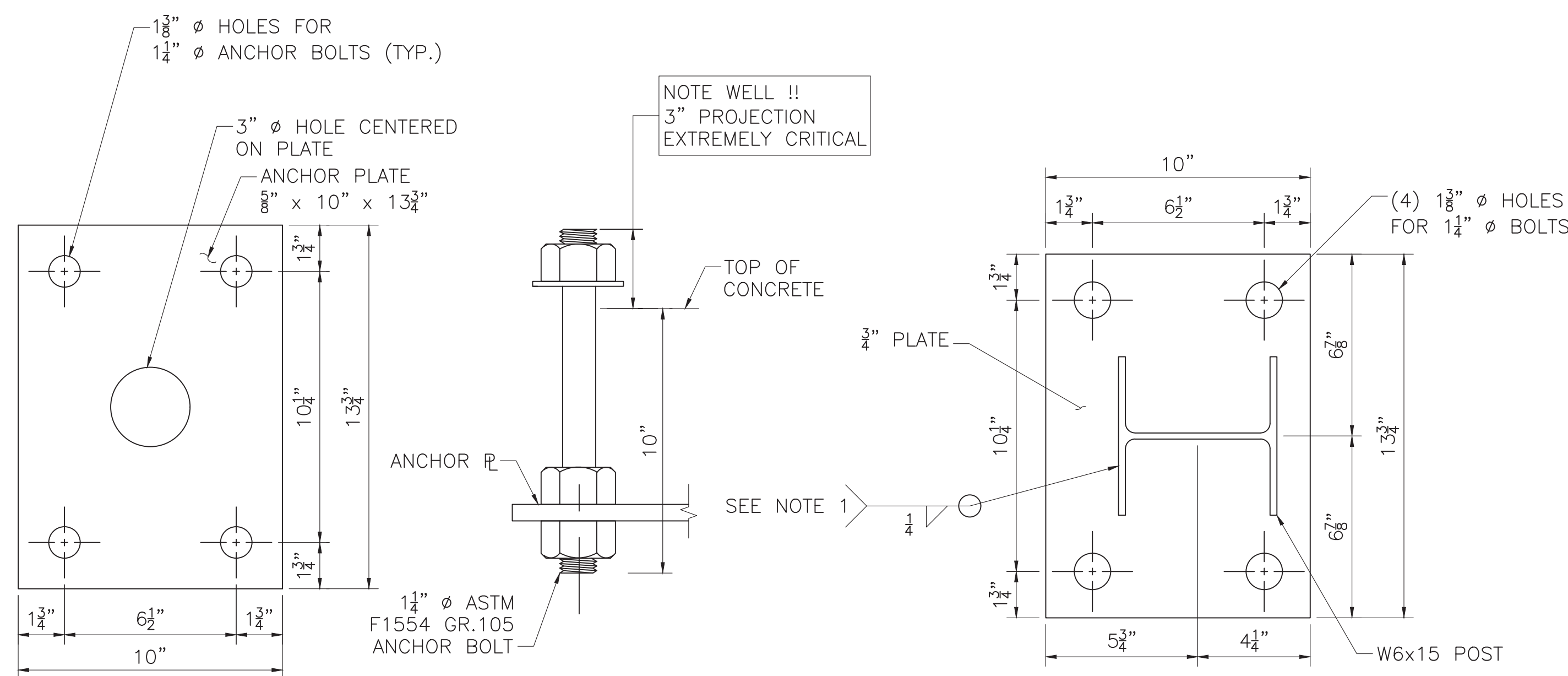
RAIL POST DETAIL (FRONT VIEW)

SCALE: 1" = 1'-0"



MODIFIED ROCKFILL SLOPE STABILIZATION

SCALE: N.T.S.



ANCHOR PLATE

SCALE: 3" = 1'-0"

ANCHOR BOLT

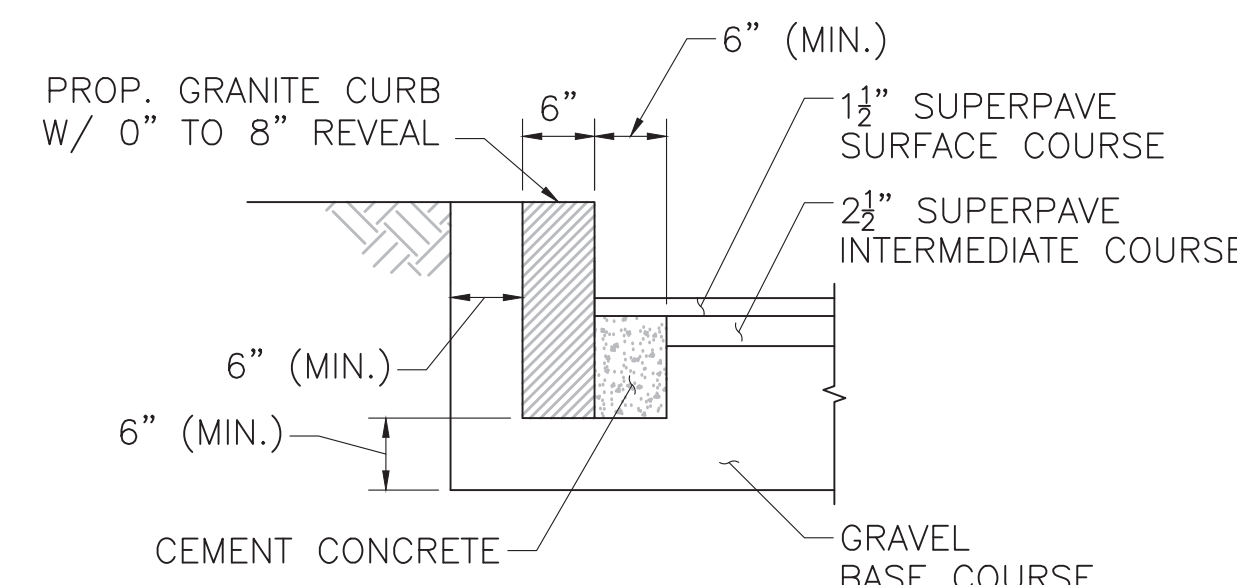
SCALE: 3" = 1'-0"

BASE PLATE

SCALE: 3" = 1'-0"

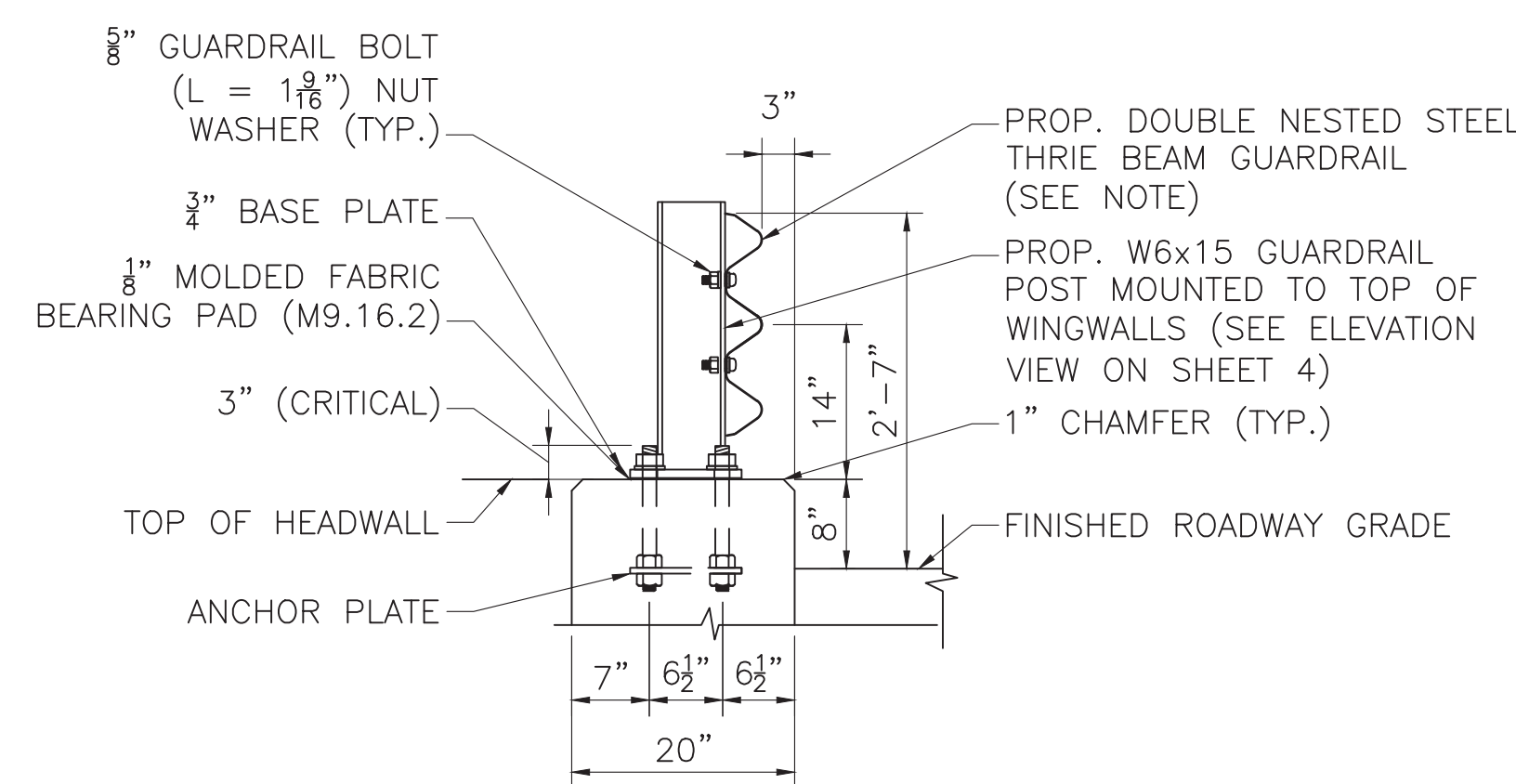
RAILING NOTES:

1. POST FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING. WELD SHALL BE BACK-GOUGED ON BACK SIDE EXCEPT AT WEB. WELD IS THE SAME ON BOTH FLANGES



GRANITE CURB TYPICAL SECTION

SCALE: 3/4" = 1'-0"

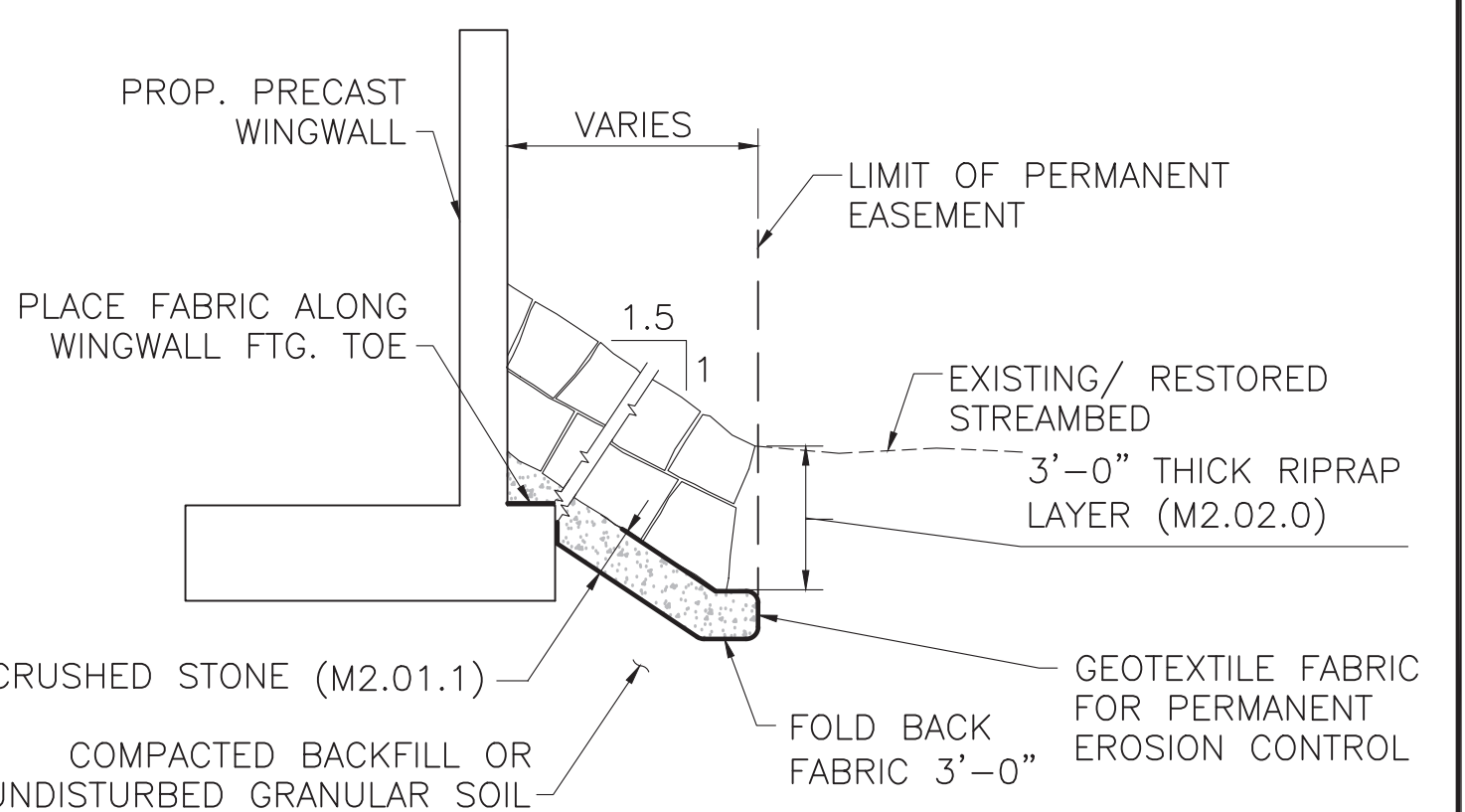


GUARDRAIL SECTION THROUGH TOP OF HEADWALL

SCALE: 3/4" = 1'-0"

NOTES:

1. REFER TO MASSDOT CONST. STD. DETAILS 400.1.0, 400.1.2 AND 400.1.3 FOR ADDITIONAL INFORMATION REGARDING THE THRIE BEAM GUARDRAIL AND HARDWARE DETAILS.
2. SEE BASE PLATE, ANCHOR PLATE AND ANCHOR BOLT DETAILS ON THIS SHEET FOR ADDITIONAL INFORMATION.



RIPRAP DETAIL

SCALE: 1/4" = 1'-0"

NOTE:

IF BEDROCK IS ENCOUNTERED CLOSER THAN 4'-0" TO FINISHED GRADE, ELIMINATE CRUSHED STONE LAYER AND GEOTEXTILE FABRIC.

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

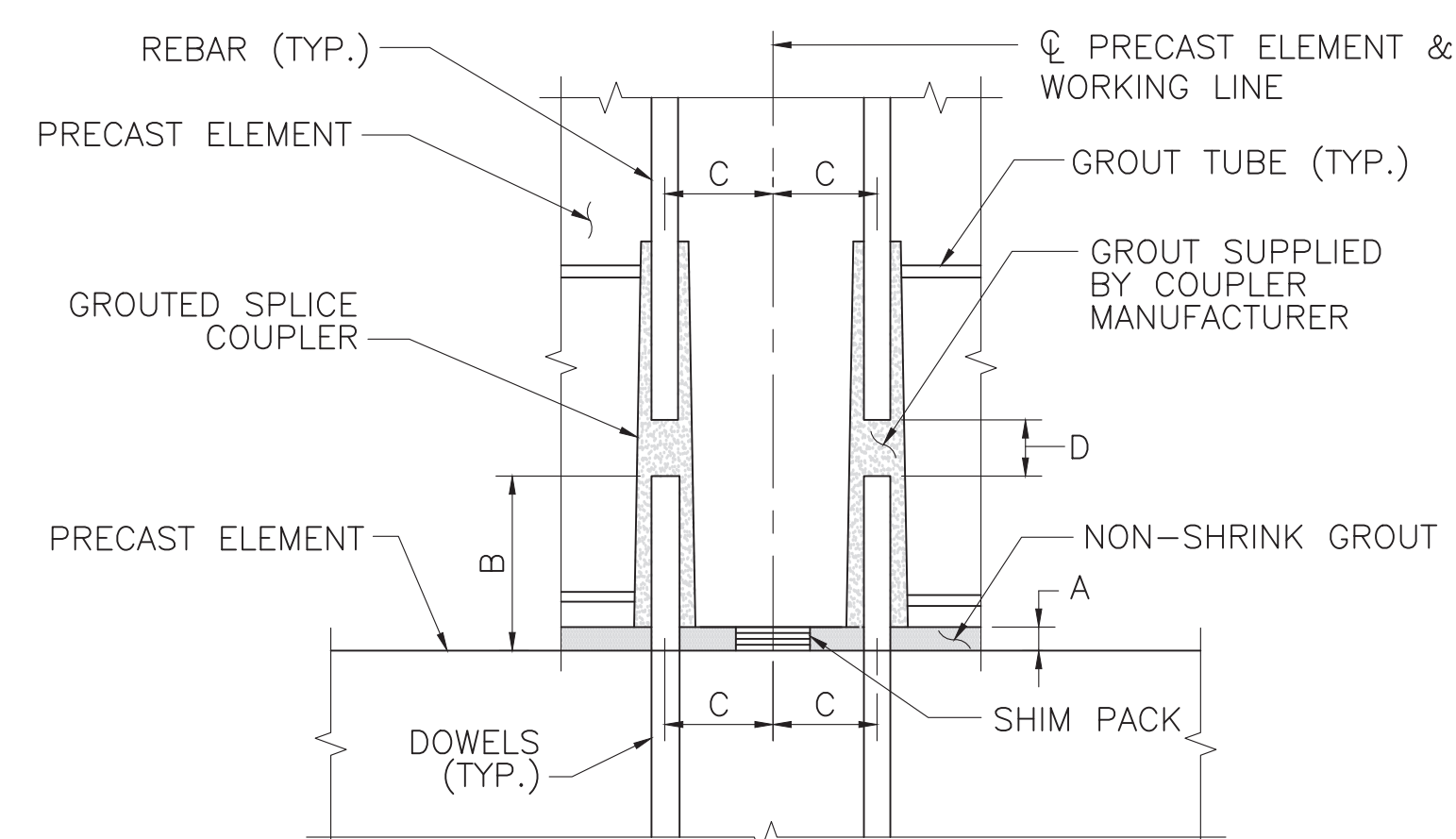
DISTRICT 3 BRIDGE ENGINEER

DATE

SHEET 8 OF 9 BRIDGE NO. G-08-061 (C97)

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9	9
PROJECT FILE NO.		T1060	

PREFABRICATION TOLERANCES



NOTES:

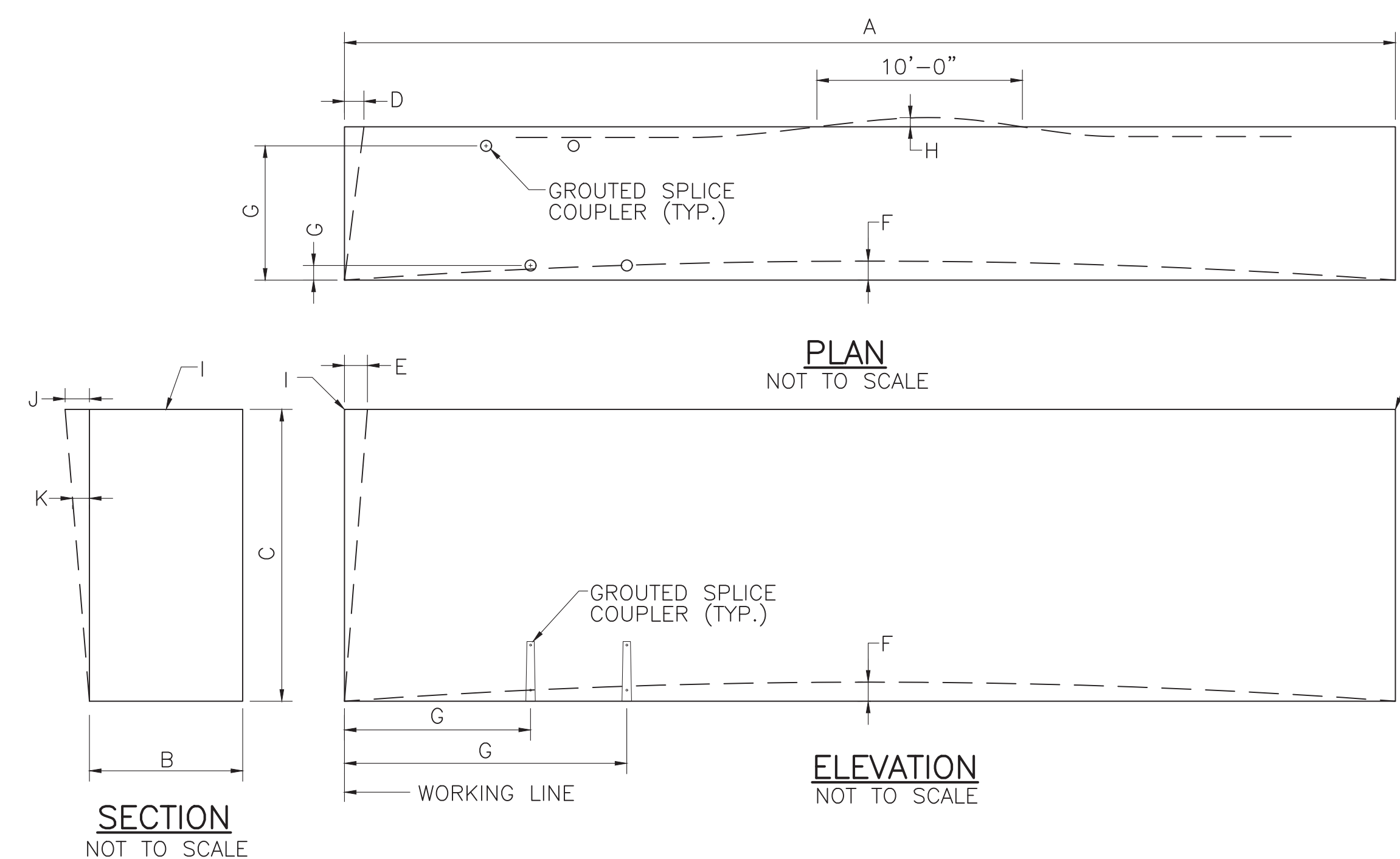
1. USE MATCHING TEMPLATES FOR THE LOCATION OF REINFORCEMENT AND GROUTED SPLICE COUPLER PLACEMENT WITHIN THE ELEMENTS TO CONTROL THE CRITICAL DIMENSION "C".
2. CONSULT MANUFACTURER OF THE GROUTED SPLICE COUPLER FOR PROPER DIMENSIONS "B" AND "D" AND FOR TOLERANCES ON THESE AND ALL DIMENSIONS.
3. BEFORE EXECUTING GROUTED SPLICE COUPLER ASSEMBLIES, ALWAYS SEEK INSTALLATION RECOMMENDATIONS FROM THE MANUFACTURER OF THE GROUTED SPLICE COUPLER USED.

GROUTED SPLICE COUPLER DETAILS

NOT TO SCALE

GROUTED SPLICE COUPLER TOLERANCES

Dimension	Description	Tolerance
A	SHIM PACK HEIGHT	$1\frac{1}{4}'' \pm \frac{3}{4}''$
B	DOWEL HEIGHT	CONSULT MANUFACTURER
C	LOCATION OF REINFORCING, GROUTED SPLICE COUPLER, AND DOWELS MEASURED FROM A WORKING LINE	$\pm 1\frac{1}{4}''$
D	GAP BETWEEN DOWELS AND REINFORCING	CONSULT MANUFACTURER



WALL SEGMENT ELEVATION ERECTION TOLERANCES

Dimension	Description	Tolerance
I	TOP ELEVATION FROM NOMINAL TOP ELEVATION	$\frac{1}{4}''$
J	MAXIMUM PLUMB VARIATION OVER HEIGHT OF PANEL	$\frac{1}{2}''$
K	PLUMB IN ANY 10 FEET OF PANEL HEIGHT	$\frac{1}{4}''$

WALL SEGMENT FABRICATION TOLERANCES

Dimension	Description	Tolerance
A	LENGTH	$\pm \frac{1}{4}''$
B	WIDTH (OVERALL)	$\pm \frac{1}{4}''$
C	DEPTH (OVERALL)	$\pm \frac{1}{4}''$
D	VARIATION FROM SPECIFIED PLAN END SQUARENESS OR SKEW	$\pm \frac{1}{2}''$
E	VARIATION FROM SPECIFIED ELEVATION END SQUARENESS OR SKEW	$\pm \frac{1}{2}''$
F	SWEEP OVER MEMBER LENGTH	$\pm \frac{3}{8}''$
G	LOCATION OF GROUTED SPLICE COUPLER MEASURED FROM A WORKING LINE	$\pm \frac{1}{4}''$
H	LOCAL SMOOTHNESS OF ANY SURFACE	$\pm \frac{1}{4}''$ IN 10 FEET

COMMONWEALTH OF MASSACHUSETTS
MassDOT, Highway Division
CONCEPTUAL DESIGN IS ACCEPTABLE
TO MASSDOT FOR CONTRACTING

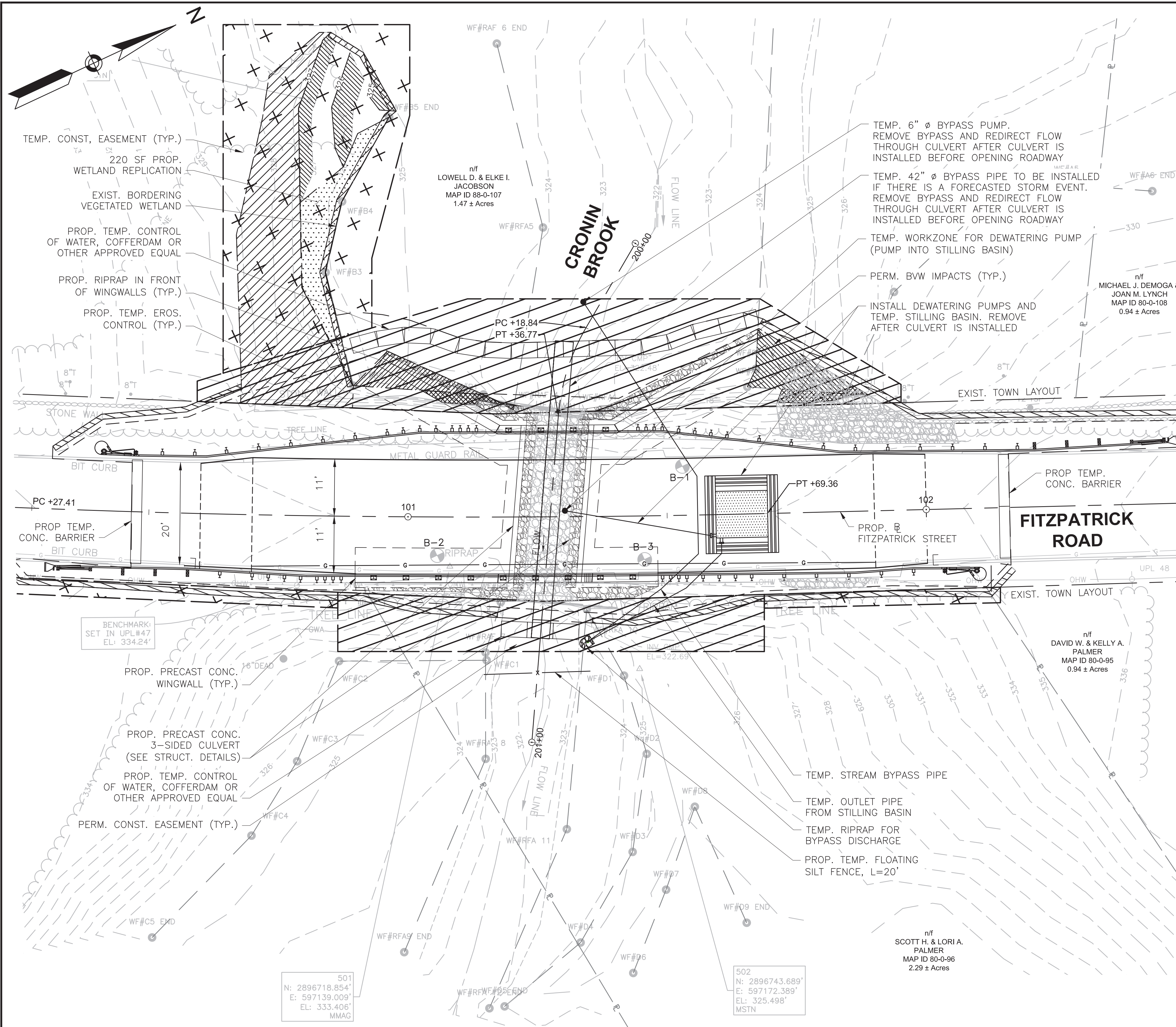
DISTRICT 3 BRIDGE ENGINEER

DATE

GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9A	9

PROJECT FILE NO. T1060
CONTROL OF WATER PLAN

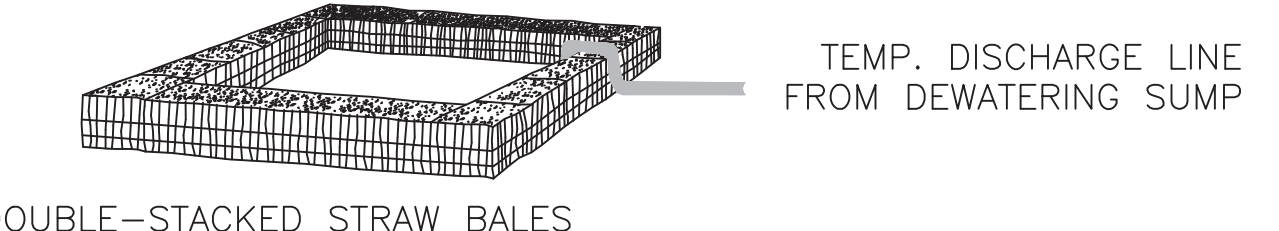


CRONIN BROOK CONTROL OF WATER PLAN

SCALE: 1" = 10'

CONTROL OF WATER NOTES

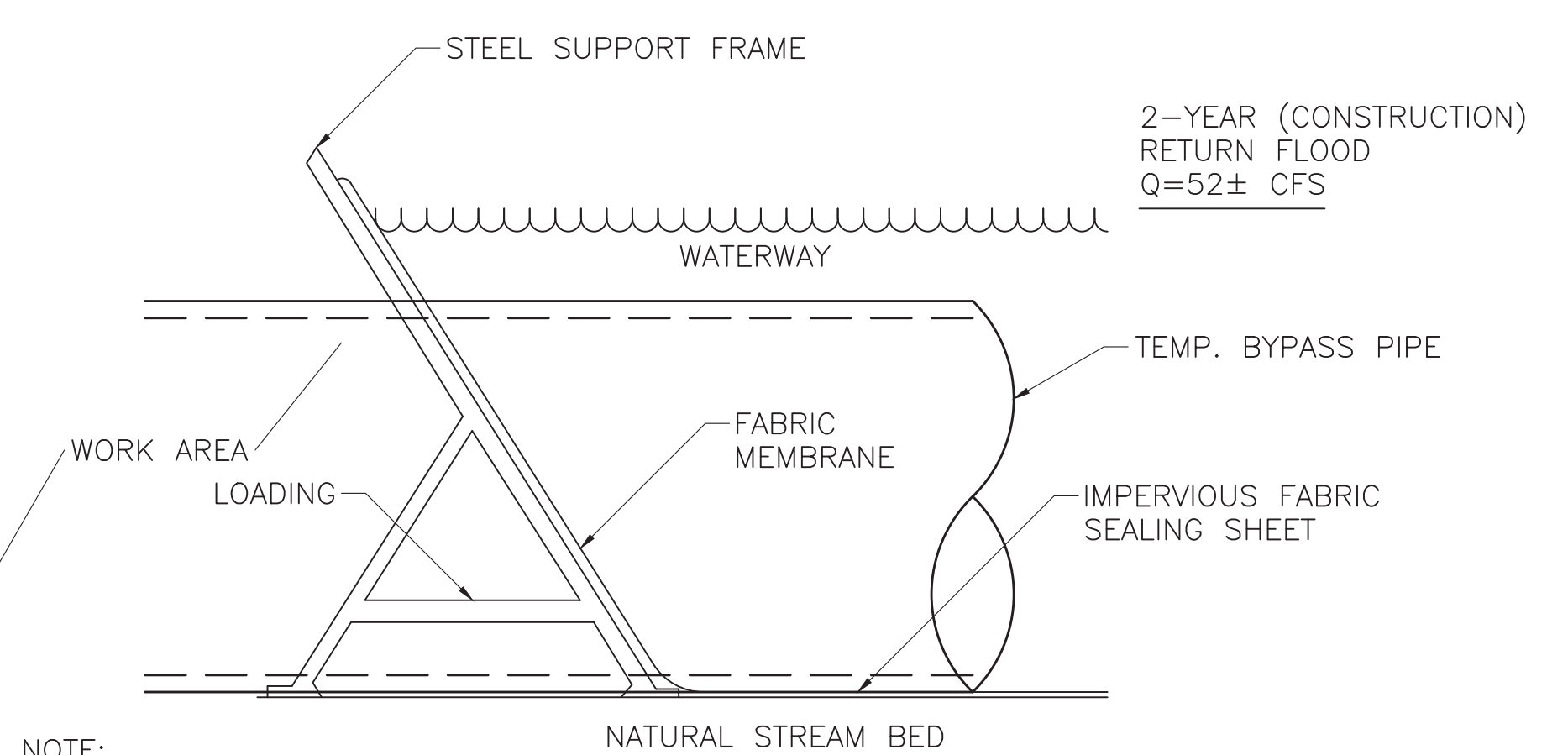
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE CONTROL OF WATER (C.O.W.) SYSTEM AND SHALL SUBMIT A C.O.W. PLAN TO THE ENGINEER FOR APPROVAL. THE C.O.W. SYSTEM SHOWN IS CONCEPTUAL ONLY. THE C.O.W. SYSTEM SHALL BE DESIGNED TO WITHSTAND A 2-YEAR FLOOD ELEVATION (NAVD).
2. FITZPATRICK ROAD SHALL BE CLOSED TO VEHICULAR AND PEDESTRIAN TRAFFIC AT THE BRIDGE CROSSING PRIOR TO BEGINNING EXCAVATION. DETOUR SIGNAGE WILL BE INSTALLED IN ACCORDANCE WITH THE MUTCD AND THE TEMPORARY TRAFFIC CONTROL PLANS INCLUDED IN THESE CONSTRUCTION DRAWINGS.
3. C.O.W. SYSTEM SHALL BE INSPECTED DAILY FOR WATER LEAKS OR EROSION AND REPAIRS PROCEDURES SHALL BE IMPLEMENTED ACCORDINGLY.
4. THE CONSTRUCTION SEQUENCE WITH REGARDS TO THE C.O.W. SYSTEM SHALL BE AS FOLLOWS:
 - 4.1. CLOSE THE ROADWAY TO VEHICULAR AND PEDESTRIAN TRAFFIC AT THE BRIDGE CROSSING.
 - 4.2. INSTALL EROSION CONTROLS: TEMPORARY EROSION CONTROL AROUND PROJECT LIMITS TO PROTECT CRONIN BROOK FROM WORK ZONE SEDIMENT; FLOATING SILT FENCE IN THE DOWNSTREAM OF THE PROJECT LIMITS TO TRAP ANY FLOATING DEBRIS/SILT THAT MAY ENTER THE BROOK.
 - 4.3. INSTALL C.O.W. COFFERDAMS, BYPASS PUMP & PIPE, DEWATERING PUMPS, AND TEMPORARY STILLING BASIN.
 - 4.4. PLACE TEMPORARY RIPRAP AT OUTLET FOR BYPASS DISCHARGE.
 - 4.5. DEWATER THE WORK AREA PRIOR TO (AND THROUGHOUT) EXCAVATION TO FACILITATE INSTALLING THE CULVERT, AND WINGWALLS IN THE DRY CONDITION. ALL DEWATERING FLOW SHALL PASS THROUGH THE STILLING BASIN TO REMOVE SEDIMENT PRIOR TO DEPOSITING BACK INTO THE STREAM.
 - 4.6. INSTALL THE THREE-SIDED RIGID FRAME AND WINGWALLS. RESTORE THE STREAMBED IN ACCORDANCE WITH THESE PLANS. INSTALL RIPRAP EMBANKMENT AND LOAM AND SEED WITH EROSION CONTROL BLANKET IN FRONT OF THE WINGWALLS. INSTALL COIR LOGS ALONG UPLAND SIDES OF STREAMBED.
 - 4.7. REDIRECT STREAM FLOW THROUGH THE CULVERT.
 - 4.8. REMOVE THE C.O.W. COFFERDAMS BYPASS PUMP & PIPE AND TEMPORARY STILLING BASIN.



NOTE:
DISCHARGE TO SEDIMENTATION BASIN (AS SHOWN) OR TO SILTATION/ DEWATERING BAG SUCH AS FLOGARD DEWATERING BAG MODEL SC-DW1215Z, OR APPROVED EQUAL BY GRAFTON CONSERVATION COMMISSION. SYSTEM SHOWN IS CONCEPTUAL ONLY AND IS TO BE DESIGNED BY CONTRACTOR.

TEMPORARY STILLING AREA

SCALE: N.T.S.



NOTE:
THE STEEL FRAME COFFERDAM SHOWN ABOVE IS SHOWN IN CONCEPT ONLY AS ONE OPTION FOR CONTROL OF WATER. THE CONTRACTOR SHALL DETERMINE THE APPROPRIATE SYSTEM FOR CONTROLLING THE WATER (I.E. BULK SANDBAGS, SHEETING, ETC). THE CONTRACTOR SHALL SUBMIT THEIR PROPOSED CONTROL OF WATER DESIGN TO THE ENGINEER FOR REVIEW AND APPROVAL.

TEMPORARY COATED FABRIC STEEL FRAME COFERDAM

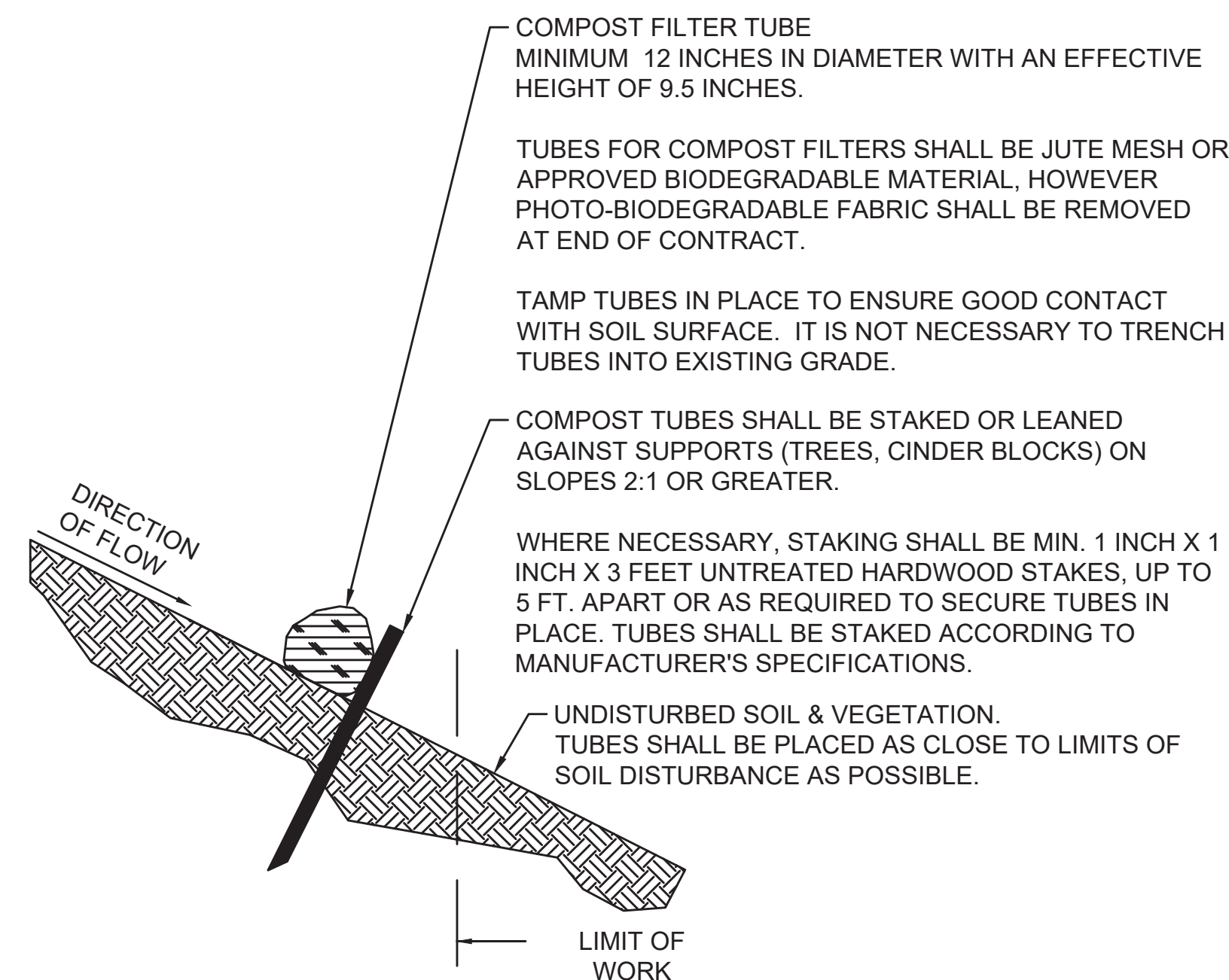
SCALE: N.T.S.

T1060_FITZPATRICK_CO(W)DWG Picked on: 28-Mar-2022 8:36 AM MARCH 26, 2022 CHAPTER 85 SUBMISSION

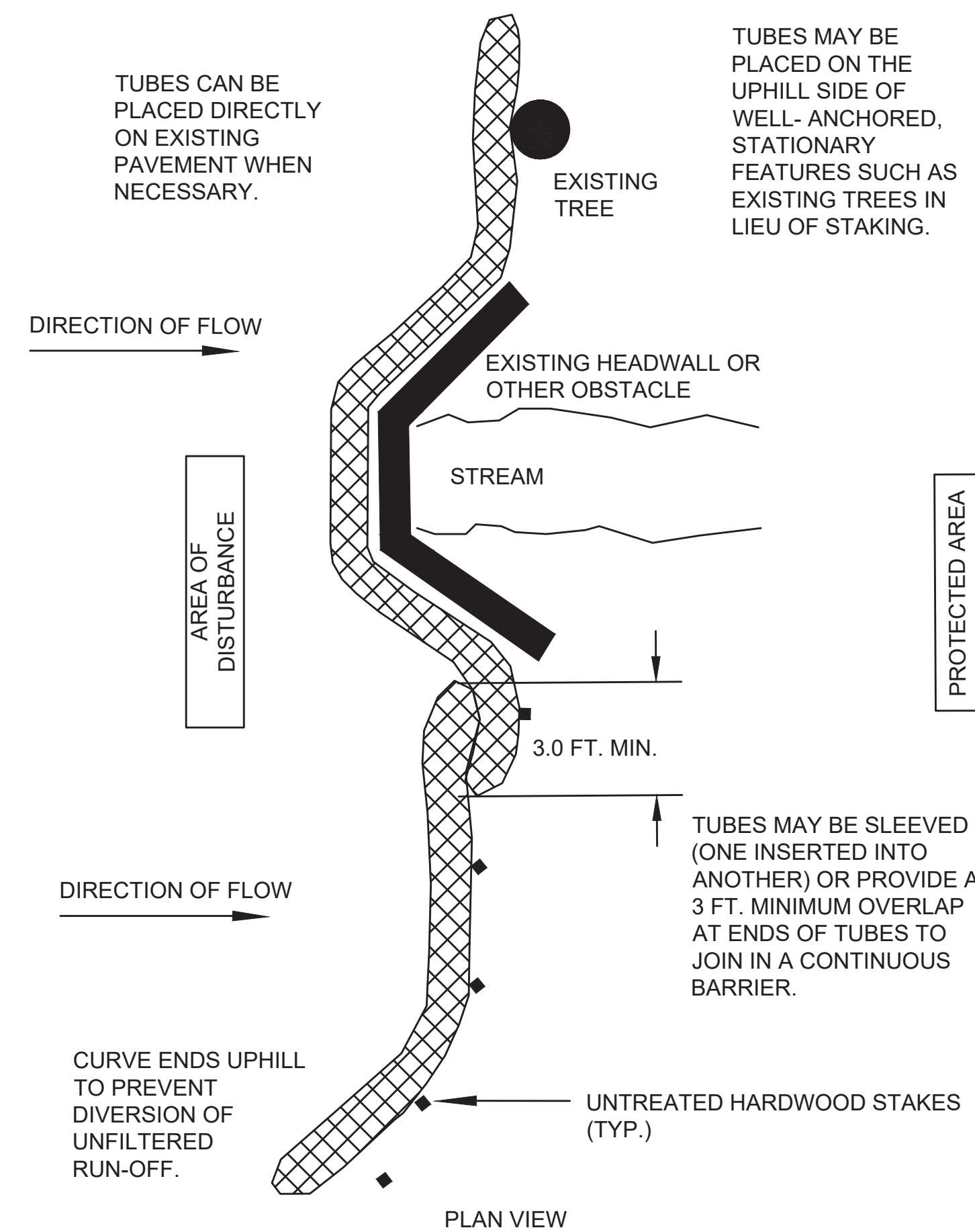
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9B	9
PROJECT FILE NO.		T1060	

NOTES:

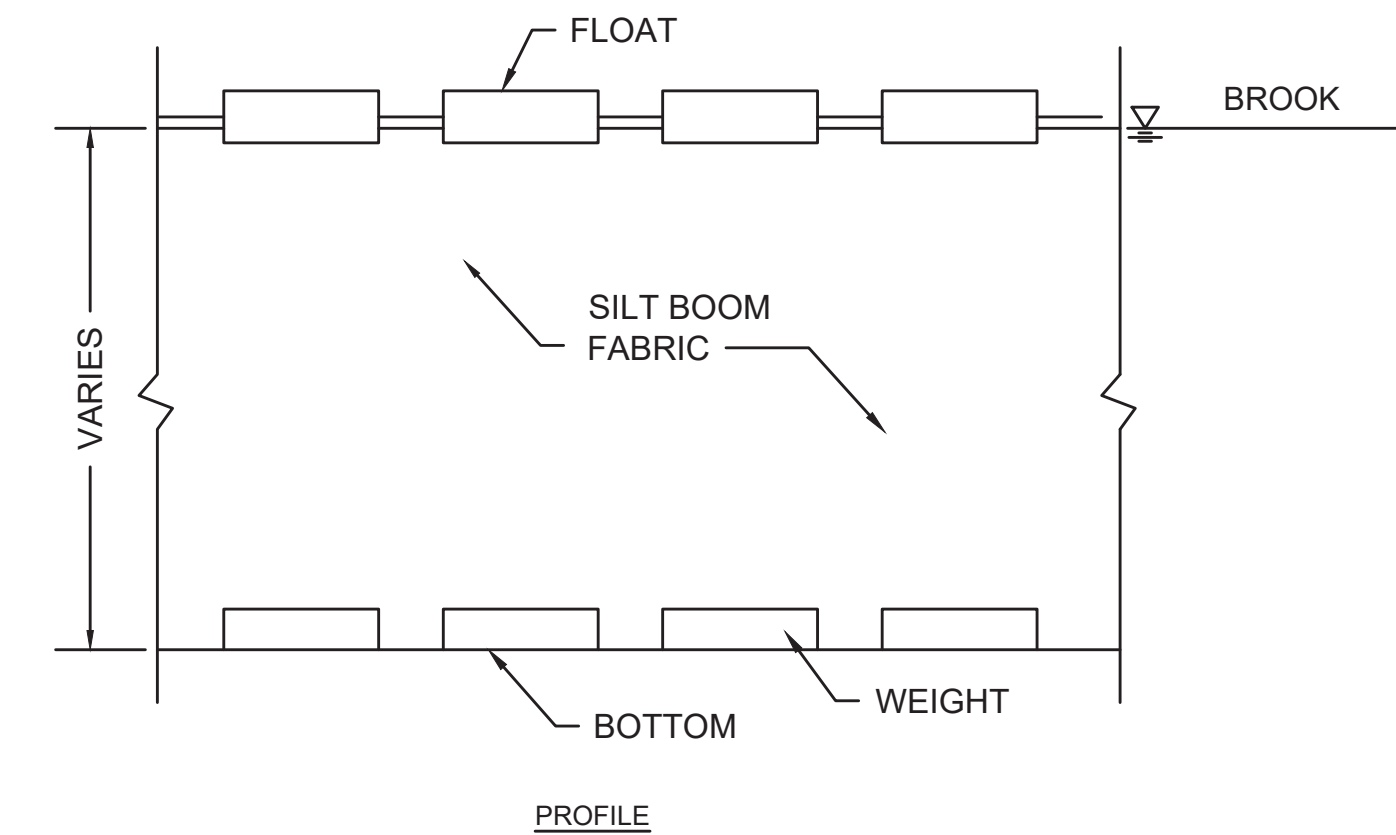
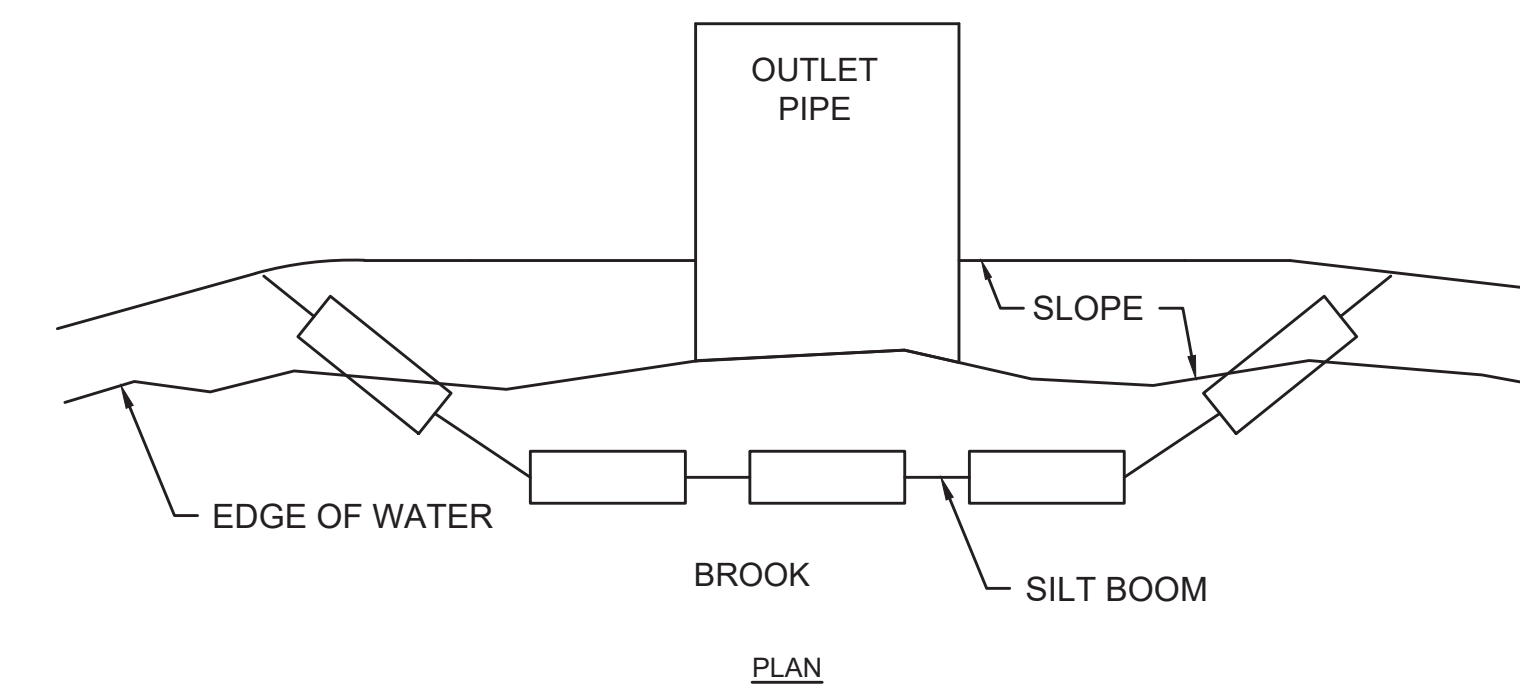
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.



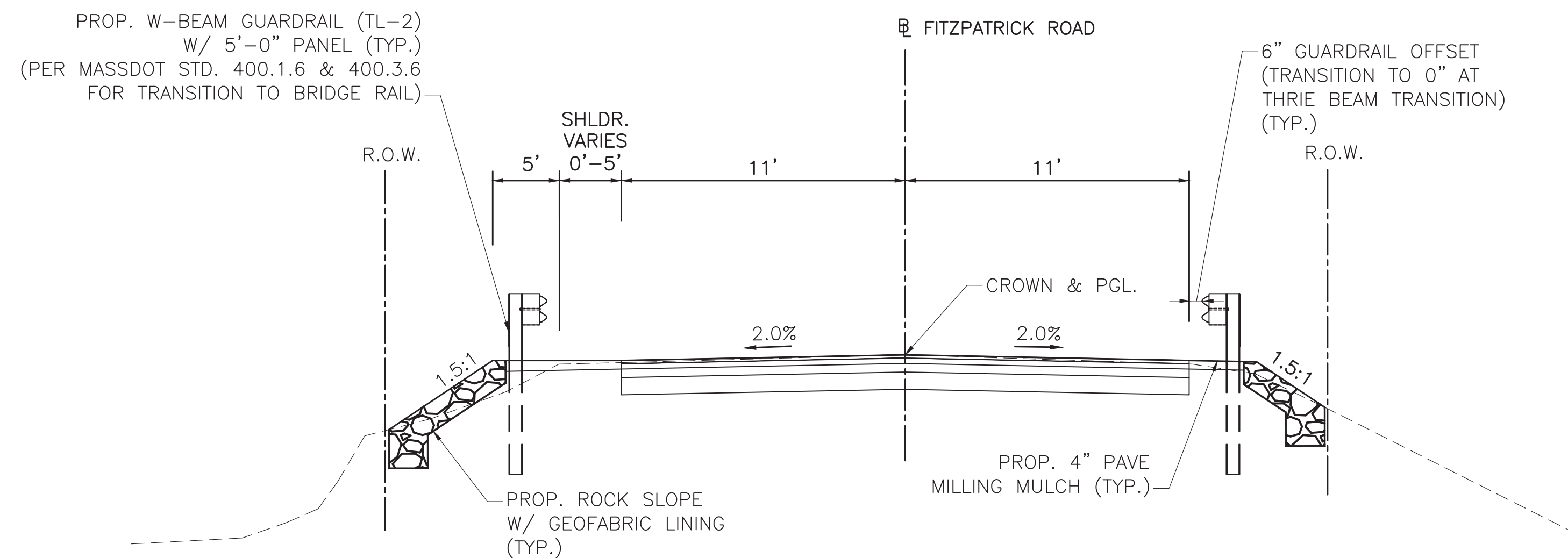
COMPOST FILTER TUBE
SCALE: N.T.S.



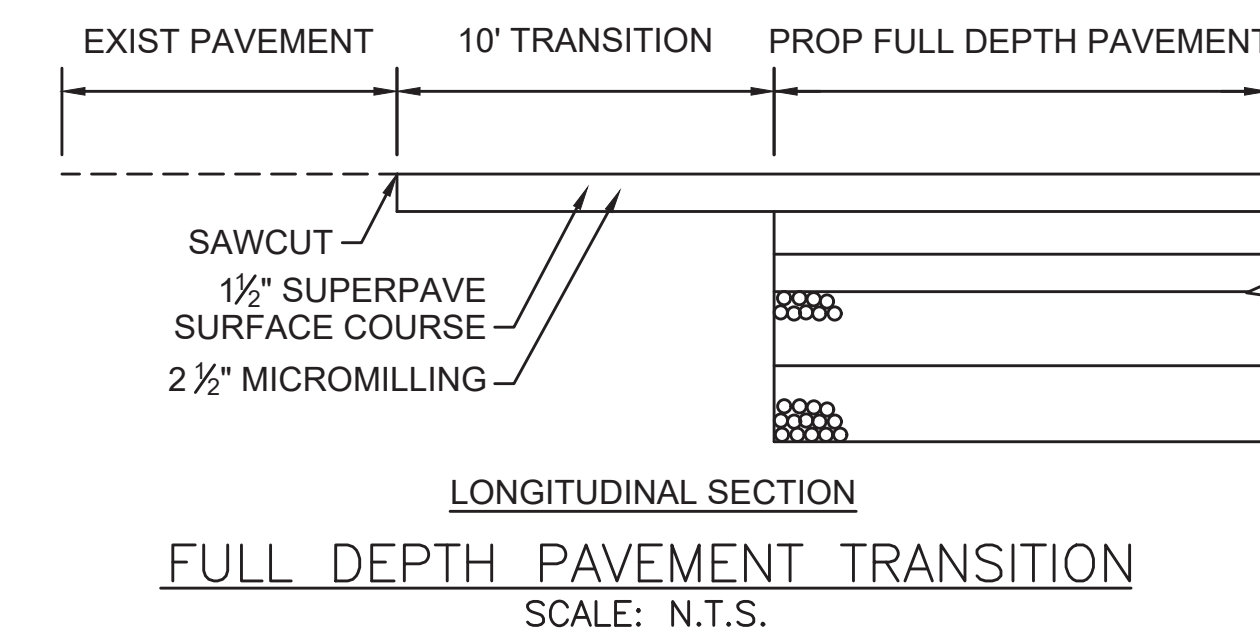
COMPOST FILTER TUBE
SCALE: N.T.S.



SILT BOOM FENCE
SCALE: N.T.S.



TYPICAL APPROACH SECTION
SCALE: N.T.S.



PAVEMENT NOTES:

PROPOSED FULL DEPTH PAVEMENT (ROADWAY):

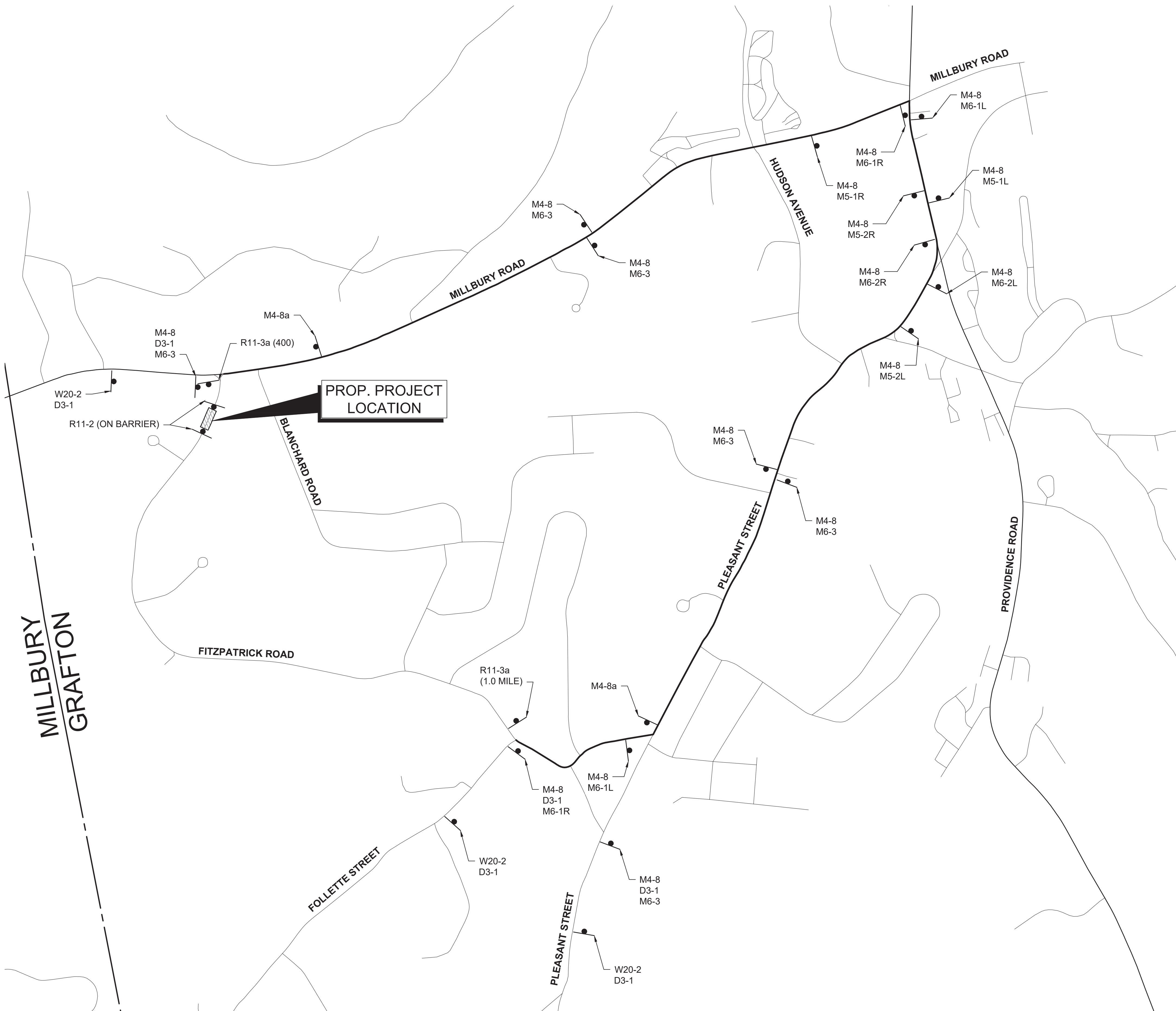
SURFACE: 1 1/2" SUPERPAVE SURFACE COURSE 12.5 (SSC - 12.5) OVER 2 1/2" SUPERPAVE INTERMEDIATE COURSE 19.0 (SIC - 19.0)

SUBBASE: 4" DENSE GRADED CRUSHED STONE OVER 8" GRAVEL BORROW, TYPE b OVER GRAVEL BORROW OR EXISTING MATERIAL MEETING TYPE b SPECIFICATIONS

GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9C	9
PROJECT FILE NO.		T1060	

TTCP (DETOUR PLAN)



DETOUR PLAN & ADVANCED SIGNAGE
SCHEMATIC FITZPATRICK ROAD

SCALE: 1"=500'



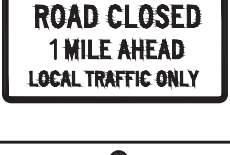






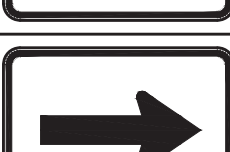






GENERAL NOTES:

1. ALL WORK ZONES AND DETOURS ARE ESTABLISHED FOR 24-HOURS A DAY. TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
2. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM WITH THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL (M.U.T.C.D.) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
3. ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE M.U.T.C.D.
4. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
6. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
7. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS AT THE DISCRETION OF THE CONTRACTOR.
8. ALL DRUMS AND/OR CONES SHALL BE SET @ 20' O.C. MAX. UNLESS OTHERWISE NOTED OR ADJUSTED BY THE ENGINEER.

GRAFTON
FITZPATRICK RD OVER
CRONIN BROOK

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	-	9D	9
PROJECT FILE NO.		T1060	

TTCP (SIGN AND SUMMARY)

TRAFFIC SIGN SUMMARY													
IDENTIFICATION NUMBER	SIZE OF SIGN (INCHES)		LEGEND	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			NUMBER OF SUPPORTS REQUIRED	UNIT AREA (S.F.)	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACKGROUND	LEGEND	BORDER			
R11-2	48	30			①		2	WHITE	BLACK	BLACK	0 ON BARRIER	10.00	20.00
R11-3a(400)	60	30					1	WHITE	BLACK	BLACK	1	12.50	12.50
R11-3a(1.0 MILE)	60	30					1	WHITE	BLACK	BLACK	1	12.50	12.50
W20-2	36	36					3	ORANGE	BLACK	BLACK	3	9.00	27.00
M4-8	24	12					16	ORANGE	BLACK	BLACK	16	2.00	32.00
M4-8a	24	18					2	ORANGE	BLACK	BLACK	2	3.00	6.00
M5-1R	21	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.19	2.19
M5-1L	21	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.19	2.19
M5-2R	22	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.29	2.29
M5-2L	23	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.40	2.40
M6-1R	21	15					2	WHITE	BLACK	BLACK	0 W/ M4-8	2.19	4.38
M6-1L	21	15					2	WHITE	BLACK	BLACK	0 W/ M4-8	2.19	4.38
M6-2R	22	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.29	2.29
M6-2L	23	15					1	WHITE	BLACK	BLACK	0 W/ M4-8	2.40	2.40
M6-3	21	15					6	WHITE	BLACK	BLACK	0 W/ M4-8	2.19	13.13
D3-1	36	12			↓		6	ORANGE	BLACK	BLACK	0 W/ M4-8 W/ W20-1	3.00	18.00

NOTES:

- CONTRACTOR TO FURNISH SIGNS CONSISTENT WITH 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS. SEE MANUAL FOR TEXT AND LEGEND DIMENSIONS.

**GEOTECHNICAL ENGINEERING
EVALUATION AND RECOMMENDATIONS**

**Fitzpatrick Road Bridge Replacement
Grafton, MA**

January 15, 2021

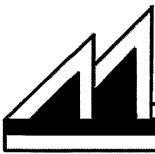
Project No. 20.230.NH

PREPARED FOR:

TEC, Inc.
146 Dascomb Road
Andover, MA 01810

PREPARED BY:

Miller Engineering & Testing, Inc.
100 Sheffield Road
Manchester, NH 03103



MILLER ENGINEERING & TESTING INC.

GEOTECHNICAL / SOIL BORINGS / ENVIRONMENTAL / SOILS / CONCRETE / MASONRY / STEEL / ROOFING / ASPHALT INSPECTION

Mail all correspondence to: 100 SHEFFIELD ROAD · PO BOX 4776 · MANCHESTER, NH 03108-4776 · TELEPHONE (603)668-6016 · Fax (603)668-8641

January 15, 2021

Mr. Jody Trunfio, P.E.
TEC, Inc.
146 Dascomb Road
Andover, MA 01810

RE: Geotechnical Engineering Evaluation & Recommendations
Fitzpatrick Road Bridge Replacement
Grafton, MA

Project No. 20.230.NH

Dear Mr. Trunfio:

This report presents the results of a subsurface exploration program and subsequent geotechnical engineering evaluation completed for the proposed bridge structure planned as part of the Fitzpatrick Road Bridge Replacement project in Grafton, Massachusetts. The bridge and wing-wall structures are proposed beneath the Fitzpatrick roadway embankment at Cronin Brook crossing as depicted on the Subsurface Exploration Location Plan presented as Figure 1 in this report. The approximate test boring locations were provided by TEC, Inc., and adjusted in the field by MET, Inc. to avoid existing utilities. This report includes a description of the site, subsurface conditions encountered, and the proposed project. In addition, geotechnical engineering evaluation and foundation design recommendations are presented herein.

We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding the contents of the report, please do not hesitate to contact us.

Sincerely,
MILLER ENGINEERING & TESTING, INC.

Frank K. Miller

Frank K. Miller, P.E.
Vice President



TABLE OF CONTENTS

1.00	INTRODUCTION.....	2
2.00	SITE AND PROPOSED CONSTRUCTION	2
3.00	SUBSURFACE EXPLORATION PROGRAM.....	2
3.10	Laboratory Testing.....	3
4.00	SUBSURFACE CONDITIONS ENCOUNTERED	3
5.00	GEOTECHNICAL ENGINEERING EVALUATION.....	4
5.10	Clearing and Stripping Operations.....	5
5.20	Construction Dewatering Operations.....	5
5.30	Reuse Of On-Site Materials	6
6.00	CONCLUSIONS AND RECOMMENDATIONS.....	6
6.10	Foundation Support System.....	6
6.20	Foundation Base Preparations.....	6
6.30	Subgrade Stabilization	7
6.40	Structural Fill Placement and Compaction	7
6.50	Foundation Design Considerations.....	7
6.60	Bridge Structure and Wing-wall Considerations.....	8
6.70	Seismic Considerations.....	9
7.00	FINAL DESIGN AND CONSTRUCTION MONITORING	10

TABLE

Table 1 Gradation Specifications

FIGURE

Figure 1 Subsurface Exploration Location Plan

ATTACHMENTS

Attachment A Limitations
Attachment B Exploration Logs
Attachment C Grain Size Test Results

1.00 INTRODUCTION

This report presents the results of a subsurface exploration program and geotechnical engineering evaluation performed in general accordance with our proposal Reference File 260-20, dated August 24, 2020.

The scope of our geotechnical engineering services may be summarized as follows:

1. Perform necessary field investigations, in accordance with the TEC, Inc. Subconsultant Consultant Agreement, dated December 2, 2020, and the MassDOT Bridge Manual, through the advancement of test borings.
2. Evaluate subsurface conditions and perform geotechnical engineering analyses to develop recommendations for bridge and wing-wall structures spread footing foundation design and construction.
3. Summarize the exploration program, engineering analyses, and evaluation in the form of a geotechnical engineering report.

Presented herein are the descriptions of the project, the site, and the subsurface conditions encountered during the subsurface exploration program. Based upon our findings, specific geotechnical engineering recommendations were formulated and are presented herein. The contents of this report are subject to the limitations in Attachment A.

2.00 SITE AND PROJECT DESCRIPTION

The existing arch culvert and head walls at the Cronin Brook crossing beneath Fitzpatrick Road are in a state of failure and will be replaced with a new bridge structure. According to TEC, Inc., the project is early in design; thus, only concept plans are currently available.

The project involves replacement of the arch culvert at Cronin Brook, at the location depicted on the Subsurface Exploration Location Plan, Figure 1. According to TEC, Inc., the proposed bridge structure will span between 12 and 15 feet, with upstream and downstream wing-walls; and the structure will consist of precast reinforced concrete supported on a spread footing foundation system. We anticipate proposed grade of the bridge surface will match existing surface elevations; and the proposed bottom of spread footing elevation has not been determined, but will be at least 4-feet (frost protection) below the stream bed level. The footings might be deeper, however, depending upon the results of a scour analysis (performed by others).

3.00 SUBSURFACE EXPLORATION PROGRAM

The subsurface exploration program was completed on January 7, 2021, by a test boring crew from MET under the supervision of a Geotechnical Engineer. The program consisted in the advancement of three (3) test borings designated as B-1, B-2 and B-3, within the proposed bridge area.

The locations of test borings are depicted on the Subsurface Exploration Location Plan, Figure No. 1. The purpose of the exploration program was to:

1. Assess the nature, consistency, and relative density of the soil strata encountered at the site, provide soil samples for visual classification, and advance test borings for design phase geotechnical engineering evaluation.
2. Assess the thickness and the condition of any fill material and organic deposits.
3. Assess the depth to competent soil and/or bedrock, and the elevation of the groundwater table.

The test borings were advanced using a truck-mounted Diedrich D-50 drill rig turning 2-1/4-inch inside-diameter hollow-stem augers. Samples were obtained at 5-foot maximum intervals or strata changes using a 1-3/8-inch inside-diameter split-spoon sampler. Standard Penetration Tests (SPT) were performed at sampling depths by driving the split-spoon sampler 24-inches with a 140-pound hammer falling 30-inches in general accordance with ASTM Designation D-1586. The standard penetration resistance, or N-value, defined as the number of hammer blows required to drive the sampler between the 6 and 18-inch increments, was used to assess the soils relative density and cohesive consistency.

3.10 Laboratory Testing

Two (2) split-spoon samples were selected for grain size analysis in accordance with ASTM D422. The samples were chosen from the glacial soil layer at the following locations:

- B-1, S-2, 2-4 feet (Fill Material)
- B-2, S-6, 11-13 feet (Glacial Till Material)

Results of these tests are presented graphically in Attachment C.

4.00 SUBSURFACE CONDITIONS ENCOUNTERED

The following section presents the generalized subsurface conditions encountered at the test boring locations during the subsurface exploration program. Detailed descriptions of subsurface conditions are provided on the Test Boring Logs presented in Attachment B.

The subsurface conditions in these areas consist of the following generalized profile from the ground surface downward:

1. Pavement Layer
2. Fill Layer
3. Buried Organic Soil Layer
4. Glacial Till Layer
5. Auger Refusal

General descriptions of the subsurface strata encountered are presented below:

Pavement Layer

All 3 test borings encountered a 4-inch thick bituminous pavement layer at the roadway surface. The pavement was supported directly upon sand and gravel base course fill material.

Fill Layer

Beneath the pavement, test borings encountered a medium dense to dense fill layer consisting of brown, fine to medium sand, some gravel, with trace amounts of silt material. Grinding augers was indicative of the presence of cobbles and boulders at some elevations in the fill layer. The thickness of the fill layer ranged from 7.5 to 9 feet at the test boring locations.

Buried Organic Soil Layer

All three (3) test borings encountered a buried fine sand and organic silt layer directly beneath the fill material. The organic material consisted of dark brown to black, fine sand and organic silt intermixed with fibrous matter. The organic layer was 6-inches (test boring B-1) to 2.0 feet (test borings B-2 and B-3) thick at the exploration locations.

Glacial Till Layer

The test borings encountered a dense to very dense glacial till stratum, directly beneath the fill and organic layers at depths of 8.0 and 11.0 feet. The till consisted of grey, fine to coarse sand, some gravel, and little silt material. The Standard Penetration Test measures typically exceeded 40 blows per foot in the till stratum.

Auger Refusal

Auger refusal was encountered at test borings ranging between depths of 13.0 and 26.0 feet below the ground surface. It could not be determined with certainty, however, whether refusal was the result of very dense soils, boulders, or bedrock. Rock coring, to obtain samples at the refusal level, was beyond the scope of our services for this project. However, judging from the consistency in refusal elevations, bedrock probably impeded advancement of the auger.

Groundwater Observations

Groundwater observations were made at each test boring location at the times indicated on the Test Boring Logs in Attachment B. The moisture condition of the split-spoon samples was monitored to provide further indications of the groundwater levels. Groundwater was measured 9.0 to 11.0 feet below ground surface at the locations of test borings.

It should be noted that groundwater levels might fluctuate from time to time due to factors such as season, temperature, precipitation, and other environmental conditions. Groundwater levels at other times, therefore, may be different from those observed and recorded during this exploration program.

5.00 GEOTECHNICAL ENGINEERING EVALUATION

Results of the subsurface exploration program indicate subsurface conditions are favorable for the design and construction of shallow foundation systems to support the proposed bridge and wingwall structures. The footings for the bridge and wingwall structures should be supported directly or indirectly upon the naturally occurring, firm and stable, dense to very dense, glacially deposited soil (fine to coarse sand, some gravel, little silt) stratum that was encountered beneath

fill and organic layers. The fill and organic layers combined thickness ranged from 8.0 to 11.0 feet at the test boring locations.

The controlling subsurface features for foundation design and construction are as follows:

- The presence of loose fill and organic deposits to depths ranging between approximately 8.0 and 11.0 feet below the existing ground surface level;
- The presence of Cronin Brook, wetlands, and potentially variable groundwater elevations in the project area; and
- The presence of moisture sensitive, fine to medium-grained sand, gravel and silt material at the anticipated footing elevations.

5.10 Clearing and Stripping Operations

Test borings advanced within the proposed bridge area encountered an 11-foot layer of fill and organic materials, which must be completely excavated from below the foundations and any reinforced backfill areas to expose the underlying, naturally occurring, dense to very dense, glacial till soil layer. Deeper organic layers might be encountered within existing wetland areas not accessible during the exploration program. In addition, the existing culvert and all associated backfill material must be excavated from the new culvert foundation area.

A Geotechnical Engineer from MET should inspect all prepared subgrade areas prior to placement of any fill material or concrete forms to verify that foundation excavation and subgrade preparation efforts were performed in compliance with recommendations presented in this Report.

5.20 Construction Dewatering Operations

Groundwater will be encountered during the excavation of fill and organic layers and deeper excavations to bottom of footing subgrade elevations. In no case should backfilling be performed below the groundwater table or in areas of standing water. The installation of an effective dewatering system will be necessary to allow for the excavation and subsequent backfilling operations “in-the-dry”. Temporary diversion of the brook, within the proposed culvert areas and dikes adjacent to wetlands, will likely be required to control site waters.

The Contractor should select, design, install, operate, and maintain a dewatering system that will prevent destabilization (heaving) of the excavation base; allow installation of compacted fill material as required; and to maintain dry excavations during backfilling of the bridge and wing-wall foundations. Groundwater should be lowered at least 1-foot below the base of the excavations. The Contractor should perform the dewatering efforts in accordance with appropriate State and Local Permitting requirements. Prior to construction, the Contractor should submit a Dewatering Plan to the Engineer and Owner for review.

The use of crushed stone material as a subgrade stabilization layer below the structure foundations should be avoided to mitigate potential seepage flow through the stone layer,

and possibility of piping adjacent to structure's, unless approval for use is granted from the Project Geotechnical and Civil Engineers.

5.30 Re-Use of On-Site Materials

The excavated fill and organic materials are considered generally unsuitable for use as backfill against the culvert and wing-walls; thus, these materials will be of limited use in the proposed embankment. Some of the existing fill material is relatively granular and has a low silt and clay content; thus, these materials may be segregated and reused as structural fill material for the project.

Representative samples of all proposed fill materials should be submitted to the MET Geotechnical Laboratory and be subjected to Grain Size Distribution Analyses and Moisture/Density Testing prior to use to determined consistency with the gradation specifications presented in Table No. 1. A Geotechnical Engineer from MET should approve all fill material to be used for the project prior to placement.

6.00 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations pertain to design and construction considerations for the proposed bridge and wing-wall structures planned as part of the proposed Fitzpatrick Road Bridge Replacement project in Grafton, Massachusetts.

6.10 Foundation Support System

Continuous spread footings should be supported directly or indirectly upon the naturally occurring glacial till soil stratum, or Gravel Borrow Fill (MHD M1.03.0, Type b) material placed and compacted upon the glacial soil layer.

6.20 Foundation Base Preparations

Prior to clearing and stripping operations, the brook must be diverted away from foundation areas, and dewatering efforts should be implemented by the Site Contractor such that the foundation excavation operations are performed in-the-dry, as discussed within Section 5.20 of this Report. Groundwater must be maintained at least 1-foot below the deepest excavation to achieve base stability during foundation construction. Subsequently, all fill material and organic layers should be completely excavated from below the structure foundation and reinforced backfill areas to expose the underlying, naturally occurring, glacial soil layer. These excavations should include the zone-of-stress influence of the footing, which is defined as that area within a 1H:1V slope projecting outward and downward from the outside edges of the footing to the base of the over-excavation area. **Excavation to subgrade should be performed using an excavator with a flat-edge bucket to reduce disturbance of the bearing soil layer.**

Excavation bases within naturally occurring soil deposits should be proofrolled in order to densify any naturally occurring loose zones or those, which are created during the excavation process. The proofrolling should consist of a minimum of four (4) passes of a 500-pound vibratory plate compactor, or equivalent effort. Should unstable areas develop during the proofrolling process, due to excess moisture, the vibratory proofrolling efforts should be stopped and static methods should be employed. Proofrolling operations may be eliminated if, in the

judgment of the geotechnical engineer, the base soils were not disturbed during excavation process.

In no case should frozen soils remain below the foundation areas. Any frozen materials located within the subgrade soils should be completely removed and replaced as recommended in Section 6.40 of this Report.

6.30 Subgrade Stabilization

If unstable areas develop at subgrade due to excess moisture, the base should be over-excavated a minimum of 12-inches and be replaced with a layer of Gravel Borrow Fill material, meeting the grain size distribution requirements in Table 1. This material should be placed in 12-inch maximum loose lifts and be compacted to at least 95 percent of the materials maximum dry density as determined by ASTM Designation D-1557. As discussed in Section 5.20, the use of crushed stone material as a subgrade stabilization layer below the structures should be avoided in areas of flowing water to mitigate potential seepage flow (i.e. piping) around structure's, unless approval for use is granted from the Project Geotechnical and Civil Engineers.

6.40 Structural Fill Placement and Compaction

The backfill material adjacent to the bridge structure and behind the wing-walls should conform to the grain size distribution requirements for Gravel Borrow Fill. These materials should be compacted to a relative compaction of at least 95 percent of the materials maximum dry density as determined by ASTM Designation D1557.

It is recommended that Gravel Borrow Fill material, meeting the grain size distribution requirements presented in Table 1, should be used to elevate low-lying areas up to the proposed culvert and headwall footing bases. This material should be placed in 12-inch maximum loose lifts and be compacted to at least 95 percent of the materials maximum dry density as determined by ASTM Designation D-1557.

Samples of all fill material to be used for the project (on-site material and borrow material) should be submitted to the MET Laboratory prior to placement for evaluation and approval.

6.50 Foundation Design Considerations

Spread footing foundations for the bridge and wingwalls should be proportioned using the Load and Resistance Factor Design (LRFD) Method as adopted by MassDOT. The foundation stresses should be transferred to the naturally occurring soil layer or structural fill through rigid, reinforced concrete footings.

The continuous spread footings will be supported directly or indirectly upon the dense to very dense, fine to medium sand, some gravel, little silt stratum below the fill and organic layers. Test borings B-1, B-2, and B-3 indicate the layer was approximately 8.0 to 11.0-feet thick. The fill and organic layers are unsuitable for support of the culvert and wing-wall foundation system.

The Factored Ultimate Bearing Capacity and Compression (immediate and long-term) of the soil layers anticipated below footing elevation were calculated for various footing widths as follows:

Footing Width, ft.	Allowable Net Bearing Pressure, psf @ 1-inch Settlement (1)	Factored Ultimate Bearing Capacity, psf (2) ($Q_{ult} \times 0.45$)
3.0	5,000	7,000
4.0	4,000	8,100
5.0	3,300	9,100
6.0	2,900	10,200
7.0	2,600	11,300
8.0	2,300	12,400
9.0	2,100	13,500

(1) Settlement Analyses performed using Schmertmann’s Method

(2) Ultimate Bearing Capacity, Q_{ult} , Determined using Meyerhof’s Equation

Resistance Factors

We recommend Resistance Factors of 0.45 and 1.00 for the Strength Limit State and Service Limit State, respectively.

Coefficient of Friction

Spread footings will be cast directly upon a compacted Gravel Borrow Fill layer or the naturally occurring sand and gravel stratum. We recommend a coefficient of friction value of 0.43 for these conditions.

Spread Footing Embedment

Concrete footings for the bridge and wing-wall foundations should be insulated from ambient temperatures using a minimum of four (4) feet of earthen cover for frost protection. However, depth of footings must be sufficient to ensure adequate scour protection. A scour analysis is beyond the scope of our services; however, we understand scour is being evaluated by others.

6.60 Bridge Structure and Wingwall Considerations

The bridge structure will be subjected to "active" and "at rest" earth pressure conditions resulting from the backfill materials. If the vertical walls of the structure are structurally designed to resist lateral deflection, an "at rest" earth pressure diagram should be used to analyze stability of the walls. On the other hand, if some rotation or translation is permissible, the walls may be designed using an "active" earth pressure diagram.

Active Case

The active earth pressure diagram should be developed using an equivalent fluid weight, increasing linearly with depth, of 37 pounds per cubic foot per foot of wall height (i.e. 0.2827 times 130 pcf). This equivalent fluid weight assumes that the abutment walls have been backfilled using Gravel Borrow Fill with a unit weight of 130 pounds per cubic foot and meeting the grain size distribution requirements established in Table 1. This value is appropriate for a

level backfill condition. The retaining wall design should account for sloping backfill if required in the final design.

At Rest Case

The at rest earth pressure diagram should be developed using an equivalent fluid weight, increasing linearly with depth, of 55 pounds per cubic foot per foot of wall height (i.e. 0.4264 times 130 pcf). This equivalent fluid weight assumes that the abutment walls have been backfilled using Gravel Borrow Fill with a unit weight of 130 pounds per cubic foot and meeting the grain size distribution requirements established in Table 1. This value is appropriate for a level backfill condition. The retaining wall design should account for sloping backfill if required in the final design.

In addition, surcharge pressures due to traffic loading should be applied to the walls where appropriate. These uniformly distributed surcharge pressures may be resolved into a horizontal force (per linear foot of wall length), which would be applied at a depth of 1/2 the wall height below the top of the wall.

The horizontal surcharge force should be calculated using the following expression:

$$F_S = 0.283 * P * H$$

Where...

F_S = surcharge force (lbs)

P = live and dead load from the surcharge (psf)

H = height of wall (ft)

The wingwalls should achieve the following factors of safety (FOS) with regard to wall stability:

$$FOS_{\text{Overturning}} = 2.0$$

$$FOS_{\text{Sliding}} = 1.5$$

The maximum toe bearing pressure should not exceed the bearing capacity, as determined according to Section 6.50, for headwall stability analyses. Passive earth pressure contribution should be neglected unless it can be assured that scour will not be a factor adjacent to the walls.

In addition to the guidelines presented above, the bridge structure and wing-walls should be designed in accordance with AASHTO Design criteria.

6.70 Seismic Considerations

Based upon results of the test borings, the naturally occurring soil deposits below the site appear to be sufficiently dense to preclude a liquefaction event under design seismic conditions. For seismic design considerations in accordance with the MassDOT LRFD Bridge Manual-Part I January 2020 Revision, a Site Class D should be used to develop the Design Response Spectrum based upon the subsurface conditions encountered in the test borings.

7.00 FINAL DESIGN AND CONSTRUCTION MONITORING

Representative samples of all backfill materials should be submitted to Miller Engineering & Testing, Inc. for testing to establish their optimum water contents and maximum dry densities, and to compare their gradation characteristics with the requirements in Table 1. In this manner, compaction criteria can be developed, which will provide the materials with adequate strength and minimal distortion. Once testing is completed, Miller Engineering & Testing, Inc. can make final recommendations relative to the placement, the compaction, and the control of these fill materials.

It is recommended that a qualified Geotechnical Engineer or his/her representative be retained to provide engineering services during the excavation and foundation construction phases of the project. This will become particularly important relative to the monitoring of foundation excavations, removal and placement of unsuitable soils, subgrade stabilization, inspection of footing excavations prior to concrete placements, and the placement of engineered fill materials. This would allow for design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. The adequacy of fill compaction should be determined by field density testing as fill is placed and compacted.

Lastly, it is recommended that this firm be retained to assist in preparation earthwork specifications and to review final design plans. In the event that any changes in the nature, the design, or the locations of the structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of the report modified or verified in writing by Miller Engineering & Testing, Inc.

Table

TABLE 1

GRADATION SPECIFICATIONS

PERCENTAGE PASSING BY WEIGHT

SIEVE SIZE	MADOT Gravel Borrow M1.03.0, Type b
3"	100
½"	50 - 85
No. 4	40 - 75
No. 50	8 - 28
No. 200	0 - 10


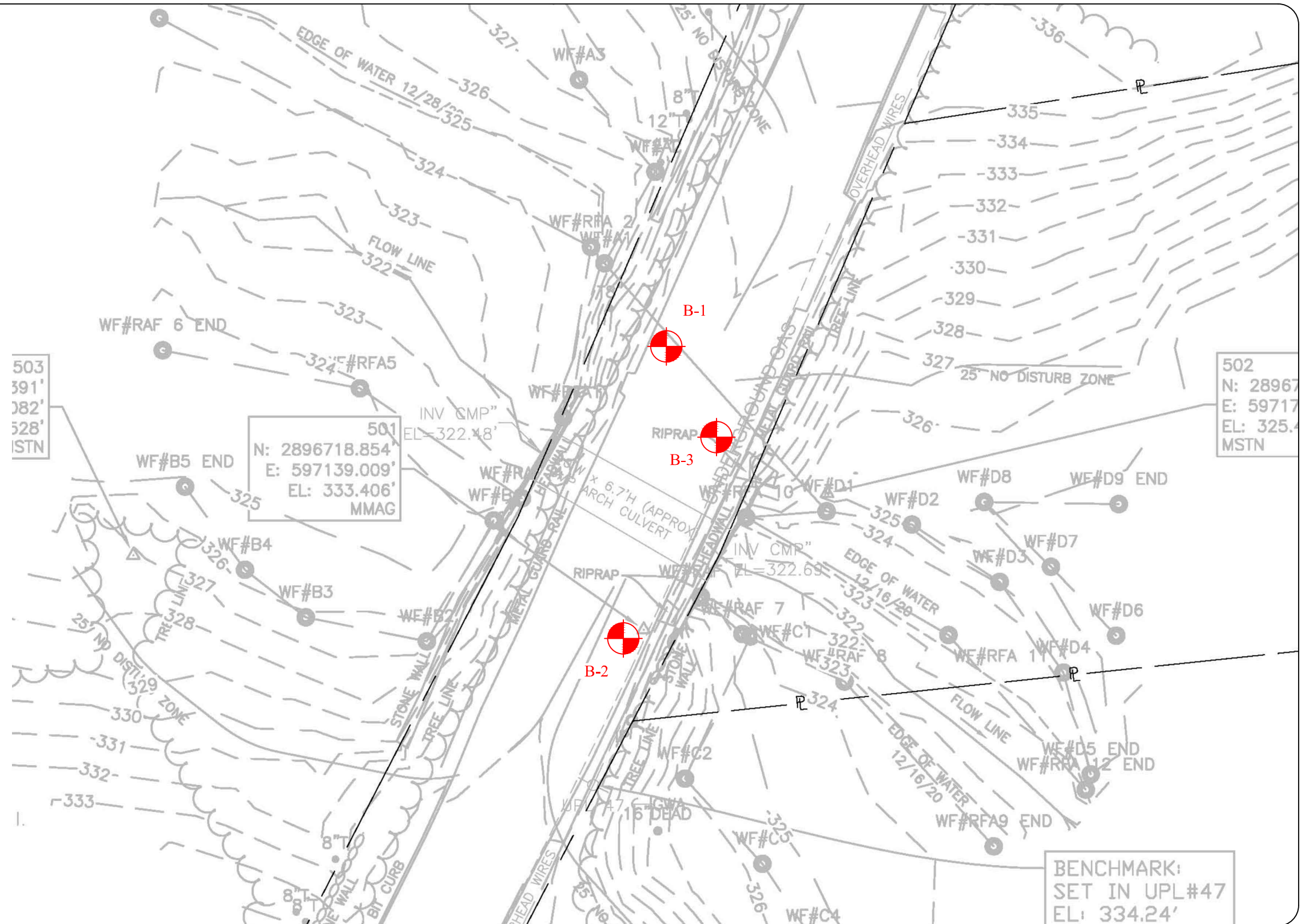
Figure

NOTES

1. This plan is a reproduction of portions of "Plan of Topographic Survey of Fitzpatrick Road, Grafton, MA", (dated January 4, 2021) by Bay Colony Group, Inc. of Foxborough, MA
2. A geotechnical engineer from Miller Engineering & Testing, Inc. inspected the test borings.
3. Test boring locations were determined by taping and pacing from known locations.

KEY

 Approximate Test Boring Location



MILLER ENGINEERING & TESTING, INC.

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MANCHESTER, NEW HAMPSHIRE 03108
TEL (603) 668-6016 // FAX (603) 668-8641

Fitzpatrick Road - Cronin Brook
Grafton, MA
January 2021
Project No. 20.230.NH

SUBSURFACE
EXPLORATION
LOCATION PLAN

FIGURE No.
1

Attachment A

LIMITATIONS

Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the boring logs.
3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time measurements were made.

Review

4. It is recommended that this firm be retained to review final design plans and specifications. In the event that any changes in the nature, design, or location of the structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by Miller Engineering & Testing, Inc.

Construction


5. It is recommended that this firm be retained to provide soils engineering services during the excavations and foundation construction phases of the work. This is to observe compliance with the design concepts, specifications, or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

Use of Report

6. This report has been prepared for the exclusive use of **TEC, Inc.** for the proposed **Fitzpatrick Road Bridge Replacement Project** located in **Grafton, Massachusetts** in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
7. This soil and foundation engineering report has been prepared for this project by Miller Engineering & Testing, Inc. This report was completed for design purposes and may be limited in its scope to prepare an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to design considerations only.

Attachment B

TEST BORING LOG

 MILLER ENGINEERING & TESTING, INC. 100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641	Project: <u>Fitzpatrick Rd. - Cronin Brook</u> <u>Grafton, MA</u>	Sheet <u>1</u> of <u>1</u> Boring No: <u>B-1</u> Location: <u>See Plan</u> Approx. Surface Elev: <u>333 ±</u>
	Project No: <u>20.230.NH</u> Date Start: <u>01-07-21</u> Date End: <u>01-07-21</u>	

GROUNDWATER OBSERVATIONS

	CASING	SAMPLER	Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	01-07-21	9'	13'	Upon Completion
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				


Depth/ Elev.	Cas bl/ft	SAMPLE				BLOWS				Strata Change	Sample Description	Notes
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"	18-24"			
0	333	-	0.0-0.3	4							4" Asphalt	
		S-1	0.9-2.0	13	7		3/1"	19	18		S-1: Brown, fine to coarse sand, some gravel, trace silt (FILL)	
		S-2	2.0-4.0	24	13	11	14	19	22		S-2: Brown, fine to coarse sand, some gravel, trace silt (L21011A) (FILL)	
5	328	S-3	4.0-6.0	24	7	11	15	17	20		S-3: Brown, fine to coarse sand, little gravel, little silt (FILL)	
		S-4	6.0-7.5	18	6	22	18	12			S-4: Brown, fine to coarse sand, little gravel, little silt (FILL)	
		S-4A	7.5-8.0	6	2				33		S-4A: Dark brown, fine to medium sand, some silt, trace gravel (Organic Layer)	
10	323	S-5	9.0-11.0	24	9	63	42	31	26		S-5: Brown, fine to coarse sand, some gravel, trace silt, wet	
											Auger Refusal at 13'	
											BORING TERMINATED AT 13 ft	
15	318											
20	313											
25	308											
30	303											

Driller: R. Marcoux	COHESIVE CONSISTENCY (Blows/Foot)	COHESIONLESS (Blows/Foot)	PROPORTIONS USED
Helper: J. Donahue	0-2 VERY SOFT	0-4 VERY LOOSE	TRACE: 0-10%
Inspector: T. Young	2-4 SOFT	4-10 LOOSE	LITTLE: 10-20%
	4-8 MEDIUM STIFF	10-30 MEDIUM DENSE	SOME: 20-35%
	8-15 STIFF	30-50 DENSE	AND: 35-50%
	15-30 HARD	50+ VERY DENSE	

NOTES: Auger Refusal at 13', moved 5' south. Auger refusal at 10.5'

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

 MILLER ENGINEERING & TESTING, INC. 100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641	Project: <u>Fitzpatrick Rd. - Cronin Brook</u> <u>Grafton, MA</u>	Sheet <u>1</u> of <u>1</u> Boring No: <u>B-2</u>
	Project No: <u>20.230.NH</u> Date Start: <u>01-07-21</u> Date End: <u>01-07-21</u>	Location: <u>See Plan</u> Approx. Surface Elev: <u>333 ±</u>

GROUNDWATER OBSERVATIONS

	CASING	SAMPLER	Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	01-07-21	11'	26'	Upon Completion
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				


Depth/ Elev.	Cas bl/ft	SAMPLE				BLOWS				Strata Change	Sample Description	Notes
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"	18-24"			
0	333	-	0.0-0.3	4							4" Asphalt	
		S-1	0.5-2.0	18	10		21	29	28		S-1: Brown, fine to coarse sand, some gravel, trace silt (FILL)	
		S-2	2.0-4.0	24	9	28	28	55	35		S-2: Brown, fine to coarse sand, some gravel, little silt (FILL)	
5	328	S-3	4.0-6.0	24	9	12	13	9	8		S-3: Brown, fine to coarse sand, some gravel, trace silt (FILL)	
		S-4	6.0-8.0	24	4	7	9	10	10		S-4: Brown, fine to coarse sand, some gravel, trace silt (FILL)	
10	323	S-5	9.0-11.0	24	12	14	16	12	18		S-5: Dark brown, fine sand and organic silt, trace gravel (Organic Layer)	
		S-6	11.0-13.0	24	13	31	23	18	14		S-6: Gray, fine to coarse sand, some gravel, little silt, wet (L21011B)	
15	318	S-7	14.0-16.0	24	7	5	21	13	11		S-7: Brown, fine to coarse sand, some subangular gravel, trace silt, wet	
20	313	S-8	19.0-21.0	24	4	11	22	23	22		S-8: Brown, fine to medium sand, some gravel, some silt, wet	(1)
25	308	S-9	24.0-26.0	24	5	15	13	12	12		S-9: Brown, silt, some fine sand, wet	(2)
											BORING TERMINATED AT 26 ft	
30	303											

Driller: R. Marcoux Helper: J. Donahue Inspector: T. Young	COHESIVE CONSISTENCY (Blows/Foot) 0-2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF 8-15 STIFF 15-30 HARD	COHESIONLESS (Blows/Foot) 0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE 30-50 DENSE 50+ VERY DENSE	PROPORTIONS USED TRACE: 0-10% LITTLE: 10-20% SOME: 20-35% AND: 35-50%
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NOTES: (1) Rock in tip of split-spoon.
 (2) 5' of blow-in, in augers.

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

TEST BORING LOG

 MILLER ENGINEERING & TESTING, INC.	Project: Fitzpatrick Rd. - Cronin Brook Grafton, MA	Sheet <u>1</u> of <u>1</u> Boring No: <u>B-3</u>
	Project No: 20.230.NH Date Start: 01-07-21 Date End: 01-07-21	Location: See Plan Approx. Surface Elev: 333 ±
100 Sheffield Road - Manchester, NH 03103 Ph. (603) 668-6016 - Fax: (603) 668-8641		

GROUNDWATER OBSERVATIONS

	CASING	SAMPLER	Date	Depth	Casing At	Stabilization Period
Type	HSA	SS	01-07-21	11'	18.5'	Upon Completion
Size	2-1/4" ID	1-3/8" ID				
Hammer		140 lbs.				
Fall		30"				

Depth/ Elev.	Cas bl/ft	SAMPLE				BLOWS				Strata Change	Sample Description	Notes
		Sample No.	Depth Range	Pen.	Rec.	0-6"	6-12"	12-18"	18-24"			
0 333		-	0.0-0.3	4							4" Asphalt	
		-	0.3-9.0	104							-: Auger Cuttings - brown, fine to coarse sand, some gravel, little silt (FILL)	
5 328												
10 323		S-1	9.0-11.0	24	9	2	3	2	3		S-1: Black organic silt, trace fine to medium sand, trace gravel (Organic Layer)	
15 318		S-2	11.0-13.0	24	4	18	17	19	30		S-2: Gray, fine to coarse sand, some gravel, little silt, wet	
		S-3	14.0-16.0	24	6	11	22	32	33		S-3: Gray, fine to coarse sand, some gravel, little silt, wet	
20 313											Auger Refusal at 18.5'	
											BORING TERMINATED AT 18.5 ft	
25 308												
30 303												

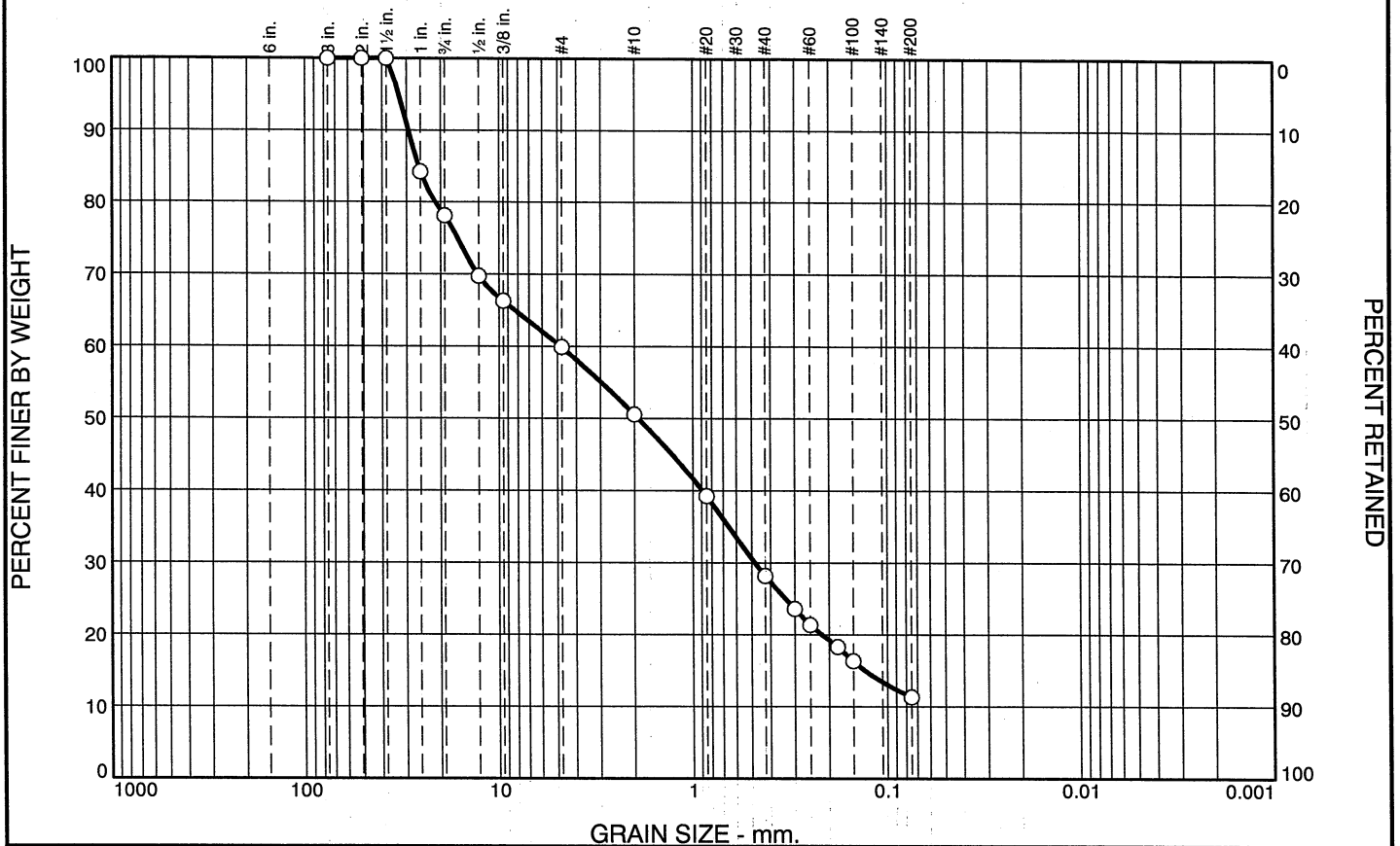
Driller: R. Marcoux Helper: J. Donahue Inspector: T. Young	COHESIVE CONSISTENCY (Blows/Foot) 0-2 VERY SOFT 2-4 SOFT 4-8 MEDIUM STIFF 8-15 STIFF 15-30 HARD	COHESIONLESS (Blows/Foot) 0-4 VERY LOOSE 4-10 LOOSE 10-30 MEDIUM DENSE 30-50 DENSE 50+ VERY DENSE	PROPORTIONS USED TRACE: 0-10% LITTLE: 10-20% SOME: 20-35% AND: 35-50%
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NOTES:

REMARKS: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES. TRANSITION MAY BE GRADUAL. WATER LEVEL READINGS HAVE BEEN MADE IN THE DRILL HOLES AT TIMES AND UNDER CONDITIONS STATED ON THE BORING LOGS. FLUCTUATIONS IN THE LEVEL OF THE GROUNDWATER MAY OCCUR DUE TO OTHER FACTORS THAN THOSE PRESENT AT THE TIME MEASUREMENTS WERE MADE.

Attachment C

GRAINSIZE DISTRIBUTION REPORT - AGGREGATE GRADING



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	22	18	9	23	17	11	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100		
2"	100		
1.5"	100		
1"	84		
.75"	78		
.5"	70		
.375"	66		
#4	60		
#10	51		
#20	39		
#40	28		
#50	24		
#60	21		
#80	18		
#100	16		
#200	11		

Material Description

Brown, fine to coarse sand, some gravel, trace silt (L21011A) (FILL)

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 29.2288 D₈₅= 25.9611 D₆₀= 4.8086
D₅₀= 1.9049 D₃₀= 0.4793 D₁₅= 0.1301
D₁₀= C_u= C_c=

Classification


USCS= AASHTO=

Remarks

BORING JAR SMPLE.

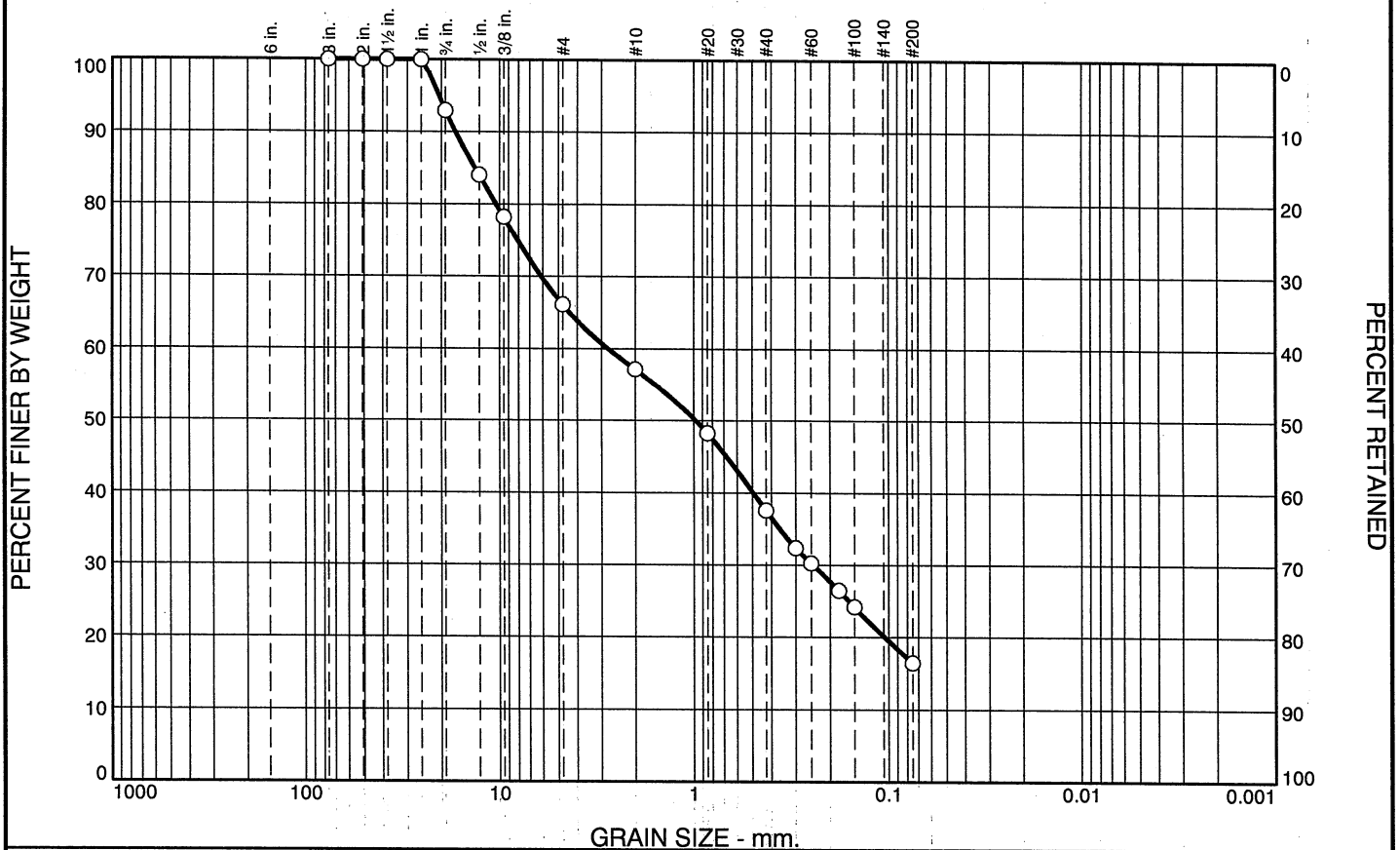
* (no specification provided)

Source of Sample: B-1 Depth: 2 Date: 1-14-21
Sample Number: S-2

 MILLER ENGINEERING & TESTING, INC.	Client: TEC Project: Fitzpatrick Rd. - Cronin Brook	Project No: 20.230.NH Figure L21011A
--	--	---

Tested By: DM

GRAINSIZE DISTRIBUTION REPORT - AGGREGATE GRADING



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	7	27	9	19	22	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100		
2"	100		
1.5"	100		
1"	100		
.75"	93		
.5"	84		
.375"	78		
#4	66		
#10	57		
#20	48		
#40	38		
#50	32		
#60	30		
#80	27		
#100	24		
#200	16		

Material Description

Gray, fine to coarse sand, some gravel, little silt, wet (L21011B)

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 16.9203 D₈₅= 13.3236 D₆₀= 2.7609
D₅₀= 0.9729 D₃₀= 0.2442 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

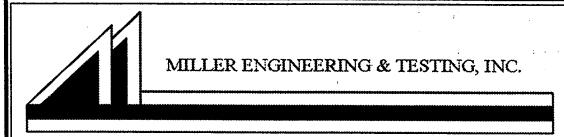
Remarks

BORING JAR SAMPLE.

* (no specification provided)

Source of Sample: B-2 Depth: 11
Sample Number: S-6

Date: 1-14-21



Client: TEC
Project: Fitzpatrick Rd. - Cronin Brook

Project No: 20.230.NH

Figure L21011B

Tested By: DM

Bay Colony Group, Inc.

MEMORANDUM

Professional Civil Engineers & Land Surveyors

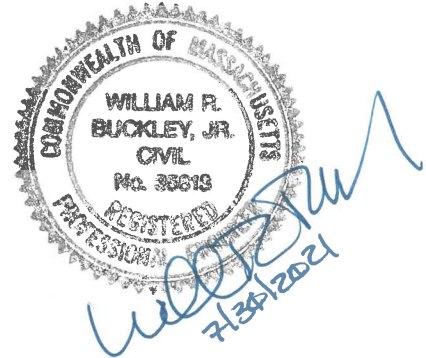
Four School Street
P.O. Box 9136
Foxborough, MA 02035
(508)543-3939
(508)543-8866 fax

July 29, 2021

To: Jody P. Trunfo, P.E., Principal, The Engineering Corp.

From: William R. Buckley, Jr., P.E.

RE: Cronin Brook, Fitzpatrick Road Grafton, MA



1.0 Introduction

1.1 Purpose

The purpose of this technical report is to present the results of an analysis conducted for the culvert conveying Cronin Brook under Fitzpatrick Road in Grafton, MA to determine the mobility and stability of the streambed and rip-rap. It also includes a discussion regarding several of the items listed in the Wetlands Protection Act -310 CMR 10.54(8). The report builds on and should be read in conjunction with the previous report issued by this office dated January 28, 2021.

1.2 Scope

The scope of work for this investigation consisted of a review of the physical data collected and the hydraulic data prepared for the project site used for the preliminary analysis. The plans prepared by TEC dated March 26, 2021 were used to determine the proposed conditions. A streambed mobility/stability analysis was conducted, the purpose of which is to evaluate whether the stream-simulation design bed would have similar mobility/stability as the reference-reach channel and, if necessary, adjust the stream-simulation design so that it has similar mobility and stability as the reference-reach channel. A rip-rap sizing analysis was performed in order to determine the rock size necessary to maintain stability during high-bed design flow. Data collected and hydraulic model computer outputs are presented in the appendices of this report. A narrative discussion of the problem statement, engineering methods, as well as results and conclusions of the hydraulic study follow.

1.3 Executive Summary

The Town of Grafton proposes to replace the existing culvert conveying Cronin Brook under Fitzpatrick Road, which is classified as an Urban Local Street, with a single open-bottom precast

concrete box culvert structure. The site lies within a National Flood Insurance Program (NFIP) Special Flood Hazard Area (SFHA) as shown on the currently effective National Flood Insurance Rate Map (FIRM) dated 7/4/2011.

2.0 Project Description

2.1 Existing Conditions

The subject culvert is located in the Town of Grafton, MA substantially within the Fitzpatrick Road layout about 500' south of Millbury Street. The Massachusetts State Plane Coordinates (NAD83-feet) are N 2896,743/E 597,134. The MassDOT culvert designation is G08061-6Q4-MUN-BRI and it was constructed in 1960. The culvert consists of a single 10' W x 6.7'H corrugated metal arch. The stream flows from west to east through the culvert and eventually to the Blackstone River which is about 1.25 mile south of the site. The source of the stream is largely undeveloped land to the north and west of the site and its drainage basin is about 2.1 square miles.

There is no evidence of scouring on the upstream end of the culvert. About 20' downstream of the culvert outlet there is a scour hole in the stream channel. The culvert slope is flat under the roadway and shows signs of rust flaking and water penetration. The headwalls are fieldstone and are missing pointing throughout as well as some large stones. There are areas of collapse and erosion around the wingwalls and the guardrails on the road are rotting.

The channel upstream and downstream from the road crossing has a plane-bed morphology where flow is relatively uniform or gradually varied between cross sections. The channel gradient is approximately 0.001 in the area of the crossing and the channel bed is composed primarily of gravel-sized sediment. The channel is moderately confined with the greater channel confinement located downstream from the crossing.

The site lies within a FEMA NFIP Regulatory Floodway as delineated on FIRM Flood Insurance Rate Map 25027C0829E dated July 4, 2011. This condition will require compliance with 44 CFR 60.3(d)(3) which requires that the proposed conditions for the 1% storm event must indicate a "no-rise" impact at every model cross section in the site location.

2.2 Proposed Action

The principal project action is to upgrade the existing culvert in order to bring it into maximum feasible compliance with the MassDOT LRFD Bridge Manual and with the Massachusetts Stream Crossing Standard (Reference 6). The horizontal and vertical alignment for the new culvert will remain approximately the same as the existing culvert. The proposed design is a 12' wide by 6' high, clear span, precast concrete, open bottom culvert. The design will pass the 10-year storm in accordance with the MassDOT LRFD Bridge Manual Table 1.3.4-1 with no overtopping of the roadway and adequate freeboard.

3.0 Engineering Methods

3.1 Streambed Mobility/Stability Analysis

The open bottom culvert will reestablish geomorphic continuity between the upstream and downstream channels. In order to ensure that the streambed in the open bottom culvert retains stability similar to the existing streambed, a stream simulation analysis was conducted. An upstream reference-reach (X-Section 1+70 – 80' west of culvert) was chosen as the reference reach for the project. The channel geometry and channel-bed sediment characteristics were used to develop a preliminary design for the stream-simulation channel bed. The replacement structure is a 12' x 6' open bottom concrete box culvert and a design slope of 0.005 was chosen, which is steeper than the reference-reach channel slope of 0.0024. The difference in slope will compensate for the difference in the channel width of flow which impacts the hydraulic radius between the reference-reach and the stream-simulation channel.

The modified Shears Equation that calculates critical shear stress is applicable to this site based on channel characteristics, which are:

- $D_{84}/D_{50} = 5.4$, which is less than 30
- Slope = 0.0024, which is less than 0.05
- Channel unit is plane bed channel
- D_{84} particle sizes (31.8856 mm) are between 10 and 250 mm.

The HEC-RAS model was used to develop the hydraulic data during the initial project and is used for this analysis. Using geomorphic indicators, the 10-year storm event was determined to be the approximate bankfull discharge event and selected hydraulic parameters from the model, including the 10-year, 25-year, 50-year, and 100-year storm events, were used in the mobility/stability analyses (Appendix A).

The analysis seeks to ensure that the design of the new channel bed retains similar characteristics to the reference-reach channel regarding the point where sediment is mobilized within the stream bed. This will enable the streambed to replenish itself as sediment moves and the streambed will retain similar characteristics upstream and downstream of the crossing. The D_{84} and D_{95} particle sizes were modeled since the design specifies using materials from the site. The analysis determined that the same flows (10-yr and above) should mobilize the D_{84} and D_{95} particle sizes in the reference-reach channel and stream-simulation channel, thus meeting the design criteria. To achieve similar D_{84} and D_{95} particle mobility in the stream-simulation design channel at the same flow as the reference-reach channel, the slope of the stream simulation channel was increased to 0.005. The contractor will be required to furnish sieve analysis and compaction tests of the material placed in the new channel to ensure that it meets the gradation characteristics of the reference-reach channel. The Modified Critical Shear Stress worksheets for the reference-reach channel and the design channel as well as a Summary Table are in Appendix B.

3.2 Rip-Rap Design

The proposed design also includes the installation of rip-rap revetment along the inlet and outlet abutments in order to prevent scour, which in turn could cause the stream bank and

bottom to move. A rip-rap design system developed by West Consultants, Inc. as a consultant to USACE that develops sizing guidance was used to analyze the stability of the rip-rap. Two methods were used to develop the rip-rap design, USACE Method and the HEC-11 method.

The hydraulic data developed using HEC-RAS and the information from the TEC drawings were used in the design. The analysis included the 10-yr, and 100-yr storm events and both methods were run. The HEC Method that uses FHWA Gradation resulted in the more conservative result and that is the recommended design. The design requires the use of angular rocks and wedges which lock together and resist rolling and sliding. It is also important that the rip-rap be supported or buttressed by buried footer rocks of similar size with particular attention paid to individual key pieces. Unless supported by similar size rocks, individual large rocks may move when the smaller bed mixture around them is scoured. The worksheets are included in Appendix C and Table 1 is a summary of the recommended gradation.

Table 1 – Rip-Rap Design Results

	Unit Weight of Stone (lb/ft ³)	Safety Factor	Layer Thickness (ft)	D100		D50		D10	
				Rock Size (ft)	Rock Weight (lbs)	Rock Size (ft)	Rock Weight (lbs)	Rock Size (ft)	Rock Weight (lbs)
10-year	175	1.5	1.9	1.3	200	0.95	75	0.4	5
25-year	175	1.5	1.9	1.3	200	0.95	75	0.4	5
100-year	175	1.5	1.9	1.3	200	0.95	75	0.4	5

3.3 Storm Flow Conveyance and Downstream Flooding

As discussed, the existing culvert is in deteriorated condition which results in extra maintenance from the municipal DPW. The roadway is classified as an Urban Local Street. For that classification the MassDOT LRFD Bridge Manual requires that the new structure be able to pass the 10-year storm event. The hydraulic analysis found that the existing culvert was adequate for that storm and the proposed design will also convey all events with no weir flow (Table 2 & Appendix A)

Table 2 – Existing and Proposed Flow Conditions

Recurrence Interval	Discharge (cfs)	Existing Conditions		Proposed Conditions	
		Culvert Flow (cfs)	Weir Flow (cfs)	Culvert Flow (cfs)	Weir Flow (cfs)
10	96	96	0	96	0
25	116	116	0	116	0
50	142	142	0	142	0
100	165	165	0	165	0

The hydraulic analysis was conducted using the US Army Corps of Engineer (USACOE), Hydrologic Engineering Center, HEC-RAS River Analysis System. HEC-RAS is capable of

calculating steady flow water surface profile elevations. The analysis found that the proposed design would not result in an increase in water surface elevation downstream of the crossing and a decrease in the water surface elevation upstream of the crossing, which would be as expected since a higher percentage of the flow is being conveyed through the culvert due to the increased size. Therefore, no increase in downstream flooding is anticipated for this design (Table 3 and Appendix A).

Table 3 – Surface Water Profile – 100-year

Cross Section Station	Water Surface Elevation - Existing (ft)	Water Surface Elevation - Proposed (ft)
0+0	324.8	324.8
1+70	326.6	326.1

3.4 Erosion and Head-Cutting

Increases in erosion and head-cutting are generally associated with the changes in the character of the riverine system, usually involving changes in slope and velocity. The installation of a barrier, such as a culvert or bridge, within the natural channel creates a condition where the bed becomes mobile due to the changes in velocity and character of flow. Bed stability is generally a prerequisite for bank stability since eroding channels impact bank heights and angles. Boundary shear stress is a more appropriate measure than just velocity of the forces that drive erosion since it takes into account the characteristics of the morphology and stream geometry. The boundary shear stresses for the project have been calculated for a reference-reach upstream of the crossing and that data was used in the design on the proposed open-bottom box culvert to ensure that the upstream and downstream channels regain geomorphic continuity through the new culvert. The new design will be constructed such that the soils within the culvert will be stable or mobile for the same design storm events as discussed in Section 3.1. This will ensure that the stability of the channel is maintained throughout and the erosion component of the stream will not be adversely impacted by the new culvert.

4.0 Conclusions and Recommendations

4.1 Conclusions

1. Simulations performed using the modified Shears Equation to determine critical shear stress indicate that the project can be constructed such that the streambed stability within the culvert will be the same as the reference-reach during the design flows. The stability of the streambed implies that there will not be increased erosion or head-cutting due to the construction of the project.
2. Simulations performed using the USACE Method and HEC-11 Method indicate that the proposed rip-rap embankment reinforcement will remain stable during the design flows.

3. Simulations performed using HEC-RAS to determine hydraulic capacity of the proposed design indicate that the culvert can convey the 10-year design flow with no weir flow and that the surface water levels upstream and downstream of the crossing are at or below the existing condition and that an increase in downstream flooding is not anticipated.

4.2 Recommendations

1. Construction notes should be added to the plans or to the specifications that require the natural substrate materials used within the culvert meet the gradation standard that matches the existing streambed of $D_{85} - 31.8856$ mm and $D_{15} - 0.3715$ mm (Appendix D).
2. Construction notes should be added to the plans or to the specifications that require the rip-rap used to be angular rocks and wedges of the specified weight and size. They must be locked together to resist rolling and sliding and that the rip-rap be supported or buttressed by buried footer rocks of similar size with particular attention paid to individual key pieces.
3. Culvert slope shall be 0.005.

Appendices

- A – HEC-RAS Data
- B – Critical Shear Street Worksheets
- C - Rip-Rap Worksheets
- D – Material Test Report

Appendix A – HEC-RAS Data

HEC-RAS Plan: Existing Conditions River: Cronin Brook Reach: North Crossing

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
North Crossing	170	10-year	96	322.50	325.61		325.62	0.000310	0.74	142	86	0.09
North Crossing	170	25-year	116	322.50	325.90		325.91	0.000290	0.78	168	95	0.09
North Crossing	170	50-year	142	322.50	326.27		326.28	0.000266	0.81	205	106	0.08
North Crossing	170	100-year	165	322.50	326.58		326.59	0.000244	0.84	239	114	0.08
North Crossing	95	10-year	96	322.70	325.49	324.15	325.56	0.002730	2.23	45	43	0.26
North Crossing	95	25-year	116	322.70	325.77	324.27	325.86	0.002683	2.39	51	49	0.26
North Crossing	95	50-year	142	322.70	326.12	324.42	326.22	0.002605	2.56	58	55	0.26
North Crossing	95	100-year	165	322.70	326.43	324.55	326.53	0.002528	2.70	64	58	0.27
North Crossing	72		Culvert									
North Crossing	50	10-year	96	322.70	324.92	324.34	325.10	0.010752	3.34	29	22	0.48
North Crossing	50	25-year	116	322.70	325.06	324.46	325.28	0.011668	3.69	32	22	0.51
North Crossing	50	50-year	142	322.70	325.23	324.62	325.49	0.012769	4.11	35	23	0.54
North Crossing	50	100-year	165	322.70	325.35	324.75	325.66	0.013775	4.46	37	23	0.56
North Crossing	0	10-year	96	322.70	324.43	324.02	324.55	0.010203	2.97	43	51	0.46
North Crossing	0	25-year	116	322.70	324.56	324.12	324.69	0.010201	3.17	50	54	0.47
North Crossing	0	50-year	142	322.70	324.71	324.24	324.86	0.010210	3.39	58	59	0.47
North Crossing	0	100-year	165	322.70	324.84	324.33	324.99	0.010202	3.56	66	70	0.48

Plan: Existing Conditions Cronin Brook North Crossing RS: 72 Culv Group: Ex Culvert Profile: 10-year

Q Culv Group (cfs)	96.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	3.95
Q Barrel (cfs)	96.00	Culv Vel DS (ft/s)	4.88
E.G. US. (ft)	325.56	Culv Inv El Up (ft)	322.48
W.S. US. (ft)	325.49	Culv Inv El Dn (ft)	322.69
E.G. DS (ft)	325.10	Culv Frctn Ls (ft)	0.15
W.S. DS (ft)	324.92	Culv Exit Loss (ft)	0.20
Delta EG (ft)	0.46	Culv Entr Loss (ft)	0.12
Delta WS (ft)	0.56	Q Weir (cfs)	
E.G. IC (ft)	324.92	Weir Sta Lft (ft)	
E.G. OC (ft)	325.56	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	325.20	Weir Max Depth (ft)	
Culv WS Outlet (ft)	324.92	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.70	Min El Weir Flow (ft)	333.92

Plan: Existing Conditions Cronin Brook North Crossing RS: 72 Culv Group: Ex Culvert Profile: 25-year

Q Culv Group (cfs)	116.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.38
Q Barrel (cfs)	116.00	Culv Vel DS (ft/s)	5.53
E.G. US. (ft)	325.86	Culv Inv El Up (ft)	322.48
W.S. US. (ft)	325.77	Culv Inv El Dn (ft)	322.69
E.G. DS (ft)	325.28	Culv Frctn Ls (ft)	0.17
W.S. DS (ft)	325.06	Culv Exit Loss (ft)	0.26
Delta EG (ft)	0.58	Culv Entr Loss (ft)	0.15
Delta WS (ft)	0.71	Q Weir (cfs)	
E.G. IC (ft)	325.22	Weir Sta Lft (ft)	
E.G. OC (ft)	325.86	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	325.41	Weir Max Depth (ft)	
Culv WS Outlet (ft)	325.06	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.89	Min El Weir Flow (ft)	333.92

Plan: Existing Conditions Cronin Brook North Crossing RS: 72 Culv Group: Ex Culvert Profile: 50-year

Q Culv Group (cfs)	142.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.87
Q Barrel (cfs)	142.00	Culv Vel DS (ft/s)	6.30
E.G. US. (ft)	326.22	Culv Inv El Up (ft)	322.48
W.S. US. (ft)	326.12	Culv Inv El Dn (ft)	322.69
E.G. DS (ft)	325.49	Culv Frctn Ls (ft)	0.20
W.S. DS (ft)	325.23	Culv Exit Loss (ft)	0.36
Delta EG (ft)	0.74	Culv Entr Loss (ft)	0.18
Delta WS (ft)	0.90	Q Weir (cfs)	
E.G. IC (ft)	325.59	Weir Sta Lft (ft)	
E.G. OC (ft)	326.22	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	325.67	Weir Max Depth (ft)	
Culv WS Outlet (ft)	325.23	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.07	Min El Weir Flow (ft)	333.92

HEC-RAS Plan: Dev12x6v2 River: Cronin Brook Reach: North Crossing

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
North Crossing	170	10-year	96	322.50	325.32		325.33	0.000509	0.86	118	77	0.11
North Crossing	170	25-year	116	322.50	325.54		325.55	0.000510	0.93	135	84	0.11
North Crossing	170	50-year	142	322.50	325.82		325.83	0.000495	0.99	160	92	0.11
North Crossing	170	100-year	165	322.50	326.05		326.07	0.000478	1.04	182	99	0.11
North Crossing	170	500-year	400	322.50	328.25		328.27	0.000280	1.18	450	139	0.09
North Crossing	95	10-year	96	322.70	325.14	324.16	325.24	0.004469	2.51	40	35	0.32
North Crossing	95	25-year	116	322.70	325.34	324.27	325.45	0.004630	2.73	45	40	0.33
North Crossing	95	50-year	142	322.70	325.60	324.42	325.73	0.004659	2.97	51	45	0.34
North Crossing	95	100-year	165	322.70	325.83	324.54	325.97	0.004643	3.14	56	50	0.35
North Crossing	95	500-year	400	322.70	327.94	325.51	328.19	0.003628	4.15	102	70	0.34
North Crossing	72		Culvert									
North Crossing	50	10-year	96	322.70	324.93	324.34	325.09	0.010766	3.27	29	22	0.48
North Crossing	50	25-year	116	322.70	325.07	324.47	325.27	0.011597	3.61	32	22	0.50
North Crossing	50	50-year	142	322.70	325.23	324.62	325.48	0.012590	4.01	36	23	0.53
North Crossing	50	100-year	165	322.70	325.35	324.75	325.65	0.013502	4.34	39	23	0.56
North Crossing	50	500-year	400	322.70	326.14	325.79	326.97	0.024396	7.36	56	27	0.79
North Crossing	0	10-year	96	322.70	324.43	324.02	324.55	0.010203	2.97	43	51	0.46
North Crossing	0	25-year	116	322.70	324.56	324.12	324.69	0.010201	3.17	50	54	0.47
North Crossing	0	50-year	142	322.70	324.71	324.24	324.86	0.010210	3.39	58	59	0.47
North Crossing	0	100-year	165	322.70	324.84	324.33	324.99	0.010202	3.56	66	70	0.48
North Crossing	0	500-year	400	322.70	325.69	325.20	325.92	0.010203	4.67	149	111	0.51

Plan: Dev12x6v2 Cronin Brook North Crossing RS: 72 Culv Group: BoxCulv12x6 Profile: 10-year

Q Culv Group (cfs)	96.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	3.37
Q Barrel (cfs)	96.00	Culv Vel DS (ft/s)	3.18
E.G. US. (ft)	325.24	Culv Inv El Up (ft)	322.60
W.S. US. (ft)	325.14	Culv Inv El Dn (ft)	322.42
E.G. DS (ft)	325.09	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	324.93	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.14	Culv Entr Loss (ft)	0.09
Delta WS (ft)	0.21	Q Weir (cfs)	
E.G. IC (ft)	324.70	Weir Sta Lft (ft)	
E.G. OC (ft)	325.24	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	324.97	Weir Max Depth (ft)	
Culv WS Outlet (ft)	324.94	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.69	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.26	Min El Weir Flow (ft)	333.92

Plan: Dev12x6v2 Cronin Brook North Crossing RS: 72 Culv Group: BoxCulv12x6 Profile: 25-year

Q Culv Group (cfs)	116.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	3.85
Q Barrel (cfs)	116.00	Culv Vel DS (ft/s)	3.65
E.G. US. (ft)	325.46	Culv Inv El Up (ft)	322.60
W.S. US. (ft)	325.34	Culv Inv El Dn (ft)	322.42
E.G. DS (ft)	325.27	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	325.07	Culv Exit Loss (ft)	0.01
Delta EG (ft)	0.19	Culv Entr Loss (ft)	0.12
Delta WS (ft)	0.28	Q Weir (cfs)	
E.G. IC (ft)	324.99	Weir Sta Lft (ft)	
E.G. OC (ft)	325.46	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	325.11	Weir Max Depth (ft)	
Culv WS Outlet (ft)	325.07	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.90	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.43	Min El Weir Flow (ft)	333.92

Plan: Dev12x6v2 Cronin Brook North Crossing RS: 72 Culv Group: BoxCulv12x6 Profile: 50-year

Q Culv Group (cfs)	142.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.40
Q Barrel (cfs)	142.00	Culv Vel DS (ft/s)	4.21
E.G. US. (ft)	325.74	Culv Inv El Up (ft)	322.60
W.S. US. (ft)	325.60	Culv Inv El Dn (ft)	322.42
E.G. DS (ft)	325.48	Culv Frctn Ls (ft)	0.08
W.S. DS (ft)	325.23	Culv Exit Loss (ft)	0.03
Delta EG (ft)	0.26	Culv Entr Loss (ft)	0.15
Delta WS (ft)	0.38	Q Weir (cfs)	
E.G. IC (ft)	325.35	Weir Sta Lft (ft)	
E.G. OC (ft)	325.74	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	325.29	Weir Max Depth (ft)	
Culv WS Outlet (ft)	325.23	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.16	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.63	Min El Weir Flow (ft)	333.92

Appendix B – Critical Shear Street Worksheets

**Summary of Flow Hydraulics and Particle Mobility/Stability
for Reference-Reach Channel and Design Channel**

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226

Reference Reach Channel

Hydraulics						Particle Mobility/Stability					
Recurrence Interval	Discharge (cfs)	Channel Slope	Energy Slope	Flow Width (ft)	Hydraulic Radius (ft)	Boundary Shear Stress (lb/ft ²)	D ₅₀ (ft)	D ₈₄ (ft)	Shields Entrainment for D ₅₀	Average Boundary Shear Stress (lb/ft ²)	D ₈₄ Particle Mobile
10	96	0.0024	0.0003	86	2.21	0.33	0.019289	0.104612	0.047	0.15	yes
25	116	0.0024	0.0003	95	2.5	0.37	0.019289	0.104612	0.047	0.15	yes
50	142	0.0024	0.0003	106	2.86	0.43	0.019289	0.104612	0.047	0.15	yes
100	165	0.0024	0.0002	114	3.17	0.47	0.019289	0.104612	0.047	0.15	yes

Design Channel

Hydraulics						Particle Mobility/Stability					
Recurrence Interval	Discharge (cfs)	Channel Slope	Energy Slope	Flow Width (ft)	Hydraulic Radius (ft)	Boundary Shear Stress (lb/ft ²)	D ₅₀ (ft)	D ₈₄ (ft)	Shields Entrainment for D ₅₀	Average Boundary Shear Stress (lb/ft ²)	D ₈₄ Particle Mobile
10	96	0.0050	0.0041	8	1.49	0.46	0.019289	0.104612	0.047	0.15	yes
25	116	0.0050	0.0052	8	1.61	0.50	0.019289	0.104612	0.047	0.15	yes
50	142	0.0050	0.0066	8	1.79	0.55	0.019289	0.104612	0.047	0.15	yes
100	165	0.0050	0.0075	8	1.89	0.59	0.019289	0.104612	0.047	0.15	yes

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Holden, MA
Project Job Number:	20-0226
Freq Event/Ref Reach:	10-year/Station 1+70

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	2.21	ft
S =	0.0024	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.33 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.33 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.0024, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60.0 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Holden, MA
Project Job Number:	20-0226
Freq Event/Ref Reach:	25-year/Station 1+70

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	2.50	ft
S =	0.0024	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma R S = 0.37 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.37 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.0024, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60.0 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Holden, MA
Project Job Number:	20-0226
Freq Event/Ref Reach:	50-year/Station 1+70

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	2.86	ft
S =	0.0024	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.43 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.43 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.0024, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60.0 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Holden, MA
Project Job Number:	20-0226
Freq Event/Ref Reach:	100-year/Station 1+70

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

$D_{50} =$	0.019289	ft
$D_{84} =$	0.104612	ft
$D_{95} =$	0.196850	ft
$\tau_{50} =$	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

$\gamma =$	62.4	lb/ft ³
R =	3.17	ft
S =	0.0024	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma R S = 0.47 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.43 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.0024, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60.0 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226
Frequency Event/Location:	10-year/Culvert

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	1.49	ft
S =	0.0050	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.46 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.46 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.005, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226
Frequency Event/Location:	25-year/Culvert

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	1.61	ft
S =	0.0050	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.50 \text{ lb/ft}^2$$

The D_{84} particles and the D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.50 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.005, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226
Frequency Event/Location:	50-year/Culvert

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	1.76	ft
S =	0.0050	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.55 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.55 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.005, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226
Frequency Event/Location:	100-year/Culvert

Given

D_{50} = Particle size in a mixture of which 50% are smaller, ft

D_{84} = Particle size in a mixture of which 84% are smaller, ft

D_{95} = Particle size in a mixture of which 95% are smaller, ft

τ_{50} = Shield's parameter for D_{50} particle size

Data Input

D_{50} =	0.019289	ft
D_{84} =	0.104612	ft
D_{95} =	0.196850	ft
τ_{50} =	0.047	

Critical Shear Stress

$\tau_{84} = 102.6 \tau_{50} D_{84}^{0.3} D_{50}^{0.7} =$	0.15	lb/ft ²
$\tau_{95} = 102.6 \tau_{50} D_{95}^{0.3} D_{50}^{0.7} =$	0.19	lb/ft ²

τ_{ci} = critical average boundary shear stress at which the sediment particle begins to move (lb/ft²)

Given

τ = Average boundary shear stress exerted by flowing water on its boundary (lb/ft²)

γ = specific weight of water (62.4 lb/ft³)

R = hydraulic radius (ft)

S = bed slope (ft/ft)

Data Input

γ =	62.4	lb/ft ³
R =	1.89	ft
S =	0.0050	ft/ft

Average Boundary Shear Stress

$$\tau = \gamma RS = 0.59 \text{ lb/ft}^2$$

The D_{84} and D_{95} particles are mobile at the design storm event since τ_{84} (0.15 lb/ft²) and τ_{95} (0.19 lb/ft²) are less than the average boundary shear stress τ (0.59 lb/ft²).

How well does the modified critical shear stress equation apply here?

$D_{84}/D_{50} = 5.4$ & $D_{95}/D_{50} = 10.2$, which are much less than 30

Slope = 0.005, which is less than 0.05

Channel unit is a plane bed channel

D_{84} (31.89 mm) and D_{95} (60 mm) particle sizes are between 10 and 250 mm.

Conclusion: Meets all criteria for use of equation (Komar & Carling)

Appendix C – Rip-Rap Worksheets

Project Name:	Cronin Brook
Project Location:	Fitzpatrick Road Grafton, MA
Project Job Number:	20-0226

USACE Method (Gradations from COE ETL 1110-2-120)

	Unit Weight of Stone (lb/ft ³)	Safety Factor	Layer Thickness (ft)	D30 (ft)	D90 (Ft)	W100			W50			W15		
						Min (lbs)	Max (lbs)	Min (lbs)	Max (lbs)	Min (lbs)	Max (lbs)	Min (lbs)	Max (lbs)	
10-year	175	1.5	0.75	0.37	0.53	15	39	8	11	2	2	2	6	
25-year	175	1.5	0.75	0.37	0.53	15	39	8	11	2	2	2	6	
100-year	175	1.5	0.75	0.37	0.53	15	39	8	11	2	2	2	6	

HEC Method (FHWA Gradation)

	Unit Weight of Stone (lb/ft ³)	Safety Factor	Layer Thickness (ft)	D100			D50			D10		
				Rock Size (ft)	Rock Weight (lbs)	Rock	Rock Size (ft)	Rock Weight (lbs)	Rock	Rock Size (ft)	Rock Weight (lbs)	Rock
10-year	175	1.5	1.9	1.3	200	0.95	0.4	0.4	5			
25-year	175	1.5	1.9	1.3	200	0.95	0.4	0.4	5			
100-year	175	1.5	1.9	1.3	200	0.95	0.4	0.4	5			

Date: 07/30/2021 Time: 11:27

```
*          RIPRAP DESIGN SYSTEM (RDS)          *
*              BY              *
*          WEST Consultants, Inc.          *
*              *              *
*              *              *
* Version 3.0              March, 2005 *
*              *              *
*              *              *
* COPYRIGHT (c) 2005          *
* WEST CONSULTANTS, INC.          *
* 16870 WEST BERNARDO DRIVE          PH: 858-487-9378 *
* SUITE 340              FAX:858-487-9448 *
* SAN DIEGO, CA 92127          WEB:WWW.WESTCONSULTANTS.COM *
*****
```

Project: 20-0226
Description: 10-year

_____ USACE Method _____

Input Parameters:

Velocity Type	Local
Channel Shape	N/A
Channel Type	N/A
Bend Angle (deg)	N/A
Local Channel Velocity	3.37 ft/s
Bottom width	N/A
Bend Radius	N/A
Top Width	N/A
Unit Weight of Stone	175. lbs/cu ft
Riprap Layer Thickness	1.00
Local Flow Depth	2.54 ft
Cotangent of Side Slope	2.00
Safety Factor	1.5
Riprap Placement	Channel Bank
Rock Type	Angular

Output Results:

Computed D30	0.05 ft
Side Slope Correction Factor	1.18
Correction for Layer Thickness	1.00
Correction for Secondary Currents	1.00

*** Using Gradations from COE ETL 1110-2-120 ***

Specific Weight 175.0 lbs/cu ft
 Layer Thickness 0.750 ft
 Selected Minimum D30 0.37 ft
 Selected Minimum D90 0.53 ft

Percent Lighter by Weight	Stone Weight, lbs	
	Minimum	Maximum
W100	15.	39.
W50	8.	11.
W15	2.	6.

_____ HEC-11 Method _____

Input Parameters:

Average Channel Velocity 3.37 ft/s
 Average Flow Depth 2.54 ft
 Unit Weight of Stone 175. lbs/cu ft
 Cotangent of Side Slope 2.00
 Material Angle of Repose 33.00 deg.
 Riprap Placement Channel Bank
 Safety Factor 1.5

Output Results:

Computed D50 0.07 ft

** FHWA Gradation**

Gradation Class Facing
 Layer Thickness 1.90 ft

Percent Smaller by Size	Rock Size, ft	Rock Weight, lbs
D100	1.30	200.
D50	0.95	75.
D10	0.40	5.

Date: 07/30/2021 Time: 11:29

```
*          RIPRAP DESIGN SYSTEM (RDS)          *
*              BY              *
*          WEST Consultants, Inc.          *
*              *              *
*              *              *
* Version 3.0              March, 2005 *
*              *              *
*              *              *
* COPYRIGHT (c) 2005          *
* WEST CONSULTANTS, INC.          *
* 16870 WEST BERNARDO DRIVE          PH: 858-487-9378 *
* SUITE 340              FAX:858-487-9448 *
* SAN DIEGO, CA 92127          WEB:WWW.WESTCONSULTANTS.COM *
*****
```

Project: 20-0226
Description: 25-year

_____ USACE Method _____

Input Parameters:

Velocity Type	Local
Channel Shape	N/A
Channel Type	N/A
Bend Angle (deg)	N/A
Local Channel Velocity	3.85 ft/s
Bottom width	N/A
Bend Radius	N/A
Top Width	N/A
Unit Weight of Stone	175. lbs/cu ft
Riprap Layer Thickness	1.00
Local Flow Depth	2.74 ft
Cotangent of Side Slope	2.00
Safety Factor	1.5
Riprap Placement	Channel Bank
Rock Type	Angular

Output Results:

Computed D30	0.07 ft
Side Slope Correction Factor	1.18
Correction for Layer Thickness	1.00
Correction for Secondary Currents	1.00

*** Using Gradations from COE ETL 1110-2-120 ***

Specific Weight 175.0 lbs/cu ft
 Layer Thickness 0.750 ft
 Selected Minimum D30 0.37 ft
 Selected Minimum D90 0.53 ft

Percent Lighter by Weight	Stone Weight, lbs	
	Minimum	Maximum
W100	15.	39.
W50	8.	11.
W15	2.	6.

_____ HEC-11 Method _____

Input Parameters:

Average Channel Velocity 3.85 ft/s
 Average Flow Depth 2.74 ft
 Unit Weight of Stone 175. lbs/cu ft
 Cotangent of Side Slope 2.00
 Material Angle of Repose 33.00 deg.
 Riprap Placement Channel Bank
 Safety Factor 1.5

Output Results:

Computed D50 0.10 ft

** FHWA Gradation**

Gradation Class Facing
 Layer Thickness 1.90 ft

Percent Smaller by Size	Rock Size, ft	Rock Weight, lbs
D100	1.30	200.
D50	0.95	75.
D10	0.40	5.

Date: 07/30/2021 Time: 11:32

```
*          RIPRAP DESIGN SYSTEM (RDS)          *
*              BY              *
*          WEST Consultants, Inc.          *
*              *              *
*              *              *
* Version 3.0              March, 2005 *
*              *              *
*              *              *
* COPYRIGHT (c) 2005          *
* WEST CONSULTANTS, INC.          *
* 16870 WEST BERNARDO DRIVE          PH: 858-487-9378 *
* SUITE 340              FAX:858-487-9448 *
* SAN DIEGO, CA 92127          WEB:WWW.WESTCONSULTANTS.COM *
*****
```

Project: 20-0226
Description: 100-year

_____ USACE Method _____

Input Parameters:

Velocity Type	Local
Channel Shape	N/A
Channel Type	N/A
Bend Angle (deg)	N/A
Local Channel Velocity	4.87 ft/s
Bottom width	N/A
Bend Radius	N/A
Top Width	N/A
Unit Weight of Stone	175. lbs/cu ft
Riprap Layer Thickness	1.00
Local Flow Depth	3.23 ft
Cotangent of Side Slope	2.00
Safety Factor	1.5
Riprap Placement	Channel Bank
Rock Type	Angular

Output Results:

Computed D30	0.13 ft
Side Slope Correction Factor	1.18
Correction for Layer Thickness	1.00
Correction for Secondary Currents	1.00

*** Using Gradations from COE ETL 1110-2-120 ***

Specific Weight 175.0 lbs/cu ft
 Layer Thickness 0.750 ft
 Selected Minimum D30 0.37 ft
 Selected Minimum D90 0.53 ft

Percent Lighter by Weight	Stone Weight, lbs	
	Minimum	Maximum
W100	15.	39.
W50	8.	11.
W15	2.	6.

_____ HEC-11 Method _____

Input Parameters:

Average Channel Velocity 4.87 ft/s
 Average Flow Depth 3.23 ft
 Unit Weight of Stone 175. lbs/cu ft
 Cotangent of Side Slope 2.00
 Material Angle of Repose 33.00 deg.
 Riprap Placement Channel Bank
 Safety Factor 1.5

Output Results:

Computed D50 0.18 ft

** FHWA Gradation**

Gradation Class Facing
 Layer Thickness 1.90 ft

Percent Smaller by Size	Rock Size, ft	Rock Weight, lbs
D100	1.30	200.
D50	0.95	75.
D10	0.40	5.

Appendix D – Material Test Report



Professional Service Industries, Inc.
480 Neponset Street, Suite 9C
Canton, MA 02021

Phone: (781) 821-2355
Fax: (781) 821-6276

Report No: MAT:0446516-36-S1

Issue No: 1

These test results apply only to the specific locations and materials noted and may not represent any other locations or elevations. This report may not be reproduced, except in full, without written permission by Professional Service Industries, Inc. If a non-compliance appears on this report, to the extent that the reported non-compliance impacts the project, the resolution is outside the PSI scope of engagement.

Approved Signatory: Yannick Lastennet (Department Manager)
Date of Issue: 1/18/2021

Material Test Report

Client: BAY COLONY GROUP
4 SCHOOL ST., P.O. BOX 9136
FOXBORO, MA 02035

CC:

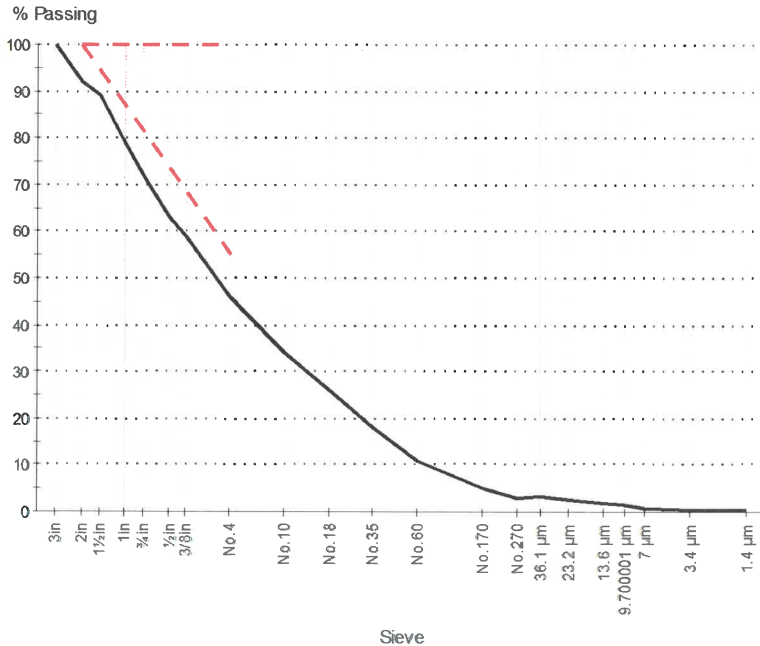
Project: BAY COLONY GROUP - LAB TESTING
CANTON, MA

Sample Details

Sample ID: 0446516-36-S1
Client Sample ID:
Date Sampled: 12/28/20
Sampled By: Client
Specification: Title V Hydrometer
Supplier:
Source: River Bed - Upstream
Material: Sandy Gravel
Sampling Method:
General Location: Fitzpatrick Road - Grafton, MA

Sample Description:

Particle Size Distribution



Grading: ASTM D 422

Date Tested: 1/14/2021
Tested By: Gary Brooks

Sieve Size	% Passing	Limits
3in (75.0mm)	100	
2in (50.0mm)	92*	100
1 1/2in (37.5mm)	89	
1in (25.0mm)	79	
3/4in (19.0mm)	72	
1/2in (12.5mm)	63	
3/8in (9.5mm)	59	
No. 4 (4.75mm)	46*	55 to 100
No. 10 (2.0mm)	34	
No. 18 (1.0mm)	26	
No. 35 (500 micrometers)	18	
No. 60 (250 micrometers)	11	
No. 170 (90 micrometers)	5	
No. 270 (53 micrometers)	3	
36.1 micrometers	3.3	
23.2 micrometers	2.4	
13.6 micrometers	1.8	
9.7 micrometers	1.5	
7.0 micrometers	0.9	
3.4 micrometers	0.3	
1.4 micrometers	0.3	

COBBLES	GRAVEL		SAND			FINES	
	Coarse (27.8%)	Fine (25.9%)	Coarse (11.9%)	Medium (18.6%)	Fine (11.7%)	Silt (3.6%)	Clay (0.6%)
(0.0%)							

D85: 31.8856 **D60:** 10.1747 **D50:** 5.8792
D30: 1.4142 **D15:** 0.3715 **D10:** 0.2109
Cu: 48.25 **Cc:** 0.93



Professional Service Industries, Inc.
480 Neponset Street, Suite 9C
Canton, MA 02021

Phone: (781) 821-2355
Fax: (781) 821-6276

Report No: MAT:0446516-36-S1

Issue No: 1

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Approved Signatory: Yannick Lastennet (Department Manager)
Date of Issue: 1/18/2021

Client: BAY COLONY GROUP
4 SCHOOL ST., P.O. BOX 9136
FOXBORO, MA 02035

CC:

Project: BAY COLONY GROUP - LAB TESTING
CANTON, MA

Sample Details

Sample ID: 0446516-36-S1
Client Sample ID:
Date Sampled: 12/28/20
Sampled By: Client
Specification: Title V Hydrometer
Supplier:
Source: River Bed - Upstream
Material: Sandy Gravel
Sampling Method:
General Location: Fitzpatrick Road - Grafton, MA

Other Test Results

Description	Method	Result	Limits
Dispersion device	ASTM D 422	Dispersant by hand	
Dispersion time (min)			
Shape			
Hardness			

Comments

* = Result does not meet the specification



TEC, Inc.

146 Dascomb Road Andover, MA 01810
169 Ocean Boulevard Unit 101, PO Box 249 Hampton, NH 03842
(978) 794-1792 (603) 601-8154
www.TheEngineeringCorp.com

DESIGNED BY ADC
DRAWN BY MWP
CHECKED BY JPT
DATE 4/13/2021
SCALE 1"=20'

PREPARED FOR
Town of Grafton
30 Providence Road
Grafton, MA 01915

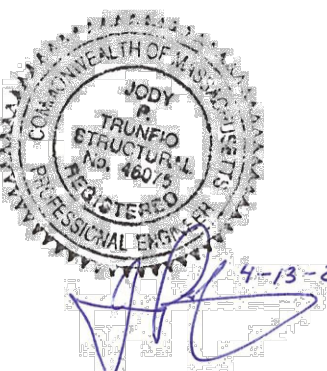
REVISIONS

ISSUED FOR
Wetland Permitting

PROJECT TITLE
Fitzpatrick Road Over Cronin Brook Culvert Replacement

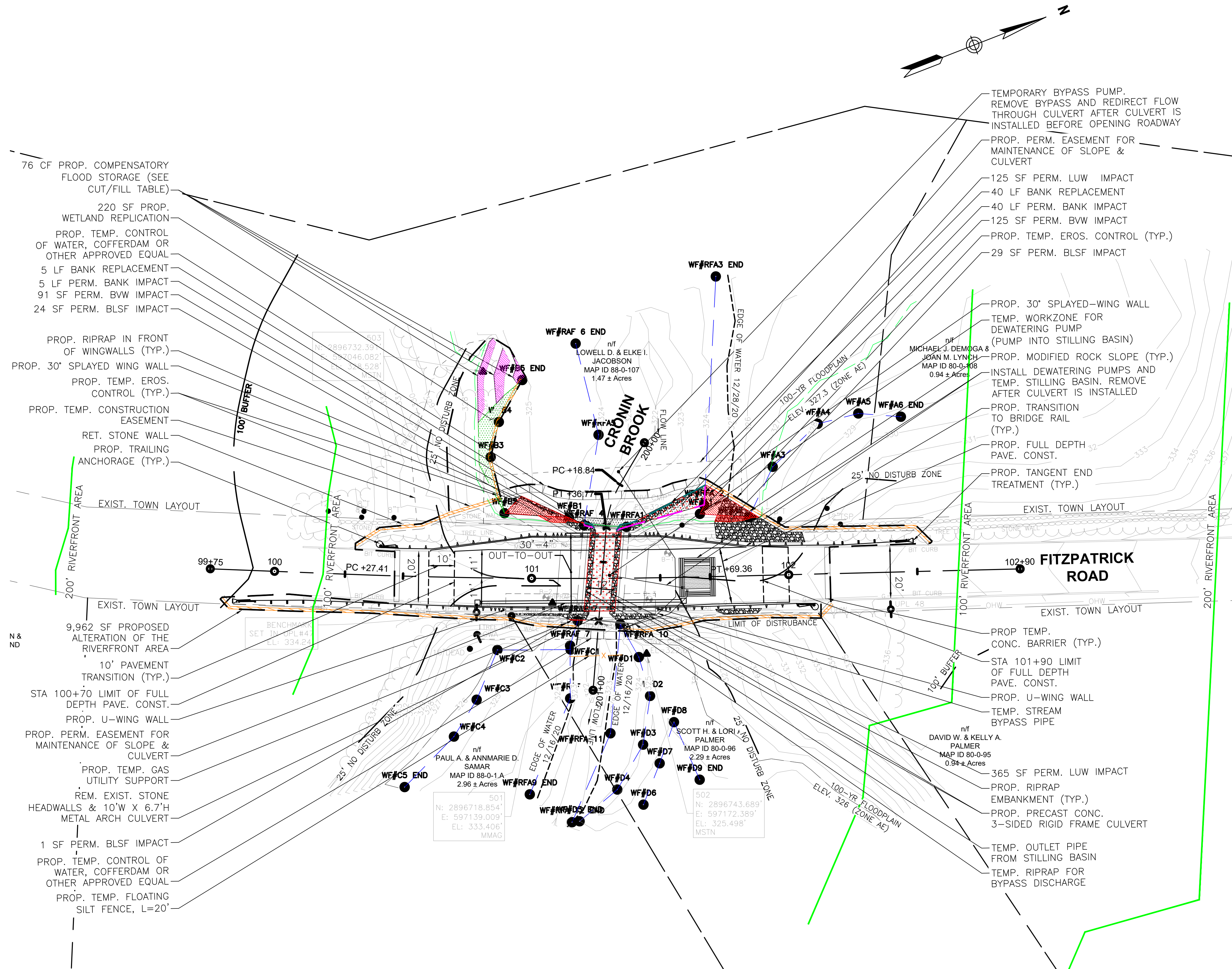
PROJECT LOCATION
Grafton Massachusetts
DRAWING TITLE
NOI Resource Area Impact Plan

PROJECT NO. T1060
TEC CAD FILE T1060_NOI
DRAWING NO. **P-1**
SHEET 1 OF 2



CONTROL OF WATER NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF THE CONTROL OF WATER (C.O.W.) SYSTEM AND SHALL SUBMIT A C.O.W. PLAN TO THE ENGINEER FOR APPROVAL. THE C.O.W. SYSTEM SHOWN IS CONCEPTUAL ONLY. THE C.O.W. SYSTEM SHALL BE DESIGNED TO WITHSTAND A 2-YEAR FLOOD ELEVATION (NAVD).
2. FITZPATRICK ROAD SHALL BE CLOSED TO VEHICULAR AND PEDESTRIAN TRAFFIC AT THE BRIDGE CROSSING PRIOR TO BEGINNING EXCAVATION. DETOUR SIGNAGE WILL BE INSTALLED IN ACCORDANCE WITH THE MUTCD AND THE TEMPORARY TRAFFIC CONTROL PLANS INCLUDED IN THE CONSTRUCTION DRAWINGS.
3. C.O.W. SYSTEM SHALL BE INSPECTED DAILY FOR WATER LEAKS OR EROSION AND REPAIRS PROCEDURES SHALL BE IMPLEMENTED ACCORDINGLY.
4. THE CONSTRUCTION SEQUENCE WITH REGARDS TO THE C.O.W. SYSTEM SHALL BE AS FOLLOWS:
 - 4.1. CLOSE THE ROADWAY TO VEHICULAR AND PEDESTRIAN TRAFFIC AT THE BRIDGE CROSSING.
 - 4.2. INSTALL EROSION CONTROLS: TEMPORARY EROSION CONTROL AROUND PROJECT LIMITS TO PROTECT THE CRONIN BROOK FROM WORK ZONE SEDIMENT; FLOATING SILT FENCE DOWNSTREAM OF THE PROJECT LIMITS TO TRAP ANY FLOATING DEBRIS/SILT THAT MAY ENTER THE BROOK.
 - 4.3. INSTALL C.O.W. COFFERDAMS, BYPASS PUMPS, DEWATERING PUMPS, AND TEMPORARY STILLING BASIN.
 - 4.4. PLACE TEMPORARY RIPRAP AT OUTLET FOR BYPASS DISCHARGE.
 - 4.5. DEWATER THE WORK AREA PRIOR TO (AND THROUGHOUT) EXCAVATION TO FACILITATE INSTALLING THE CULVERT, AND WINGWALLS IN THE DRY CONDITION. ALL DEWATERING FLOW SHALL PASS THROUGH THE STILLING BASIN TO REMOVE SEDIMENT PRIOR TO DEPOSITING BACK INTO THE STREAM.
 - 4.6. INSTALL THE THREE-SIDED BOX CULVERT AND WINGWALLS. RESTORE THE STREAMBED IN ACCORDANCE WITH THE CONSTRUCTION PLANS. INSTALL RIPRAP EMBANKMENT AND LOAM AND SEED WITH EROSION CONTROL BLANKET IN FRONT OF THE WINGWALLS. INSTALL COMPOST FILTER TUBE ALONG UPLAND SIDES OF STREAMBED.
 - 4.7. REDIRECT STREAM FLOW THROUGH THE CULVERT.
 - 4.8. REMOVE THE C.O.W. COFFERDAMS BYPASS PUMPS AND TEMPORARY STILLING BASIN.



RESOURCE AREA IMPACTS
SCALE: 1" = 20'-0"

SCALE IN FEET

RESOURCE AREA IMPACTS (SUMMARY)	
PROP. ALTERATION OF THE RIVERFRONT AREA / LIMIT OF DISTURBANCE = 9,962 SF	
PERM. BANK IMPACT = 45 LF	
PERM. LAND UNDER WATER (LUW) IMPACT = 490 SF	
PERM. BORDERING VEGETATED WETLAND (BVW) IMPACT = 216 SF	
PERM. BORDERING LAND SUBJECT TO FLOODING (BLSF) IMPACT = 54 SF	
PROP. BANK REPLACEMENT = 45 LF	
PROP. WETLAND REPLICATION AREA = 220 SF	
PROP. COMPENSATORY FLOOD STORAGE = 76 CF	

LEGEND:

- COMPOST FILTER TUBES
- FLOATING SILT FENCE
- 100' & 200' RIVERFRONT AREA BUFFERS
- FLAGGED WETLANDS
- 100-YR FLOODPLAIN
- CONTROL OF WATER

- 76 CF PROP. COMPENSATORY FLOOD STORAGE (SEE CUT/FILL TABLE)
- 220 SF PROP. WETLAND REPLICATION
- PROP. TEMP. CONTROL OF WATER, COFFERDAM OR OTHER APPROVED EQUAL
- 5 LF BANK REPLACEMENT
- 5 LF PERM. BANK IMPACT
- 91 SF PERM. BVW IMPACT
- 24 SF PERM. BLSF IMPACT
- PROP. RIPRAP IN FRONT OF WINGWALLS (TYP.)
- PROP. 30' SPLAYED WING WALL
- PROP. TEMP. EROS. CONTROL (TYP.)
- PROP. TEMP. CONSTRUCTION EASEMENT
- RET. STONE WALL
- PROP. TRAILING ANCHORAGE (TYP.)
- EXIST. TOWN LAYOUT
- 200' RIVERFRONT AREA
- 100' RIVERFRONT AREA
- 100' BUFFER
- 25' NO DISTURB ZONE
- 9,962 SF PROPOSED ALTERATION OF THE RIVERFRONT AREA
- 10' PAVEMENT TRANSITION (TYP.)
- STA 100+70 LIMIT OF FULL DEPTH PAVE. CONST.
- PROP. U-WING WALL
- PROP. PERM. EASEMENT FOR MAINTENANCE OF SLOPE & CULVERT
- PROP. TEMP. GAS UTILITY SUPPORT
- REM. EXIST. STONE HEADWALLS & 10'W X 6.7'H METAL ARCH CULVERT
- 1 SF PERM. BLSF IMPACT
- PROP. TEMP. CONTROL OF WATER, COFFERDAM OR OTHER APPROVED EQUAL
- PROP. TEMP. FLOATING SILT FENCE, L=20'

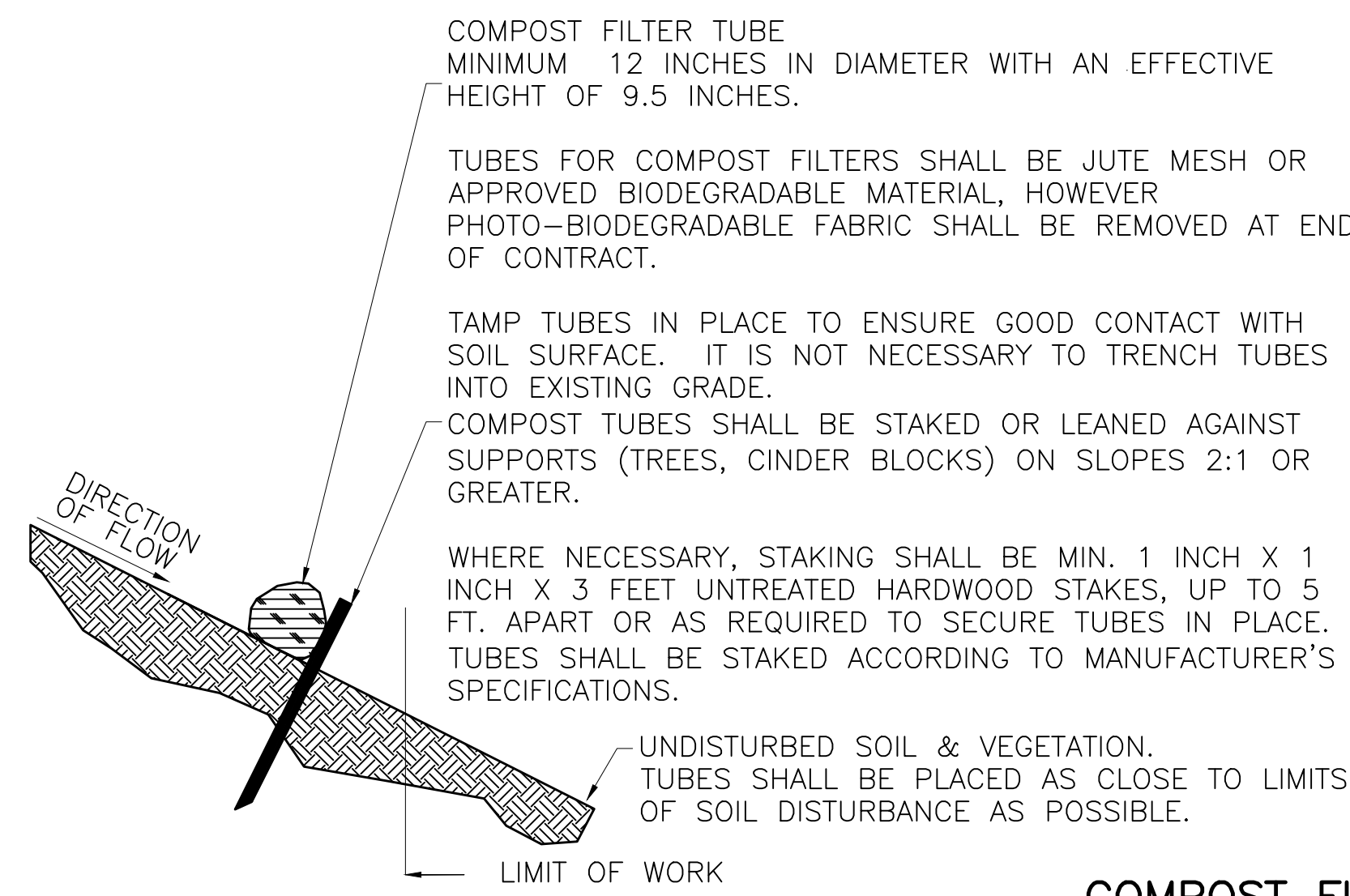
- TEMPORARY BYPASS PUMP. REMOVE BYPASS AND REDIRECT FLOW THROUGH CULVERT AFTER CULVERT IS INSTALLED BEFORE OPENING ROADWAY
- PROP. PERM. EASEMENT FOR MAINTENANCE OF SLOPE & CULVERT
- 125 SF PERM. LUW IMPACT
- 40 LF BANK REPLACEMENT
- 40 LF PERM. BANK IMPACT
- 125 SF PERM. BVW IMPACT
- PROP. TEMP. EROS. CONTROL (TYP.)
- 29 SF PERM. BLSF IMPACT

- PROP. 30' SPLAYED-WING WALL
- TEMP. WORKZONE FOR DEWATERING PUMP (PUMP INTO STILLING BASIN)
- PROP. MODIFIED ROCK SLOPE (TYP.)
- INSTALL DEWATERING PUMPS AND TEMP. STILLING BASIN. REMOVE AFTER CULVERT IS INSTALLED
- PROP. TRANSITION TO BRIDGE RAIL (TYP.)
- PROP. FULL DEPTH PAVE. CONST.
- PROP. TANGENT END TREATMENT (TYP.)

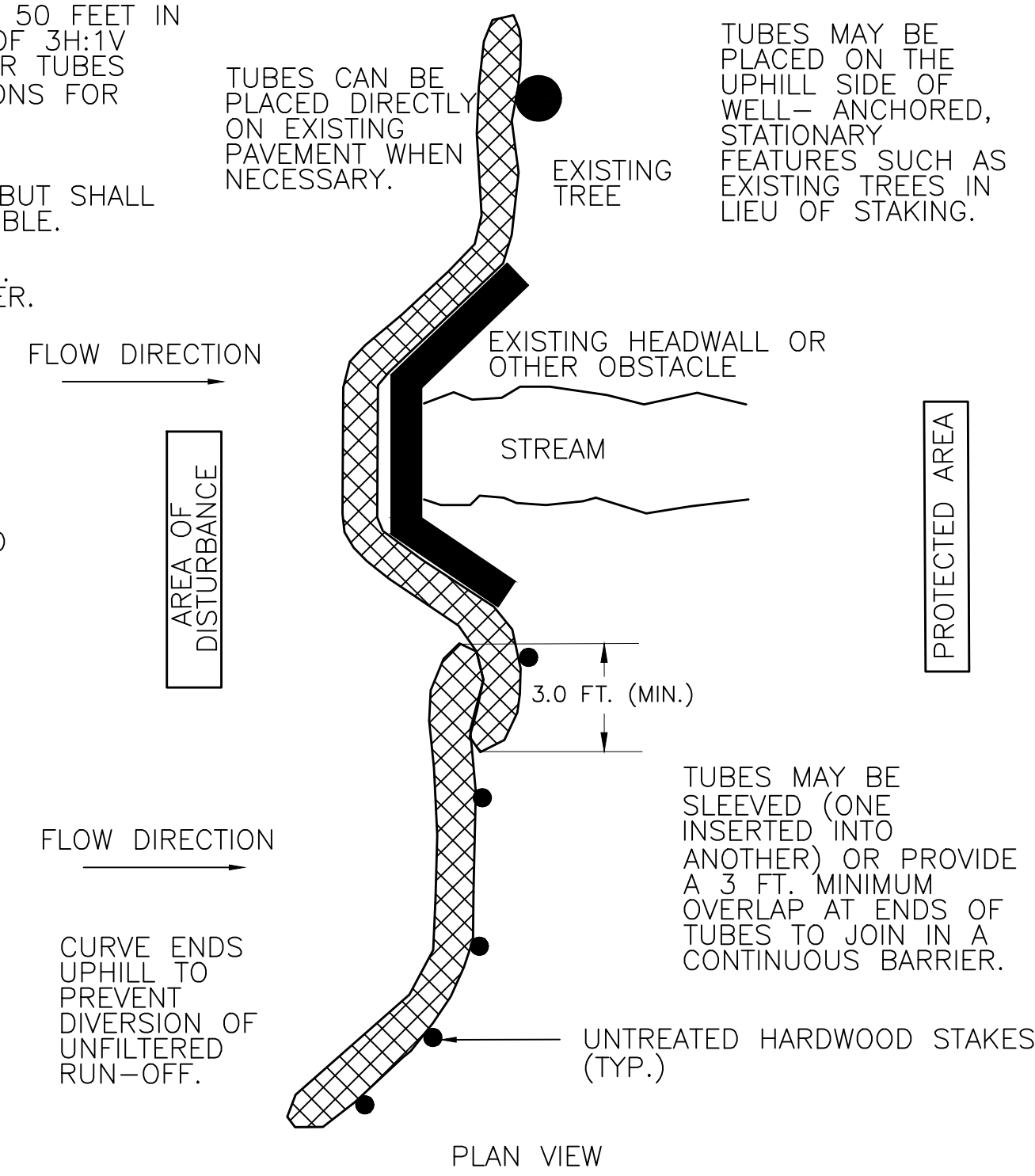
- PROP. TEMP. CONC. BARRIER (TYP.)
- STA 101+90 LIMIT OF FULL DEPTH PAVE. CONST.
- PROP. U-WING WALL
- TEMP. STREAM BYPASS PIPE
- 365 SF PERM. LUW IMPACT
- PROP. RIPRAP EMBANKMENT (TYP.)
- PROP. PRECAST CONC. 3-SIDED RIGID FRAME CULVERT
- TEMP. OUTLET PIPE FROM STILLING BASIN
- TEMP. RIPRAP FOR BYPASS DISCHARGE

NOTES:

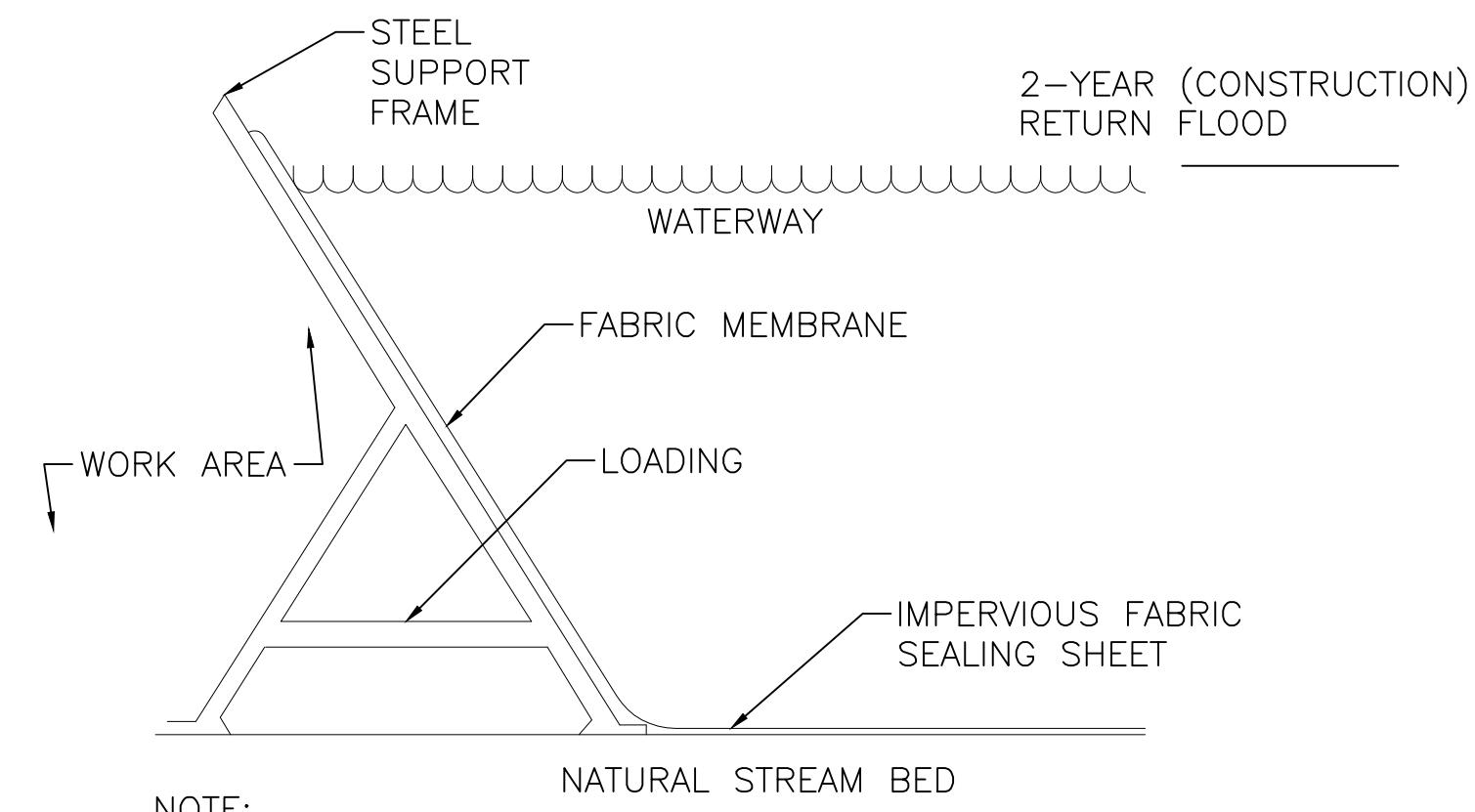
1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.



COMPOST FILTER TUBE
N.T.S.

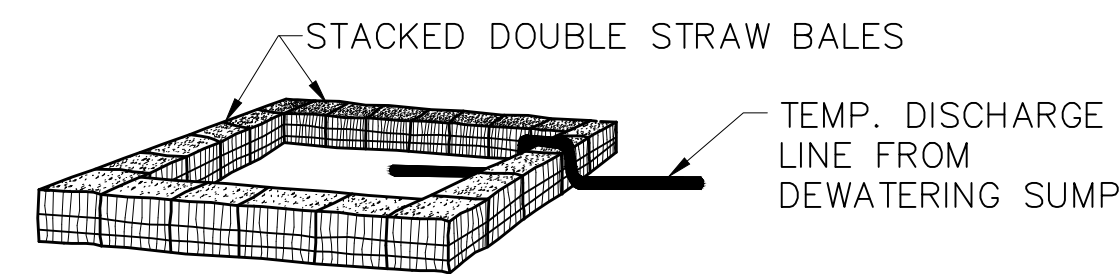


PLAN VIEW



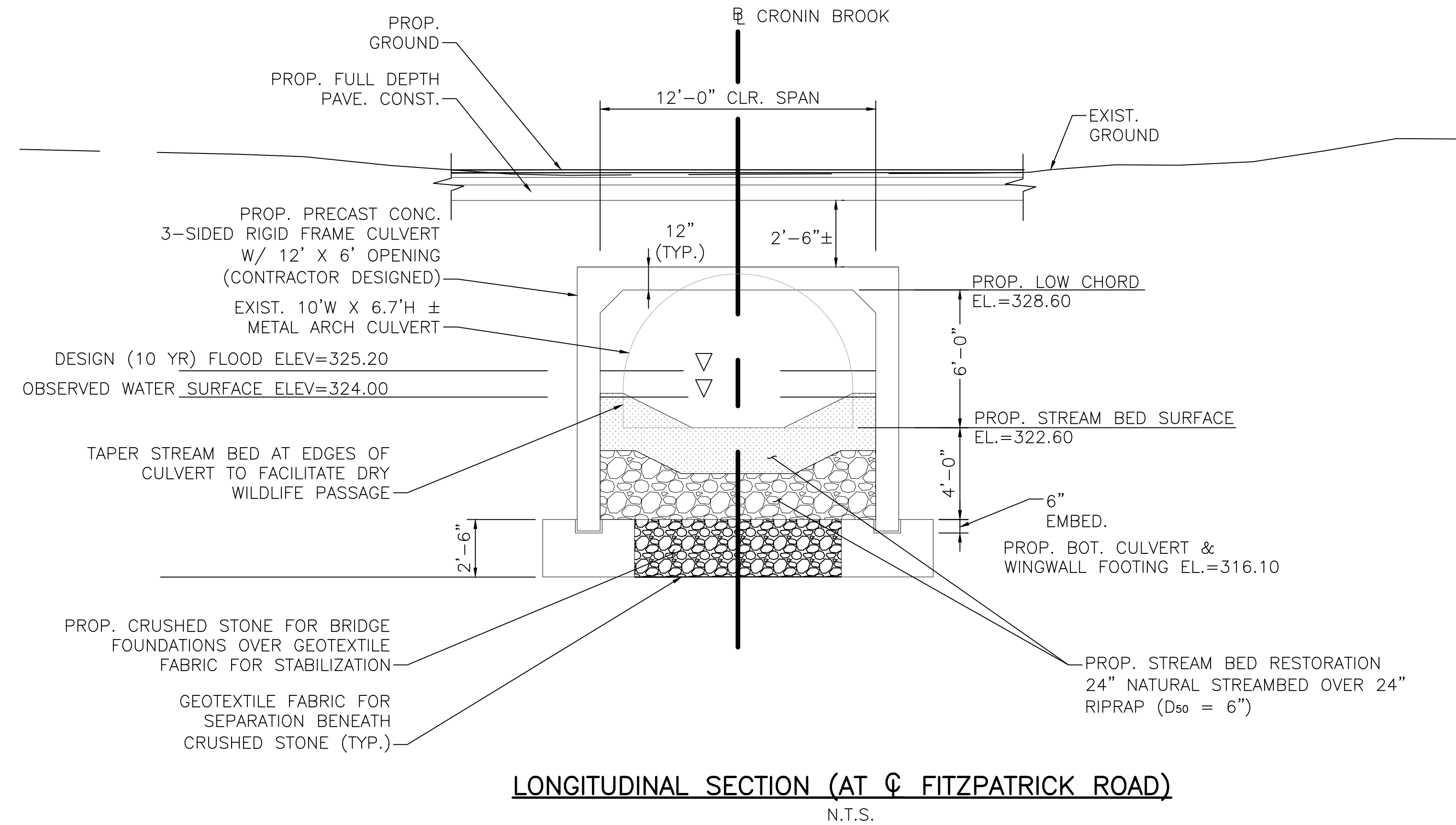
NOTE:
THE STEEL FRAME COFFERDAM SHOWN ABOVE IS SHOWN IN CONCEPT ONLY AS ONE OPTION FOR CONTROL OF WATER. THE CONTRACTOR SHALL DETERMINE THE APPROPRIATE SYSTEM FOR CONTROLLING THE WATER (I.E. BULK SANDBAGS, SHEETING, ETC). THE CONTRACTOR SHALL SUBMIT THEIR PROPOSED CONTROL OF WATER DESIGN TO THE ENGINEER FOR REVIEW AND APPROVAL.

TEMPORARY COATED FABRIC STEEL FRAME COFFERDAM
N.T.S.



NOTE:
DISCHARGE TO SEDIMENTATION BASIN (AS SHOWN) OR TO SILTATION/ DEWATERING BAG SUCH AS FLOGARD DEWATERING BAG MODEL SC-DW1215Z, OR APPROVED EQUAL BY GRAFTON CONSERVATION COMMISSION. SYSTEM SHOWN IS CONCEPTUAL ONLY AND IS TO BE DESIGNED BY CONTRACTOR.

TEMPORARY STILLING AREA
N.T.S.



LONGITUDINAL SECTION (AT ♀ FITZPATRICK ROAD)
N.T.S.

FLOOD STORAGE CUT/FILL TABLE			
ELEVATION (FT, NAVD)	FLOODPLAIN IMPACT (CF)	FLOODPLAIN MITIGATION (CF)	FLOODPLAIN NET (CF)
325-326	4	24	20
326-327	43	45	2
327-327.3	6	7	1
TOTALS	53	76	23

TEC, Inc.

146 Dascomb Road
Andover, MA 01810
(978) 794-1792
www.TheEngineeringCorp.com

169 Ocean Boulevard
Unit 101, PO Box 249
Hampton, NH 03842
(603) 601-8154

DESIGNED BY BKH
DRAWN BY MWP
CHECKED BY JPT
DATE 4/6/2021
SCALE Not to Scale

PREPARED FOR

Town of Grafton
30 Providence Road
Grafton, MA 01519

REVISIONS

ISSUED FOR

Wetland Permitting

PROJECT TITLE

Fitzpatrick Road
Over Cronin Brook
Culvert Replacement

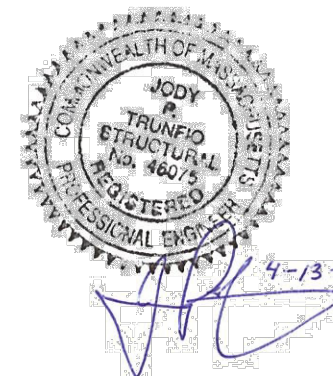
PROJECT LOCATION

Grafton
Massachusetts

DRAWING TITLE

NOI Resource
Area Impact Plan

PROJECT NO. T1060
TEC CAD FILE T1060_DET
DRAWING NO. P-2
SHEET 2 OF 2





Grafton Conservation Commission

GRAFTON MEMORIAL MUNICIPAL CENTER
30 PROVIDENCE ROAD
GRAFTON, MASSACHUSETTS 01519
Phone: (508) 839-5335 ext. 1138 • FAX: (508) 839-4602
www.grafton-ma.gov • concom@grafton-ma.gov

September 14, 2021

Paul Cournoyer
Town of Grafton
30 Providence Road
Grafton, MA 01519
Via email

Subject: DEP # 164-1011 / WP #826 – Order of Conditions Approval with Special Conditions
Fitzpatrick Road culvert (Assessor's Map 80, Lot 95, 69, 107, 108)

Mr. Cournoyer:

Enclosed, please find your approved Order of Conditions and Grafton Wetlands Protection Bylaw Permit with special conditions for property located at the above referenced location. Please review these documents and follow all conditions. Some of these conditions will need to be met prior to commencing work at the site.

Please be advised that it is your responsibility to have these documents recorded with the Worcester Registry of Deeds. Once recorded, please submit a copy of the page containing the registry bar code label to the Conservation Commission office prior to commencing work.

If you have any questions or concerns, please contact the office at 508-839-5335 extension 1138, or via e-mail at: concom@grafton-ma.gov

Sincerely,

Leah Cameron

Leah Cameron
Conservation Agent

Enclosures

Cc: Brian Szczurko, Town of Grafton, via email
Jody Trunfio & Matt Perry, TEC, Inc., via email

Massachusetts Department of Environmental Protection
 Bureau of Resource Protection - Wetlands
WPA Form 5 - Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 MassDEP File #:164-1011
 eDEP Transaction #:1308499
 City/Town:GRAFTON

A. General Information

1. Conservation Commission GRAFTON

2. Issuance a. OOC b. Amended OOC

3. Applicant Details

a. First Name	PAUL	b. Last Name	COURNOYER
c. Organization	TOWN OF GRAFTON		
d. Mailing Address	30 PROVIDENCE ROAD		
e. City/Town	GRAFTON	f. State	MA
		g. Zip Code	01519

4. Property Owner

a. First Name	PAUL	b. Last Name	COURNOYER
c. Organization	TOWN OF GRAFTON		
d. Mailing Address	30 PROVIDENCE ROAD		
e. City/Town	GRAFTON	f. State	MA
		g. Zip Code	01519

5. Project Location

a. Street Address	FITZPATRICK ROAD		
b. City/Town	GRAFTON	c. Zip Code	01519
d. Assessors Map/Plat#	80	e. Parcel/Lot#	95, 69, 107, 108
f. Latitude	42.53596N	g. Longitude	71.58005W

6. Property recorded at the Registry of Deed for:

a. County	b. Certificate	c. Book	d. Page
-----------	----------------	---------	---------

7. Dates

a. Date NOI Filed : 4/13/2021 b. Date Public Hearing Closed: 8/17/2021 c. Date Of Issuance: 9/14/2021

8. Final Approved Plans and Other Documents

a. Plan Title:	b. Plan Prepared by:	c. Plan Signed/Stamped by:	d. Revised Final Date:	e. Scale:
NOI RESOURCE AREA IMPACT PLAN	TEC, INC.	JODY TRUNFIO	8/12/21	1" = 40'
WETLAND REPLICATION PLAN WITH ASSOCIATED NARRATIVE	TEC, INC.	JODY TRUNFIO	5/14/21	1" = 20'

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act

Following the review of the the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act.

Check all that apply:

Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 MassDEP File #:164-1011
 eDEP Transaction #:1308499
 City/Town:GRAFTON

a. <input checked="" type="checkbox"/> Public Water Supply	b. <input type="checkbox"/> Land Containing Shellfish	c. <input checked="" type="checkbox"/> Prevention of Pollution
d. <input checked="" type="checkbox"/> Private Water Supply	e. <input checked="" type="checkbox"/> Fisheries	f. <input checked="" type="checkbox"/> Protection of Wildlife Habitat
g. <input checked="" type="checkbox"/> Ground Water Supply	h. <input checked="" type="checkbox"/> Storm Damage Prevention	i. <input checked="" type="checkbox"/> Flood Control

2. Commission hereby finds the project, as proposed, is:

Approved subject to:

- a. The following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

Denied because:

- b. The proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**
- c. The information submitted by the applicant is not sufficient to describe the site, the work or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310CMR10.02(1)(a). _____ a. linear feet

Inland Resource Area Impacts:(For Approvals Only):				
Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input checked="" type="checkbox"/> Bank	<u>45</u> a. linear feet	<u>45</u> b. linear feet	<u>45</u> c. linear feet	<u>45</u> d. linear feet
5. <input checked="" type="checkbox"/> Bordering Vegetated Wetland	<u>216</u> a. square feet	<u>216</u> b. square feet	<u>220</u> c. square feet	<u>220</u> d. square feet
6. <input checked="" type="checkbox"/> Land under Waterbodies and Waterways	<u>490</u> a. square feet	<u>490</u> b. square feet	<u>490</u> c. square feet	<u>490</u> d. square feet
	<u>0</u> e. c/y dredged	<u>0</u> f. c/y dredged		
7. <input checked="" type="checkbox"/> Bordering Land Subject to Flooding	<u>54</u> a. square feet	<u>54</u> b. square feet	<u>54</u> c. square feet	<u>54</u> d. square feet
Cubic Feet Flood Storage	<u>54</u> e. cubic feet	<u>54</u> f. cubic feet	<u>76</u> g. cubic feet	<u>76</u> h. cubic feet

Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 MassDEP File #:164-1011
 eDEP Transaction #:1308499
 City/Town:GRAFTON

8. <input type="checkbox"/> Isolated Land Subject to Flooding	<u> </u> a. square feet	<u> </u> b. square feet		
Cubic Feet Flood Storage	<u> </u> c. cubic feet	<u> </u> d. cubic feet	<u> </u> e. cubic feet	<u> </u> f. cubic feet
9. <input checked="" type="checkbox"/> Riverfront Area	<u>9962</u> a. total sq. feet	<u>9962</u> b. total sq. feet		
Sq ft within 100 ft	<u>9760</u> c. square feet	<u>9760</u> d. square feet	<u> </u> e. square feet	<u> </u> f. square feet
Sq ft between 100-200 ft	<u>202</u> g. square feet	<u>202</u> h. square feet	<u> </u> i. square feet	<u> </u> j. square feet

Coastal Resource Area Impacts:

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. <input type="checkbox"/> Land Under the Ocean	<u> </u> a. square feet	<u> </u> b. square feet		
	<u> </u> c. c/y dredged	<u> </u> d. c/y dredged		
12. <input type="checkbox"/> Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input type="checkbox"/> Coastal Beaches	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. c/y nourishment	<u> </u> d. c/y nourishment
14. <input type="checkbox"/> Coastal Dunes	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. c/y nourishment	<u> </u> d. c/y nourishment
15. <input type="checkbox"/> Coastal Banks	<u> </u> a. linear feet	<u> </u> b. linear feet		
16. <input type="checkbox"/> Rocky Intertidal Shores	<u> </u> a. square feet	<u> </u> b. square feet		
17. <input type="checkbox"/> Salt Marshes	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. square feet	<u> </u> d. square feet
18. <input type="checkbox"/> Land Under Salt Ponds	<u> </u> a. square feet	<u> </u> b. square feet		
	<u> </u> c. c/y dredged	<u> </u> d. c/y dredged		
19. <input type="checkbox"/> Land Containing Shellfish	<u> </u> a. square feet	<u> </u> b. square feet	<u> </u> c. square feet	<u> </u> d. square feet
20. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	<u> </u> c. c/y dredged	<u> </u> d. c/y dredged		

Massachusetts Department of Environmental Protection

Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:164-1011
eDEP Transaction #:1308499
City/Town:GRAFTON

21. Land Subject to Coastal Storm Flowage

_____ a. square feet b. square feet

22.

Restoration/Enhancement (For Approvals Only)

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c & d or B.17.c & d above, please entered the additional amount here.

_____ a. square feet of BVW

_____ b. square feet of Salt Marsh

23.

Streams Crossing(s)

If the project involves Stream Crossings, please enter the number of new stream crossings/number of replacement stream crossings.

_____ 0

_____ 1

a. number of new stream crossings

_____ b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
 - a. the work is a maintenance dredging project as provided for in the Act; or
 - b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not exceed the issuance date of the original Final Order of Conditions.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered

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Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File #:164-1011

eDEP Transaction #:1308499

City/Town:GRAFTON

land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work..

10. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

" Massachusetts Department of Environmental Protection"

[or 'MassDEP']

File Number : "164-1011"

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before Mass DEP.
12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
13. The work shall conform to the plans and special conditions referenced in this order.
14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.
17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

19. The work associated with this Order(the "Project") is (1) is not (2) subject to the Massachusetts Stormwater Standards. If the work is subject to Stormwater Standards, then the project is subject to the following conditions;
- a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollutant Discharge Elimination System Construction General Permit as required by Stormwater Standard 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.
- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that: *i.* all construction period BMPs have been

▣ **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:

MassDEP File #:164-1011

eDEP Transaction #:1308499

City/Town:GRAFTON

removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures; *ii.* as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized; *iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10; *iv.* all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition; *v.* any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

- c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 19(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following: *i.*) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and *ii.*) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.
- d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollutant Discharge Elimination System Multi-Sector General Permit.
- e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 19(f) through 19(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 19(f) through 19(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.
- f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.
- g) The responsible party shall:
 - 1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
 - 2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
 - 3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

▫ **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands

WPA Form 5 - Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:164-1011
eDEP Transaction #:1308499
City/Town:GRAFTON

-
- h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.
 - i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.
 - j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.
 - k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.
 - l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions:

SEE ATTACHED "EXHIBIT A"

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? Yes No

2. The Conservation Commission hereby (check one that applies):

a. DENIES the proposed work which cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw specifically:

1. Municipal Ordinance or Bylaw _____

2. Citation _____

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order or Conditions is issued. Which are necessary to comply with a municipal ordinance or bylaw:

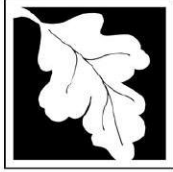
b. APPROVES the proposed work, subject to the following additional conditions.

1. Municipal Ordinance or Bylaw _____
GRAFTON
WETLANDS
PROTECTION
BYLAW

2. Citation _____

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

The special conditions relating to municipal ordinance or bylaw are as follows:
SEE ATTACHED "EXHIBIT A"



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
 Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
 164-1011
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1308499
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 Grafton
 City/Town

E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

9/14/21
 1. Date of Issuance

Please indicate the number of members who will sign this form. This Order must be signed by a majority of the Conservation Commission.

5
 2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

The signatures electronically inserted below represent the intent to sign the foregoing document in accordance with MGL Chapter 110G §9 and pursuant to the Commission's electronic signature authorization vote recorded on 06/11/2020 in Book 62574 and Page 216 at the Worcester Registry of Deeds.

<small>DocuSigned by:</small> 	<u>Sandra Brock</u> Printed Name
<small>DocuSigned by:</small> 	<u>Alicia Bergeron</u> Printed Name
<small>DocuSigned by:</small> 	<u>Patrick Huegel</u> Printed Name
<small>DocuSigned by:</small> 	<u>Jonathan Nickerson</u> Printed Name
<small>DocuSigned by:</small> 	<u>Elizabeth Doherty</u> Printed Name

Signature	Printed Name
Signature	Printed Name
Signature	Printed Name

by hand delivery on

by certified mail, return receipt requested, on

9/14/21
 Date

 Date

□ **Massachusetts Department of Environmental
Protection**
Bureau of Resource Protection - Wetlands
WPA Form 5 - Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:164-1011
eDEP Transaction #:1308499
City/Town:GRAFTON

Signature of Applicant

Rev. 4/1/2010

EXHIBIT 'A'

This Order of Conditions and Grafton Wetlands Permit are issued with the following special conditions:

Findings

1. The Commission determined that this project meets the performance standards of the general provisions of the Wetlands Protection Act. Additionally, the lack of possible, reasonable alternatives and the proposed mitigation measures allow the project to be permitted as a limited project under 310 CMR 10.53(3)(i).
2. Per the letter dated 5/4/21 from NHESP, it was determined that the project does not present any adverse impacts to mapped habitats.
3. Through the peer review process, the Commission determined that the project's ability to meet the stream crossing standards is reasonable considering the overall improvement.

Waivers

1. The Commission granted a waiver from Section V.C.5.a. of the Grafton Wetlands Protection Bylaw Regulations to allow for temporary and permanent impacts to the twenty-five (25) foot no-disturb buffer zone due to the nature of the project.

General Conditions

1. The work shall be completed as shown on the plans entitled "**NOI Resource Area Impact Plan**" received on 8/12/21 and "**Wetland Replication Plan**" with a final revision date of 5/14/21 with the associated "**Wetland Replication Narrative**" dated 5/14/21.
2. If substantial changes from the above-referenced plans are proposed, those changes shall be submitted to the Commission for review in order to determine whether they qualify as a **minor change, require an amended Notice of Intent/Application, or require a new Notice of Intent/Application.**
3. The Commission reserves the right to **require additional measures if deemed necessary** to protect wetland resource areas and interests as defined in MGL Chapter 131 Section 40 (310 CMR 10.00), the Grafton Wetlands Protection Bylaw and Regulations, and the Grafton Stormwater Management Bylaw and Regulations.
4. This document shall be **included in all construction contracts, subcontracts, and specifications** dealing with the work proposed and shall supersede any conflicting contract requirements. The applicant shall ensure that all contractors, subcontractors, and other personnel are fully aware of these terms and conditions. Thereafter, the contractor will be held jointly liable for any violation of this Order/Permit.
5. This Order/Permit and the approved plans shall be **available at the project site** at all times.
6. **Work shall be halted** on the site if the Commission, Agent, or DEP determine that any of the work is not in compliance with this Order/Permit.
7. Per **NHESP**, any changes to the proposed project or any additional work beyond that shown on the site plans dated 4/13/21 may require an **additional filing with the Division of Fisheries & Wildlife pursuant to the MESA.**

Conditions Prior to Commencement of Work

8. Prior to commencement of work, this Order of Conditions and Grafton Wetlands Protection Bylaw Permit **shall be recorded** with the Worcester Registry of Deeds. Once recorded, a copy of any pages containing Registry barcode labels shall be submitted to the Commission.
9. Prior to commencement of work, a **sign shall be displayed** at the site entrance, not less than two (2) square feet, nor more than three (3) square feet, bearing the words "Grafton Wetlands Permit #826." In addition, the DEP file # must be displayed as required by the Order of Conditions.
10. Prior to commencement of work, the wetland boundary and twenty-five (25) foot no-disturb buffer zone must be **survey located and clearly flagged or staked** in the field.
11. Prior to commencement of work, the **erosion and sedimentation control measures detailed in the application shall be installed** where indicated on the above-referenced plan (especially the floating silt fence, cofferdam, and dewatering basin) and shall serve as the limit of disturbance. Where an erosion control barrier is not required, the limit of disturbance shall be marked with stakes, flagging or construction fencing.
12. Prior to commencement of work, the contractor shall designate a **construction staging area**, located outside of all wetland resource areas and no-disturb zones and as far from the buffer zone and riverfront area as possible. All construction trailers, dumpsters, portable sanitary facilities, material storage, and overnight parking of equipment shall be located within the staging area. The perimeter of the staging area shall be protected with silt fence and the ground surface shall be protected with stone or another suitable non-erosive material. Any leakage or spillage of oil, hydraulic fluid, gasoline, or other pollutants must be cleaned up immediately and disposed of off-site. All fueling of equipment shall be performed outside of wetland resource areas and buffer zones. The Commission shall be notified immediately in the event of any spillage.
13. Prior to commencement of work, the **detail for the streambed substrate** shall be finalized with the Commission's peer reviewer, EcoTec, Inc. The Commission shall receive a copy of the finalized detail, as well as proof of EcoTec, Inc.'s approval.

Conditions During Construction

14. **Construction equipment is prohibited beyond the erosion control barriers and delineated limit of work.**
15. The **erosion control barriers shall be maintained** in good repair until all work is complete and all disturbed areas have been fully stabilized. The applicant or qualified designee shall inspect the erosion controls daily, remove and properly dispose of any accumulated sediment, and replace any components, as necessary. The applicant shall immediately control any erosion problems that occur.
16. The applicant shall always maintain an **adequate and easily accessible supply of any erosion control materials** planned for use on site for emergency and/or routine replacement.
17. **Loaming and seeding** shall occur within seven (7) days of final grading. If any disturbed portion of the project is inactive for more than fourteen (14) days, it must be stabilized by seeding with a temporary stabilizing seed mix, unless the fourteen (14) days are in the winter. If this winter condition should occur, the applicant shall request a determination from the Commission as to whether seeding or an alternative measure should be conducted.
18. Materials shall be **stockpiled as far from the one hundred (100) foot buffer zone and riverfront area as possible**. Soil stockpiles must be stabilized or covered at the end of each

workday. Stockpile side slopes shall not be greater than two to one (2:1). Stockpiles shall be surrounded by erosion control barriers.

19. The **wetland replication** shall be performed as specified in the approved plans referenced above unless otherwise specified in this Order/Permit. The Commission reserves the right to require additional plantings to ensure achievement of seventy-five percent (75%) cover of wetland plant species within two full growing seasons, as specified in 310 CMR 10.55 (4)(b) and the Grafton Wetlands Protection Bylaw and Regulations.
 - a. The preparation and planting of replication areas shall be completed in conjunction with, or as soon as is practicable following, the alteration of the wetlands that are being replaced, but in no event later than thirty (30) days after the alteration.
 - b. Once wetland alteration has commenced, no other work is to be commenced on site until establishment of the replication area is completed.
 - c. An erosion control barrier must be installed between the existing wetland and the replication area prior to any work commencing within the replication area. No work, disturbance, or clearing is permitted within the adjacent existing wetland.
 - d. The excavation, wetland soil installation, and planting of the replication area shall be supervised by a qualified wetland scientist hired by the Commission at the applicant's expense. The replication area shall also be inspected by said scientist at the end of each growing season for a minimum of two (2) growing seasons and written inspection reports shall be submitted to the Commission.
 - e. Once completed, the replication area shall be protected by a twenty-five (25) foot no-disturb buffer zone unless otherwise depicted on the above-referenced plans.
 - f. During the monitoring period, any invasive species identified within the replication area and its no-disturb buffer zone shall be eradicated.
20. **Compensatory flood storage** shall be constructed prior to any filling of land subject to flooding.
21. Any work occurring within wetland resource areas shall occur **during the dry season (typically July through September)**.
22. **Perchlorate blasting agents** shall not be used in connection with this project.
23. All existing and proposed catch basins and storm drains on the site or on the streets adjacent to the site shall be protected by **silt sacks or an equivalent product** to prevent sediment from entering the drainage system. Silt sacks (or the equivalent) shall be maintained and regularly cleaned of sediment until final and complete site stabilization, at which point they may be removed.
24. At the end of each workday, the applicant shall **sweep** any sediment tracked onto the adjacent streets. All construction vehicles exiting the property shall be cleaned of soil prior to traveling on public streets within Grafton. All equipment washing shall occur within the designated staging area. Any runoff resulting from the washing of trucks or equipment shall not be directed toward, nor dumped into, any on-site drainage system or any area subject to protection under the MA Wetlands Protection Act or Grafton Wetlands Protection Bylaw.
25. An **impervious concrete washout structure** must be installed on site, located outside of all wetland resource areas and buffer zones, and must include signage labeling the structure "Concrete Washout Area". This is the only location on site where concrete trucks and tools are permitted to be rinsed. All materials deposited within the concrete washout structure must be disposed of off-site.
26. If a different **dewatering** plan from that in the above-referenced approved plans proves to be necessary, a new plan shall be submitted to the Commission for approval. Dewatering activities shall be monitored daily to ensure that sediment-laden water is appropriately settled prior to discharge. Water shall not be discharged directly into an area subject to jurisdiction of the

Wetlands Protection Act or Grafton Wetlands Protection Bylaw. Management of groundwater and soil collected during excavation and dewatering activities shall be monitored by a Licensed Site Professional in accordance with MA DEP regulations. All excavated materials not reused on site shall be removed from the site immediately and disposed of properly.

27. All **erosion control materials shall remain** in place until the site is fully stabilized but shall be removed prior to the issuance of a complete Certificate of Compliance. The permit numbers sign may be removed at the same time.
28. Upon completion of the work described herein, the applicant shall submit hard copies and electronic copies of the following to the Commission:
 - I. Two written **Requests for Certificates of Compliance** (WPA Form 8A and Grafton Bylaw Form 8A)
AND
 - II. A **letter** from a Massachusetts Registered Professional Engineer that certifies compliance of the project with this Order/Permit and details any deviations that exist, along with their potential effect on the project. A statement that the work is in "substantial compliance" without detailing the deviations shall not be accepted.
OR
 - III. A complete **as-built plan** shown as a bolded overlay on top of the approved plans with any deviations shown in red, signed and stamped by a Massachusetts Registered Professional Engineer or Land Surveyor

Ongoing Conditions:

29. A **no-disturb zone** of a minimum of twenty-five (25) feet shall be maintained along the upland edge of bordering vegetated wetlands. This area must be allowed to grow naturally and undisturbed. This condition is ongoing and does not expire with the issuance of a Certificate of Compliance.
30. Any **future disturbance** proposed on site which goes beyond that permitted in the approved plans referenced above shall be submitted to the Commission for review and approval. This condition is ongoing and does not expire with the issuance of a Certificate of Compliance.



Grafton Conservation Commission

GRAFTON MEMORIAL MUNICIPAL CENTER
30 PROVIDENCE ROAD
GRAFTON, MASSACHUSETTS 01519
Phone: (508) 839-5335 ext. 1138 • FAX: (508) 839-4602
www.grafton-ma.gov • concom@grafton-ma.gov

Form 5: Wetlands Permit Grafton Wetlands Protection Bylaw & Regulations

Rev. 5/17
Pg. 1 of 2

Grafton Wetlands Permit #: Project Location:

Assessor's Map #: Lot #:

Applicant: Address:

Owner: Address:

This Permit is issued as follows:

Wetlands Permit OR Amended Wetlands Permit
OR Order of Resource Area Delineation (ORAD)

Approved OR Denied

In conjunction with Order of Conditions # and/or SW Permit
issued on .

The property is recorded at the Worcester Registry of Deeds, Book: Page:

The Grafton Conservation Commission has reviewed and held a public hearing on the above referenced application and plans. Based on the information available to the Commission at this time, the Commission has determined that the area on which the proposed work is to be done is significant to the interests protected by the Grafton Wetlands Protection Bylaw and orders that all work shall be performed in accordance with the **conditions found in the attached "Exhibit A."** To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the application, the conditions shall control.

If an Order of Conditions, pursuant to MGL Ch. 131 § 40, has been issued for all or part of the project, said Order of Conditions (referenced above) is incorporated into this Permit and appended hereto.

This Permit is valid for three years from the date of issuance, unless otherwise specified by the Commission.

The applicant is responsible for ensuring that this Permit is recorded at the Registry of Deeds or the Land Court for the district in which the land is located. After recording, submit a copy of the page containing the registry bar code label to the Conservation Commission office.



Grafton Conservation Commission

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Form 5
Pg. 2 of 2

Grafton Wetlands Permit #:

Project Location:

This Permit is issued to the applicant and delivered as follows:

by hand delivery or by certified mail, return receipt requested

on (Date of Issuance):

The signatures electronically inserted below represent the intent to sign the foregoing document in accordance with MGL Chapter 110G §9 and pursuant to the Commission's electronic signature authorization vote recorded on 06/11/2020 in Book 62574 and Page 216 at the Worcester Registry of Deeds.

Signatures:

DocuSigned by:

F269FA88AC1486

DocuSigned by:
Patrick Huelgel
2E997C4E8EBCD421

DocuSigned by:

90861C277AE411

DocuSigned by:

90861C277AE411

DocuSigned by:
Jonathan McIerson
3742C598C898E1

DocuSigned by:

3742C598C898E1

This Permit must be signed by a majority of the Commission.

Any person aggrieved by this Permit or decision of the Commission, whether or not previously a party to the proceeding, may appeal according to MGL Ch. 249 §4. Appeals shall be made to Worcester Superior Court within sixty (60) days of the date of the signing and/or issuance of said Permit or decision, whichever is the later. Notice of the appeal and a copy of the complaint shall be sent by certified mail, or hand-delivered, to the Commission, the Town Clerk, its authorized representative, and Town Counsel, so as to be received within ten (10) days. The appeal shall contain any facts pertinent to the issue, a copy of the decision being appealed, bearing the date of filing thereof, the complete name and address of the party filing the appeal, the name and address of the attorney, if any, representing the person filing the appeal, and the relief being sought. If the appeal is filed by some person or persons other than the original applicant, appellants, or petitioner, the original applicant and all members of the Commission shall be named as parties defendant.

EXHIBIT 'A'

This Order of Conditions and Grafton Wetlands Permit are issued with the following special conditions:

Findings

1. The Commission determined that this project meets the performance standards of the general provisions of the Wetlands Protection Act. Additionally, the lack of possible, reasonable alternatives and the proposed mitigation measures allow the project to be permitted as a limited project under 310 CMR 10.53(3)(i).
2. Per the letter dated 5/4/21 from NHESP, it was determined that the project does not present any adverse impacts to mapped habitats.
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AND
 - II. A **letter** from a Massachusetts Registered Professional Engineer that certifies compliance of the project with this Order/Permit and details any deviations that exist, along with their potential effect on the project. A statement that the work is in "substantial compliance" without detailing the deviations shall not be accepted.
OR
 - III. A complete **as-built plan** shown as a bolded overlay on top of the approved plans with any deviations shown in red, signed and stamped by a Massachusetts Registered Professional Engineer or Land Surveyor

Ongoing Conditions:

29. A **no-disturb zone** of a minimum of twenty-five (25) feet shall be maintained along the upland edge of bordering vegetated wetlands. This area must be allowed to grow naturally and undisturbed. This condition is ongoing and does not expire with the issuance of a Certificate of Compliance.
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