TOWN OF NORTH READING

INVITATION FOR BIDS

Contract No. 2024-04E: Chestnut Street over Ipswich River – Bridge Replacement

BRIDGE REPLACEMENT
CHESTNUT STREET OVER IPSWICH RIVER (N-18-003) (CMX)

BIDS DUE:
JANUARY 23, 2025
11:00 AM

At the

Department of Public Works Office
North Reading Town Hall
235 North Street
North Reading, Massachusetts 01864

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DIVISION 0

BIDDING AND CONTRACT REQUIRMENTS

INVITATION FOR BIDS

The Town of North Reading through its Town Administrator is seeking sealed bids for the replacement of the existing bridge carrying Chestnut Street over Ipswich River. The project includes demolition of the existing twin culverts, construction of new bridge abutments, wingwalls, precast concrete deck beams, concrete topping slab, bridge railing, and utility supports. The work also includes the temporary control of water, construction of rip-rap, modified rockfill slope, full depth pavement, HMA pavement mill and overlay, cement concrete sidewalk, sidewalk flumes, clearing and grubbing, wetland replication and other incidental work. Construction is expected to be completed by November 28, 2025 starting on or before April 1, 2025.

Clearly marked sealed bids will be received at the North Reading Town Hall in the Department of Public Works Office, 235 North Street, North Reading, MA 01864 on or before **Thursday January 23, 2025 at 11:00 AM, no exceptions,** at which time sealed bids will be read out loud at the North Reading Town Hall, Room 14, 235 North Street, North Reading, MA 01864. See bid documents described below for requirements of an acceptable bid.

The bidding for and award of the contract for this project are to be in accordance with the requirements of Massachusetts General Laws Chapter 30 § 39M. Bidders shall be pre-qualified by the Massachusetts Department of Transportation with a class of work as, **Bridge – Construction**, for the project with an estimated value of **$3,416,492.50**, in accordance with MGL Chapter 81, Section 8B. Bidders are on notice that this project is subject to the schedule of prevailing wage rates as determined by the Commissioner of the Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety and applicable Federal Regulations.

The Proposal Guaranty shall be in the form of either cash, bid bond, certified check, bank treasurer's check, or bank cashier's check, made payable to the Town of North Reading in the amount of 5% of the value of the bid including add alternates.

Bid documents containing specification requirements and conditions will be available after 10:00 a.m. Thursday, December 26, 2024 on TEC, Inc's. website, www.theengineeringcorp.com/bids. For more information or questions regarding bid specifications, please contact Kasey Burke at kburke@theengineeringcorp.com. Questions will not be received after 12:00 p.m. on Monday, January 9, 2025. Contract Award is subject to availability of Funding through the Town of North Reading.

A non-mandatory pre-bid meeting is scheduled for Thursday, January 9, 2025 at 10:00 am at the North Reading Town Hall, Room 14, 235 North Street, North Reading, MA 01864.

Proposals that do not include a properly completed "Affidavit" pertaining to noncollusion, etc., will be declared non-responsive and not eligible for award consideration. No Bidder may withdraw their bid for a period of thirty days, excluding Saturdays, Sundays and legal holidays after the actual date of the opening of bids.

One original shall be submitted. NO faxed or emailed proposals will be accepted. Bids are to be submitted in a SEALED envelope.

If submitting a bid in a mailer, the enclosed bid shall be in a separate sealed envelope.

The Town of North Reading fully complies with federal, state, and local laws and directives governing equal opportunity, affirmative action and non-discrimination in all Town activities and actively solicits bids/proposals from MBE/WBE businesses in accordance with Town of North Reading policy.

The Town reserves the right to waive any informality and to reject any or all bids if it is in the public interest to do so.

Michael P. Gilleberto
North Reading Town Administrator

INFORMATION FOR BIDDERS

1.01 PROJECT IDENTIFICATION

A.	Owner:	Town of North Reading, Massachusetts
B.	Awarding Authority:	By its Town Administrator
C.	Mailing Address:	Department of Public Works Office North Reading Town Hall 235 North Street North Reading, Massachusetts 01864
D.	Project Name:	**BRIDGE REPLACEMENT AT CHESTNUT STREET OVER IPSWICH RIVER (N-18-003) (CMX)**
E.	Funding:	**Local**

1.02 RECEIPT OF BIDS

A. General Bids for the project will be received by the Awarding Authority at the time and place stated in Section 00020, INVITATION TO BID, and then at said place publicly opened and read aloud.

B. Each bid must be submitted in a sealed envelope, addressed to the North Reading Town Hall, Department of Public Works Office, 235 North Street, North Reading, MA 01864. Each sealed envelope containing a bid must be plainly marked on the outside with **2024-04E: Chestnut Street over Ipswich River – Bridge Replacement** and the envelope should bear on the outside the name of the Bidder and his address. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to

the North Reading Department of Public Works at the above address. Each must be time stamped and signed by a Town Employee upon receipt.

C. All bids must be made on the bid form included in the specifications. All blank spaces for bid prices must be filled in, in ink or typewritten, and the bid form must be fully completed and executed when submitted. Only one (1) set of the bid documents is required.

D. List of required Documents for General Bid submission:

1. Section 00300, Bid Form

   a. References
   b. Certificate of Non-Collusion
   c. Conflict of Interest Statement

3. Section 00310, Bid Bond (see Article 1.08 below)

4. Section 00311, Bidder's Certification Regarding Payment of Prevailing Wages

E. Section 00375, STATEMENT OF TAX COMPLIANCE, must be submitted to the Owner before the award of the contract.

1.03 ABILITY AND EXPERIENCE OF BIDDER

A. No award will be made to any bidder who cannot satisfy the Owner that he has sufficient ability and experience in this class of work and sufficient capital and plant to enable him to prosecute and complete the Work successfully within the time named. The Owner's decision or judgment on these matters shall be final, conclusive and binding.

B. MassDOT prequalification with the class of work as **Bridge – Construction**, for the project with an estimated value of **$3,416,492.50** will be required of all bidders.

1.04 INFORMATION NOT GUARANTEED

A. All information given in the Contract Documents relating to the subsurface and other conditions, natural phenomena, existing pipes and other structures is from the best sources at present available to Owner. All such information is furnished only for the information and convenience of bidders and is not guaranteed.

B. It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes or other structures encountered during construction will be the same as those indicated in the contract documents.

C. It is agreed further and understood that no bidder or contractor shall use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner or the Engineer, arising from or by reason of any variance which may exist between the information made available and the actual subsurface or other conditions, natural phenomena, existing pipes or other structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

1.05 MODIFICATIONS AND WITHDRAWAL OF BIDS

A. The Owner may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. Should there be reasons why the Contract cannot be awarded within the specified period; the time may be extended by mutual agreement between Owner and the Bidder.

B. No Bidder may withdraw his bid within thirty (30) calendar days, excluding Saturdays, Sundays and legal holidays after the actual date of the bid opening.

C. Prior to Bid Opening, bids may be withdrawn upon written or telegraphic request of the Bidder provided confirmation of any telegraphic withdrawal, signed by the Bidder, is placed in the mail and postmarked prior to the time set for the Bid Opening. Bid documents and security of any Bidder withdrawing his bid in accordance with the foregoing conditions will be returned.

1.06 EXAMINATION OF CONTRACT DOCUMENTS AND SITE(S)

A. Each Bidder is responsible for inspecting the sites and for reading and being thoroughly familiar with the contract documents. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to their bid.

B. Bidders must satisfy themselves of the accuracy of their bid by examination of the site(s) and a review of the Contract Documents. After bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be done.

C. The Contract Documents contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the Owner or any other person shall not affect the risks or obligations assumed by the Bidder or relieve him from fulfilling any of the conditions of the Contract.

1.07 ADDENDA AND INTERPRETATIONS

A. All questions by prospective Bidders as to the interpretation of the Contact Documents shall be submitted in writing to the Engineer and shall be in their possession by 12:00 PM on Monday, January 13, 2025. The Engineer will then post interpretations of all questions to TEC, Inc's website and notify all registered plan holders of said posting by 12:00 on Friday, January 17, 2025.

B. Oral or telephone interpretations will not be generally made, and if made, shall be strictly informal and not legally valid or binding.

C. Written interpretations shall be made in the form of Addenda to the Bidding and Contract Documents. Bidders are urged to communicate all errors and discrepancies found in the Bidding and Contract Documents to the Engineer. Telephone calls pointing out any such errors or discrepancies will be taken by the Engineer, but only for the purpose of receiving the information in order that it may be properly processed, and not for interpretation or clarification.

D. Each Bidder shall be responsible for determining that they have received all addenda issued and shall acknowledge said receipt on Section 00300, BID FORM.

E. All potential bidders must register as a plan holder at https://theengineeringcorp.com/bids to be eligible to receive addenda.

1.08 BIDS, BONDS, AND AWARD OF CONTRACT

A. Each bid must be accompanied by a bid bond, certified check or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the Owner in the amount of five (5) percent of the value of the total bid (base bid plus bid alternate). As soon as bid prices have been compared, the Owner will return the bid deposits of all except the three (3) lowest responsible Bidders. When the Agreement is executed, the bid deposits of the two (2) remaining unsuccessful Bidders will be returned. The bid deposit of the successful Bidder will be retained until the payment bond has been executed and approved, after which it will be returned.

B. Each Bidder shall sign his name in the space provided for. If a partnership or corporation makes the bid, the name and address of the partnership or corporation shall be shown, together with the names of the partners or the officers. A bid made by a partnership shall be acknowledged by one of the partners; a bid made by a corporation shall be acknowledged by one of the authorized officers thereof, and the corporate seal attached.

C. A conditional or qualified bid will not be accepted.

D. Bids will be compared on the basis of the total price stated in the bid. In the event that there is a discrepancy in the bid between written words and figures, the prices written in words shall govern. The Owner agrees to examine and consider each bid submitted in consideration of the bidder’s agreements, as hereinabove set forth and as set forth in the bid. The contract will be awarded to “the lowest responsible and eligible bidder” pursuant to General Laws Chapter 30, Section 39M, as amended. 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. Contract award shall be subject to availability of an appropriation for funding.

E. The Owner may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein. The Owner may also reject bids which in its sole judgment are either incomplete, conditional, obscure or not responsive or which contain additions not called for, erasures not properly initialed, alterations, or similar irregularities, or the Owner may waive such omissions, conditions or irregularities.

F. The low Bidder shall supply the names and addresses of major material Suppliers and Subcontractors when required to do so by the Owner.

G. A payment bond in the amount of fifty (50) percent of the contract price, with a corporate surety approved by the Owner, will be required of the General Contractor for the faithful performance of the contract, and may be required by the General Contractor of Sub-

contractors. If bonds are required of sub-contractors, the General Contractor shall pay the premiums for these bonds.

H. Attorneys-in-fact who sign bid bonds or payment bonds must file with each bond a certified and effective dated copy of their power of attorney.

1.09 REDUCTION IN SCOPE OF WORK

A. The Owner reserves the right to decrease the scope of the work to be done under this contract and to omit any work in order to bring the cost within available funds. To this end, the Owner reserves the right to reduce the quantity of any items or omit all of any progress of work. The Owner further reserves the right, at any time during the progress of the work, to restore all or part of any items previously omitted or reduced. Exercise by the Owner of the above rights shall not constitute any ground or basis of claim for damages or for anticipated profits on the work omitted.

1.10 EXECUTION OF THE AGREEMENT

A. The party to whom the Contract is awarded will be required to execute the Section 00500, FORM OF AGREEMENT and obtain the payment bond, and certificates of insurance within ten (10) calendar days from the date when Section 00430, NOTICE OF AWARD is delivered to the Bidder. If any Bidder fails to execute the Section 00500, FORM OF AGREEMENT and furnish a payment bond as stated in his bid, his bid deposit shall become the property of the Owner as liquidated damages, provided that in case of death, disability or other unforeseen circumstances affecting the Bidder, his bid deposit may be returned to him, provided further that the amount of the bid deposit to be retained shall not exceed the difference between the low bid and the bid of the next lowest eligible Bidder.

1.11 INSURANCE CERTIFICATES

A. The Contractor will not be permitted to start any construction work until he has submitted certificates covering all insurances called for under Article 6 of the General Conditions.

1.12 NOTICE TO PROCEED

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

1.13 TIME SCHEDULE FOR COMPLETION OF WORK

A. The work in this contract shall be completed by October 15, 2025. Work performed beyond the agreed upon timeframe may be subject to liquidated damages in the amount specified herein.

B. It is the intent of this contract that the road closure/Contractor mobilization shall not occur until after the execution of this contract and be completed in accordance with the schedule outlined in the contract documents. Prospective bidders shall be aware of the time constraints related to the gas utility work described later in the project documents.

C. Submittals, material approvals, and material procurement, etc. are expected to occur immediately upon contract procurement to facilitate April 2025 contractor mobilization/road closure.

1.14 WAGE RATES

A. Minimum wage rates, as determined by the Department of Labor and Workforce Development, under the provision of the Massachusetts General Laws, Chapter 149, Sections 26 to 27H, as amended, apply to this Project. It is the responsibility of the Bidder, before Bid Opening, to request, if necessary, any additional information on Massachusetts Wage Rates for those trades' people who are not covered by the applicable Massachusetts Wage Decision, but who may be employed for the proposed work under this Contract.

B. In accordance with Chapter 149, Section 27B, it is the responsibility of the Contractor and any Subcontractors to submit payroll records to the Owner on a weekly basis.

1.15 LAWS AND REGULATIONS

A. Applicable provisions of Massachusetts General Laws and Regulations and/or the United States Code and Code of Federal Regulations govern this Contract and any provision violation of the foregoing shall be deemed null, void and of no effect.

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

C. This project is subject to all of the OSHA Safety and Health Regulations (see 29 CFR Part 1926/1910 and all subsequent amendments) as promulgated by the United States Department of Labor on June 24, 1974 and to the Massachusetts, "Construction Industry Rules and Regulations", 454 CMR 10.00, et seq. Contractors shall be familiar with the requirements of these regulations, and all other pertinent regulations and requirements.

D. Certain provisions of the Massachusetts General Laws are applicable to the construction contracts including, but not limited to, those contained in Chapter 30 and Chapter 149. All applicable provisions of the Massachusetts General Laws are incorporated into the Contract as if fully set forth herein and shall prevail over any conflicting provisions of the Contract Documents. Special attention is called to the Contract being bid on under the provisions of Massachusetts General Laws Chapter 30 Section 39M.

E. This Project is a local project being bid, awarded and administered by the Owner (Town of North Reading, Massachusetts) through its awarding authority (Town Administrator's office). All bidders are on notice that the Contractor awarded this work shall be specifically required:

- To possess and/or obtain all licenses and permits necessary to complete performance under this Contract;
- To comply with M.G.L. Chapter 62C, Section 49A (compliance with Tax Laws);
- To comply with M.G.L. Chapter 151A, Section 19A (licenses to conduct business; contributions);

- To comply with M.G.L. Chapter 152 (Workers Compensation);
- To comply with all relevant Prevailing Wage Rates and Employment Laws;
- To comply with M.G.L. Chapter 156B and Chapter 181, Section 4, and has filed all required certificates and reports with the Secretary of State and the Attorney General's Office;
- To comply with Federal Anti-Lobbying requirements of 31 USC 1352;
- That it and any of its subcontractors are not currently disbarred or suspended by the Federal Government or the Commonwealth under any law, regulation or Executive Order;
- To comply with M.G.L. Chapter 268A (Conflict of Interest)

Federal and State laws and regulations prohibiting discrimination, including the American Disabilities Act, the Rehabilitation Act, the Federal Fair Housing Act, unlawful discrimination (M.G.L. Chapter 151B), business discrimination (M.G.L. Chapter 151E), the Public Accommodations Law (M.G.L. Chapter 272, Sections 92A, 98 and 98A), the Massachusetts Constitution, Article CXIV, M.G.L. Chapter 93, Section 103, the Telecommunications Act, and the Attorney General Office Protection of Elders, apply to this Contract.

1.16 INSPECTION OF THE WORK

A. The Contractor shall provide at all times proper facilities for access and inspection by representatives of the Owner, Federal, State or other agency having jurisdiction over the work of this project.

1.17 SALES TAX

A. This project is exempt from State Sales and Use or Excise Taxes to the extent allowed by law.

1.18 GUARANTEES

A. In addition to other guarantees due the Owner, the Contractor guarantees that the Work and services to be performed under the Contract, and all workmanship, materials and equipment performed, furnished, used or installed in the construction shall be free from defects and flaws, and shall be performed and furnished in strict accordance with the Contract Documents, that the strength of all parts of all manufactured equipment shall be adequate and as specified and that the performance test requirements of the Contract shall be fulfilled. This guarantee shall be for a period of one year from and after the date of completion and acceptance of the Work as stated in the final estimate. If part of the Work is accepted in accordance with that subsection of this Agreement titled Partial Acceptance, the guarantee for that part of the Work shall be for a period of one year from the date fixed for such acceptance. The Payment Bond shall remain in full force and effect through the Guarantee Period.

B. If at any time within the said period of guarantee any part of the Work requires repairing, correction or replacement, the Owner may notify the Contractor in writing to make the required repairs, correction, or replacements. If the Contractor neglects to commence making such repairs, corrections, or replacements to the satisfaction of the Owner within three days from the date of receipt of such notice, or having commenced fails to prosecute such Work with diligence, the Owner may employ other persons to make the same, and all direct and indirect costs of making said repairs, correction or replacements, including compensation for additional professional services, shall be paid by the Contractor.

1.19 RECORD KEEPING

A. The Contractor is reminded that the provisions of Chapter 30, Section 39R relative to record keeping apply to this Contract. A brief summary of the requirements is as follows:

1. The Contractor and all subcontractors shall maintain books, records, and accounts at least six (6) years after the final payment. They will be subject to inspection by the awarding authority, officers of the Inspector General, or the Deputy Commissioner of Capital Asset Management and Maintenance.

2. Any changes in Town record keeping or recording transactions that affect the awarding authority shall be explained along with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.

3. The Contractor shall file with the awarding authority a statement of management as to whether the system of internal accounting controls has been established.

4. The Contractor shall file with the awarding authority a statement prepared and signed by an independent certified public accountant that an examination has been made of internal accounting controls.

1.20 ENGINEER

A. The Engineer for this project is The Engineering Corp. (TEC). Questions regarding the Contract Documents shall be directed to: TEC:
Kasey Burke, kburke@theengineeringcorp.com

END OF SECTION

BID FORM

To the Town of North Reading, Massachusetts, herein called the Owner, acting by and through its Town Administrator, for the **Bridge Replacement at Chestnut Street Bridge over Ipswich River (N-18-003) (CMX), Project No. 2024-04E.**

The Undersigned, as bidder, herein referred to as singular and masculine, declares as follows:

(1) The only parties interested in this BID as Principals are named herein;

(2) This BID is made without collusion with any other person, firm, or corporation;

(3) No officer, agent, or employee of the Owner is directly or indirectly interested in this BID;

(4) He has carefully examined the site of the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this BID, and he has carefully read and examined the Documents, the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;

(5) He understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the Documents or in any of the other Contract Documents and he agrees that he shall not use or be entitled to use any such information made available to him through the Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner or the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and he has made due allowance therefore in this BID;

(6) And he understands that the quantities of work tabulated in this BID or indicated on the Documents or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer/Owner;

(7) He agrees that, if this BID is accepted he will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Contract Documents, and that he will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of the Engineer as therein set forth, and that he will take in full payment therefore the lump sum for the Work as stated in the schedule below.

(Note: Bidders must bid on each item. All entries in the entire BID must be made clearly and in ink; prices bid must be written in both words and figures. In case of discrepancy, the amount shown in words will govern.)

(Bidders should insert extended item prices obtained from quantities and unit prices.)

TO: Department of Public Works Office
North Reading Town Hall
235 North Street
North Reading, MA 01864

PROJECT: **Bridge Replacement at Chestnut Street Bridge over Ipswich River (N-18-003) (CMX)**
Project No. 2024-04E

DATE: _____

SUBMITTED BY:

_____
(Full name)

_____
(Full address)

_____

Bridge Replacement – Work Items

Note:
The unit price for each item must be written in words and figures. In case of discrepancy, the amount shown in words will govern.

ITEM NO.	QTY	ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE		TOTAL	
			DOLLARS	CENTS	DOLLARS	CENTS
101.	0.4	AT CLEARING AND GRUBBING PER ACRE				
102.1	100	AT TREE TRIMMING PER FOOT				
102.511	2	AT TREE PROTECTION - ARMORING & PRUNING PER EACH				
115.1	1	AT DEMOLITION OF BRIDGE NO. N-18-003 PER LUMP SUM				
120.	250	AT EARTH EXCAVATION PER CUBIC YARD				
121.	5	AT CLASS A ROCK EXCAVATION PER CUBIC YARD				
140.	900	AT BRIDGE EXCAVATION PER CUBIC YARD				
141.	15	AT CLASS A TRENCH EXCAVATION PER CUBIC YARD				
141.1	15	AT TEST PIT FOR EXPLORATION PER CUBIC YARD				
144.	10	AT CLASS B ROCK EXCAVATION PER CUBIC YARD				
148.	550	AT DREDGING AND DISPOSING OF MATERIAL PER CUBIC YARD				
150.	50	AT ORDINARY BORROW PER CUBIC YARD				
151.	325	AT GRAVEL BORROW PER CUBIC YARD				

CARRIED FORWARD _____

BT-1

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
151.2	700	AT	GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES PER CUBIC YARD				
153.1	15	AT	CONTROLLED DENSITY FILL - NON-EXCAVATABLE PER CUBIC YARD				
156.	90	AT	CRUSHED STONE PER TON				
156.1	325	AT	CRUSHED STONE FOR BRIDGE FOUNDATIONS PER TON				
170.	700	AT	FINE GRADING AND COMPACTING - SUBGRADE AREA PER SQUARE YARD				
181.11	20	AT	DISPOSAL OF UNREGULATED SOIL PER TON				
181.12	10	AT	DISPOSAL OF REGULATED SOIL - IN-STATE FACILITY PER TON				
181.13	10	AT	DISPOSAL OF REGULATED SOIL - OUT-OF-STATE FACILITY PER TON				
181.14	8	AT	DISPOSAL OF HAZARDOUS WASTE PER TON				
258.	5	AT	STONE FOR PIPE ENDS PER SQUARE YARD				
280.15	1	AT	SIDEWALK FLUME PER LUMP SUM				
302.08	220	AT	8 INCH DUCTILE IRON WATER PIPE (RUBBER GASKET) PER FOOT				

CARRIED FORWARD _____

BT-2

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
309.	425	AT	DUCTILE IRON FITTINGS FOR WATER PIPE PER POUND				
373.08	120	AT	8 INCH WATER PIPE INSULATION PER FOOT				
375.08	2	AT	8 INCH INSERTION VALVE AND BOX PER EACH				
415.2	550	AT	PAVEMENT FINE MILLING PER SQUARE YARD				
440.	1600	AT	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL PER POUND				
443.	6	AT	WATER FOR ROADWAY DUST CONTROL PER THOUSAND GALLONS				
450.31	60	AT	SUPERPAVE INTERMEDIATE COURSE - 12.5 (SIC -12.5) PER TON				
450.42	125	AT	SUPERPAVE BASE COURSE - 37.5 (SBC - 37.5) PER TON				
450.601	120	AT	SUPERPAVE BRIDGE SURFACE COURSE - 9.5 POLYMER (SSC-B - 9.5 - P) PER TON				
450.701	20	AT	SUPERPAVE BRIDGE PROTECTIVE COURSE - 9.5 POLYMER (SPC-B - 9.5 - P) PER TON				
451.	10	AT	HMA FOR PATCHING PER TON				
452.	175	AT	ASPHALT EMULSION FOR TACK COAT PER GALLON				

CARRIED FORWARD _____

BT-3

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
453.	1020	AT	HMA JOINT ADHESIVE PER FOOT				
470.	2	AT	HOT MIX ASPHALT BERM PER TON				
472.	10	AT	TEMPORARY ASPHALT PATCHING PER TON				
504.2	1	AT	GRANITE CURB TYPE VA4 - SPLAYED END PER EACH				
506.	225	AT	GRANITE CURB TYPE VB - STRAIGHT PER FOOT				
509.	45	AT	GRANITE TRANSITION CURB FOR PEDESTRIAN CURB RAMPS - STRAIGHT PER FOOT				
620.12	220	AT	GUARDRAIL, TL-2 (SINGLE FACED) PER FOOT				
620.131	160	AT	GUARDRAIL, DEEP POST (SINGLE FACED) PER FOOT				
627.1	1	AT	TRAILING ANCHORAGE PER EACH				
627.82	3	AT	GUARDRAIL TANGENT END TREATMENT, TL-2 PER EACH				
628.21	1	AT	TRANSITION TO NCHRP 350 GUARDRAIL PER EACH				
628.24	6	AT	TRANSITION TO BRIDGE RAIL PER EACH				

CARRIED FORWARD _____

BT-4

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
697.1	1	AT	SILT SACK PER EACH				
697.2	50	AT	FLOATING SILT FENCE PER FOOT				
698.1	125	AT	GEOTEXTILE FABRIC FOR STABILIZATION PER SQUARE YARD				
698.3	5	AT	GEOTEXTILE FABRIC FOR SEPARATION PER SQUARE YARD				
698.4	150	AT	GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL PER SQUARE YARD				
701.	125	AT	CEMENT CONCRETE SIDEWALK PER SQUARE YARD				
701.2	24	AT	CEMENT CONCRETE PEDESTRIAN CURB RAMP PER SQUARE YARD				
748.	1	AT	MOBILIZATION PER LUMP SUM				
751.	100	AT	LOAM FOR ROADSIDES PER CUBIC YARD				
751.7	10	AT	COMPOST BLANKET PER CUBIC YARD				
755.35	1	AT	INLAND WETLAND REPLICATION AREA PER LUMP SUM				
755.75	80	AT	WETLAND SPECIALIST PER HOURS				
756.	1	AT	NPDES STORMWATER POLLUTION PREVENTION PLAN PER LUMP SUM				
765.	700	AT	SEEDING PER SQUARE YARD				

CARRIED FORWARD _____

BT-5

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
765.453	2	AT	WOODLAND EDGE SHADE SEED MIX PER POUND				
765.635	3	AT	NATIVE SEEDING AND ESTABLISHMENT PER POUND				
767.121	800	AT	SEDIMENT CONTROL BARRIER PER FOOT				
767.78	125	AT	COMPOST MULCH OVER MODIFIED ROCK PER SQUARE YARD				
769.	475	AT	PAVEMENT MILLING MULCH UNDER GUARD RAIL PER FOOT				
847.1	1	AT	SIGN SUP (N/GUIDE)+RTE MKR W/1 BRKWAY POST ASSEMBLY - STEEL PER EACH				
866.106	800	AT	6 INCH REFLECTORIZED WHITE LINE (THERMOPLASTIC) PER FOOT				
867.106	850	AT	6 INCH REFLECTORIZED YELLOW LINE (THERMOPLASTIC) PER FOOT				
874.2	1	AT	TRAFFIC SIGN REMOVED AND RESET PER EACH				
874.8	1	AT	MISCELLANEOUS SIGNS REMOVED AND RESET PER EACH				
903.	15	AT	3000 PSI, 1.5 INCH, 470 CEMENT CONCRETE PER CUBIC YARD				
945.03	4	AT	30-INCH UTILITY POLE CAISSON PER EACH				
983.1	375	AT	RIPRAP PER TON				

CARRIED FORWARD _____

BT-6

BROUGHT FORWARD _____

ITEM NO.	QTY		ITEM WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE DOLLARS	UNIT PRICE CENTS	TOTAL DOLLARS	TOTAL CENTS
986.	80	AT	MODIFIED ROCKFILL PER TON				
991.1	1	AT	CONTROL OF WATER - STRUCTURE NO. N-18-003 PER LUMP SUM				
992.321	1	AT	TEMPORARY UTILITY SUPPORT FOR 4" GAS LINE PER LUMP SUM				
995.01	1	AT	BRIDGE STRUCTURE, BRIDGE NO. N-18-003 PER LUMP SUM				

TOTAL _____

BT-7

BASIS OF AWARD: The bid combination listed above serving as the basis of award shall be contingent on available funding.

Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by TEC, Inc., the undersigned, hereby offer to enter into a Contract to perform the Work, **Bridge Replacement at Chestnut Street Bridge over Ipswich River (N-18-003) (CMX), Project No. 2024-04E,** for the Price of:

$_____dollars,

($_____) in lawful money of the United States of America and, We have included herewith, the unit price bid forms, and the required security deposit or Bid Bond as required by the Instruction to Bidders.

This project is exempt from all Massachusetts sales taxes.

The undersigned agrees that for extra work, if any, will be performed in accordance with Article 10 of the General Conditions of the Contract and will be paid for in accordance with Article 11 of the General Conditions of the Contract.

The bid security accompanying this BID shall be in the amount of 5 percent of the BID.

If this BID is accepted by the Owner, the undersigned agrees to complete the entire work provided to be done under the Contract within the agreed upon time frame between the Contractor and Town stipulated in the AGREEMENT. Liquidated damages for each calendar day of delay shall be $250 as stipulated in the AGREEMENT.

As provided in the INFORMATION FOR BIDDERS, the bidder hereby agrees that he will not withdraw this BID within thirty (30) calendar days, Saturdays, Sundays, and legal holidays excluded after the actual date of the opening of Bids and that, if the Owner shall accept this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within ten (10) days after notification that the AGREEMENT and other Contract Documents are ready for signature.

Should the bidder fail to fulfill any of his agreements as hereinabove set forth, the Owner shall have the right to retain as liquidated damages the amount of the bid check or cash which shall become the Owner's property. If a bid bond was given, it is agreed that the amount thereof shall be paid as liquidated damages to the Owner by the Surety.

Bidder has examined copies of all the Contract Documents and the following addenda listed:

Addenda number(s) _____ or circle: N/A
(To be filled in by Bidder if Addenda are issued.)

The time period for holding bids where Federal approval is not required is 30 days, Saturdays, Sundays and legal holidays included, after the opening of bids and where Federal approval is required, the time period for holding bids is 30 days, Saturdays, Sundays and legal holidays excluded after Federal approval.

The undersigned must furnish a 50 percent Construction Payment Bond with a surety company acceptable to the Owner. The name and address of the surety company who will sign the payment bond is as follows:

_____

The bidder, by submittal of this BID, agrees with the Owner that the amount of the bid security deposited with this BID fairly and reasonably represents the amount of damages the Owner will suffer due to the failure of the bidder to fulfill his agreements as above provided.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to MGL Ch. 30, Section 39M. The bidding and award of the contract will be in full compliance with Section 39M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated there under.

Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The attached CERTIFICATE OF NON-COLLUSION must be signed and submitted as part of the Bid Proposal.

(SEAL)_____L.S. By _____
(Name of Bidder) (Signature and title of authorized representative)

_____
(Business address)

_____
(City and State)

Date _____

The bidder is a corporation incorporated in the State (or Commonwealth) of _____ - a partnership - an individual. (Bidder must add and delete as necessary to make this sentence read correctly.)

(Note: If the bidder is a corporation, affix corporate seal and give below the names of its president, treasurer, and general manager if any; if a partnership, give full names and residential addresses of all partners; and if an individual, give residential address if different from business address.)

The required names and addresses of all persons interested in the foregoing Bid, as Principals, are as follows:

_____

_____

_____

_____

The bidder is requested to state below what work of a similar character to that included in the proposed Contract he has done and to give references that will enable the Owner to judge his experience, skill, and business standing.

_____

_____

_____

_____

(Add supplementary page if necessary.)

* * *

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 other person. As used in this certification, the work "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

_____
(Name of person signing bid or proposal)

_____
(Name of business)

CONFLICT OF INTEREST STATEMENT

The proposer hereby certifies, under the penalties of perjury, that:

1. The proposer has not given, offered, or agreed to give any person (as that term is defined below), or received, accepted, or agreed to accept from any person, any gift, contribution, offer of employment, or financial incentive of any kind as an inducement for, or in connection with, the award of the contract for services for which the proposer is applying.
2. No consultant to or subcontractor for the proposer has given, offered, or agreed to give any gift, contribution, offer of employment or financial incentive of any kind to the proposer of to any other person as an inducement for, or in connection with, the award to the consultant or subcontractor of a contract by the proposer.
3. No person, other than a bona fide full-time employee of the proposer has been retained or hired by the proposer to solicit for or in any way assist the proposer in obtaining the contract for services for which the proposer is applying, upon an agreement or understanding that such person be paid a fee or other consideration contingent upon the award of the contract to the proposer.
4. Throughout the duration of the contract, if awarded the contract, the proposer will not have any financial relationship in connection with the performance of the contract with any materials or system manufacturer, distributor or vendor.

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. These provisions shall not apply to any stockholder of a corporation the stock of which is listed for sale to the general public with the Securities and Exchange Commission, if such stockholder holds less than ten percent of the outstanding stock entitled to vote at the annual meeting of such corporation

The proposer further hereby certifies, under the penalties for perjury, that all information provided in this proposal to provide services is true and correct.

_____
Firm Name

_____
Authorized Principal (Printed Name)

_____
Authorized Principal (Signature)

_____
Title

_____
Date

BID BOND

Know all men by these presents, that we, the undersigned, _____
_____ As Principal,
and _____ as Surety, are
hereby held and firmly bound unto _____ as
Owner in the penal sum of
_____ for the payment of
which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20_____.

The Condition of the above obligation is such that whereas the Principal has submitted to
_____ a certain Bid, attached hereto
and hereby made a part hereof to enter into a contract in writing, for the
_____
_____
_____

Now, therefore,

(a) If said Bid shall be rejected, or
(b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a Bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation, shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its Bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid and said Surety does hereby waive notice of any such extension.

In witness whereof, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)
Principal

_____
Surety

By: _____

Important - Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

CERTIFICATION REGARDING
PAYMENT OF PREVAILING WAGES

The undersigned Bidder hereby certifies, under the pains and penalties of perjury, that the foregoing bid is based upon the payment to laborers to be employed on the project of wages in an amount no less than the applicable prevailing wage rates established for the project by the Massachusetts Department of Labor and Workforce Development, Division of Occupational Safety. The undersigned bidder aggress to indemnify the awarding authority for, from and against an loss, expanse, damages, actions or claims, including any expense incurred in connection with any delay or stoppage of the project work, arising out of or as a result of (1) the failure of the said bid to be based upon the payment of the said applicable prevailing wage rates or (2) the failure of the bidder, if selected as the Contractor, to pay laborers employed on the project the said applicable prevailing wage rates.

DATED: _____ NAME OF BIDDER: _____

By: _____

Name: _____

Title: _____

_____, MASSACHUSETTS

LLC CERTIFICATE OF INCUMBENCY AND AUTHORITY

_____, LLC

I, _____, do hereby certify that:

1. I am the duly elected and acting _____ of _____ LLC, a limited liability company organized and existing in good standing under the laws of the State of _____ (the "Company").

2. Attached hereto as Exhibit A is a true and correct copy of resolutions which were duly adopted by the members of the Company on _____, 20___.

3. The attached resolutions have not been amended, rescinded or modified and are in full forces and effect on the date hereof in the form originally adopted, and are in conformity with the Articles of Organization and Operating Agreement of the Company.

4. Attached hereto as Exhibit B is a true and correct copy of the Articles of Organization dated _____, 20___ and the Operating Agreement dated _____, 20___.

5. The attached Articles of Organization and Operating Agreement have not been amended, rescinded, or modified and are in full forces and effect on the date hereof.

6. The following person are the Authorized Officers of the Company in the capacities indicated, and the signatures set forth after their names and titles are their true and genuine signatures.

Name	Office	Signature

Witness, my signature and the seal of the Company this ___day of _____, 20__.

_____
Name:
Title:

CERTIFICATE OF VOTE

(to be filed if Contractor is a Corporation)

I, _____, hereby certify that I am the duly qualified
(Secretary of the Corporation)

and acting Secretary of _____ and I further certify that a meeting of the
(Name of Corporation)

Directors of said Company, duly called and held on _____, at which
(Date of Meeting)

all Directors were present and voting, the following vote was unanimously passed:

VOTED: To authorize and empower

_____

_____

_____

_____

_____

Anyone acting singly, to execute Forms of General Bid, Contracts or Bonds on behalf of the Corporation.

I further certify that the above vote is still in effect and has not been changed or modified in any respect.

By:_____
(Secretary of Corporation)

A True Copy:

Attest:_____
(Notary Public)

My Commission Expires:_____
(Date)

CERTIFICATIONS REQUIRED BY LAW FOR PUBLIC CONSTRUCTION CONTRACTS

You must COMPLETE and SIGN the following certifications. You must also print, at the bottom of this page, the name of the contractor for whom these certifications are submitted.

TAX COMPLIANCE

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I, the undersigned, authorized signatory for the below named contractor, do hereby certify under the pains and penalties of perjury that said contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

NON-COLLUSION

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

PUBLIC CONTRACTOR DEBARMENT

The undersigned certifies under penalty of perjury that the below named contractor is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

OSHA TRAINING

Pursuant to G.L. c. 30, §39S, the Contractor hereby certifies under penalties of perjury as follows:

(1) Contractor is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work;
(2) All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration at the time the employee begins work and they shall furnish documentation of successful completion of said course with the first certified payroll report for each employee; and
(3) All employees to be employed in the work subject to this contract have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least 10 hours in duration.

COMPLETE AND SIGN BELOW:

_____ _____
Authorized Person's Signature Date

_____
Print Name & Title of Signatory

_____
Name of Contractor

BIDDERS QUALIFICATION FORM

The Bidder is requested to provide a general description and references for three projects he/she has completed within the past five years that are similar in character to that included in this contract. The Bidder shall provide: a general description of the projects; final construction cost for the projects; name, title, address and phone number of reference for whom the project was constructed. The Town will contact the references to judge the Bidders experience, skill, and qualifications.

1)

2)

3)

NOTICE OF AWARD

To:

Project Description:

The Town of North Reading hereinafter called "Owner" has considered the Bid submitted by you for the above described work in response to its DOCUMENT 00020, INVITATION TO BID dated _____2024, and DOCUMENT 00100, INFORMATION FOR BIDDERS. You are hereby notified that your Bid has been accepted in the amount of **$**

You are required by the DOCUMENT 00100, INFORMATION FOR BIDDERS to execute the DOCUMENT 00500, FORM FOR AGREEMENT and furnish the required Contractor's Payment Bond and Certificates of Insurance within ten (10) calendar days from the date of this Notice of Award. If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice of Award, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner. Dated this ___ th day of_____, 20__.

Owner: **TOWN OF NORTH READING, MA.**

By its Town Administrator

_____
Michael P. Gilleberto

Acceptance of Notice:

Receipt of the above Notice of Award is hereby acknowledged

by _____, this

_____day of _____, 20___

By _____

Title_____

FORM OF AGREEMENT

THIS AGREEMENT made this _____ day of _____

in the year Two Thousand and ____, between _____, with a

usual place of business at _____, hereinafter

called the CONTRACTOR, and the Town of _____, acting by its _____, with a

usual place of business at _____ Street, _____, MA _____, hereinafter called the

OWNER.

The CONTRACTOR and the OWNER, for the consideration hereinafter named, agree as follows:

1. Scope of Work

The Contractor shall furnish all labor, materials, equipment and insurance to perform all work required for the project known as the _____ Project, in strict accordance with the Contract Documents and all related Drawings and Specifications. The said Documents, Specifications, Drawings and any GENERAL SUPPLEMENTARY CONDITIONS are incorporated herein by reference and are made a part of this Agreement.

2. Contract Price

The Owner shall pay the Contractor for the performance of this Agreement, subject to additions and deductions provided herein, in current funds, the sum of _____.

3. Commencement and Completion of Work and Liquidated Damages

It is agreed that time is of the essence of this Agreement. The Contractor shall commence and prosecute the work under this Agreement upon execution hereof and shall complete the work on or before _____.

A. Definition of Term: The Term "Substantial completion" shall mean the date certified by the Owner when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner may occupy the project, or designated portion(s) thereof, for the use for which it is intended.

B. Time as Essential Condition: It is understood and agreed that the commencement of and substantial completion of the work are essential conditions of this Agreement. It is further agreed that time is of the essence for each and every portion of the Contract Documents wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract Documents any additional time is allowed for the completion of any work, the new time fixed by such extension shall be of the essence of this Agreement. It is understood and agreed that the times for the completion of the work are reasonable, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.

C. Progress and Completion: Contractor shall commence work promptly upon execution of this Agreement and shall prosecute and complete the work regularly, diligently and uninterruptedly at such a rate of progress as will insure Substantial Completion within the stipulated number of calendar days.

D. Liquidated Damages: It is expressly agreed between the Contractor and the Owner that the Contractor will be responsible for all damages which may arise due to the Contractor's failure to substantially complete the work within the above specified time. If the Contractor shall neglect, fail or refuse to complete the work within the specified number of days, or any extension thereof authorized by the Owner, Contractor agrees, as a part of the consideration for the execution of this Contract by the Owner, to pay the Owner the amount specified herein, not as a penalty, but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day, excluding Saturdays, Sundays and legal Holidays, that the Contractor shall be in default of Substantial completion after the date specified in the Agreement. Due to the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, said amount is agreed to be the amount of damages which the Owner would sustain, and said amount shall be retained from time to time by the Owner from current periodic estimates. The amount of liquidated damages shall be **$250** per day.

4. Performance of the Work

A. Direction of the Work: The Contractor shall supervise and direct the Work, using his best skills and attention which shall not be less than such state of skill and attention generally rendered by the contracting profession for projects similar to the Project in scope, difficulty and location. The Contractor shall maintain adequate supervisory personnel at the project site during the performance of the Work. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Agreement.

B. Responsibility for the Work: (1) The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees,

and other persons performing any of the Work under a contract with the Contractor. This obligation shall also extend to the presence on the Site of suppliers of materials or equipment, their employees, contractors, and agents engaged in the work.

(2) The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Owner in its administration of the Agreement, or by inspections, tests or approvals required or performed by persons other than the Contractor.

C. Permits and Fees: Unless otherwise expressly provided, the Contractor shall secure and pay for all permits and fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Agreement and which are legally required at the time the bids are received, and the same shall at all times be the property of the Owner and shall be delivered to the Owner upon completion of the Project.

D. Notices, Compliance With Laws: (1) The Contractor shall give all notices and comply with all federal, state and local laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work. The Contractor shall provide the Owner with reproductions of all permits, licenses and receipts for any fees paid. The Owner represents that it has disclosed to the Contractor all orders and requirements known to the Owner of any public authority particular to this Agreement.

(2) If the Contractor observes that any of the Contract Documents are at variance with applicable laws, statutes, codes and regulations in any respect, he shall promptly notify the Owner in writing, and any necessary changes shall be accomplished by appropriate modification.

(3) If the Contractor performs any Work which he knows or should know is contrary to such laws, ordinances, rules and regulations, and without such notice to the Owner, he shall assume full responsibility therefor and shall bear all costs attributable thereto.

(4) In the performance of the Work, the Contractor shall comply with all applicable federal, state and local laws and regulations including those relating to workplace and employee safety. The Contractor shall notify the Owner immediately of any conditions at the place of the work which violate said laws and regulations and shall take prompt action to correct and eliminate any such violations.

E. Project Superintendent: The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site at all times during the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the

Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case.

F. Progress Schedule: The Contractor, immediately after being awarded the Contract, shall prepare and submit for the Owner's information an estimated progress schedule for the Work. The progress schedule shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

G. Drawings, Specifications and Submittals:

(1) The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, and "As-Built" Drawings and Specifications in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be delivered to the Owner upon completion of the Work.

(2) By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

(3) The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Owner's approval of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Owner in writing of such deviation at the time of submission and the Owner has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Owner's approval thereof.

(4) The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Owner on previous submittals.

(5) No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the Owner. All such portions of the Work shall be in accordance with approved submittals.

H. Protection of the Work and Owner's Property: The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Agreement. He shall at all times safely guard and protect his own work, and that of adjacent property

from damage. The Contractor shall replace or make good any such damage, loss or injury. The Contractor shall clean the work area and restore it to its original condition upon completion of the work.

I. Quality of the Work: The Contractor shall perform the work in a good, workmanlike manner. The Contractor hereby guarantees that the entire work constructed by him under the Agreement will meet fully all requirements thereof as to quality of workmanship and materials. The Contractor hereby agrees to make at his own expense any repairs or replacements made necessary by defects in materials or workmanship supplied to him that become evident within one (1) year after the date of the final payment, and to restore to full compliance with the requirements set forth herein any part of the work constructed hereunder, which during said one (1) year period is found to be deficient with respect to any provisions of the Contract Documents. The Contractor also agrees to hold the Owner harmless from claims of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for same from the Owner. If the Contractor fails to make the repairs and replacements promptly, the Owner may do the work and the Contractor shall be liable to the Owner for the cost thereof.

J. Warranty: The Contractor guarantees to Owner that all materials incorporated into the work will be new unless otherwise specified or agreed. Prior to final payment, the Contractor shall deliver to the Owner all manufacturers' warranties, together with such endorsements or assignments as are necessary to ensure to the Owner the full rights and benefits of such warranties.

5. Affirmative Action/Equal Employment Opportunity

The Contractor is directed to comply with all applicable State Laws, Ordinances, Bylaws, and rules and regulations regarding affirmative action/equal employment opportunity requirements. Failure of the Contractor to comply with any such law, rule or regulation shall constitute grounds for the Owner to terminate the Agreement.

6. Site Information Not Guaranteed; Contractor's Investigation

All information given in the Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of the Contractor and is not guaranteed.

It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures encountered during construction will be the same as those indicated in the Contract Documents.

Contractor has familiarized himself with the nature and extent of the Contract Documents, work, locality, and with all local conditions and federal, state, and local laws, rules, ordinances, and regulations that in any manner may affect costs, progress, or performance of the work. Contractor has made, or has caused to be made, examinations, investigations, and tests and studies of such reports and related data in addition to those referred to in the paragraph above as he deems necessary for the performance of the work at the Contract Price, within the Contract Time, and in accordance with the other Terms and Conditions of the Contract Documents; and no additional examinations, tests, investigations, reports, and similar data are or will be required by the Contractor for such purposes.

Contractor has correlated the results of all such observations, examinations, investigations, tests, reports, and data with the Contract Documents. Contractor has given the Owner written notice of all conflicts, errors, or discrepancies that he has discovered in the Contract Documents, and the resolution thereof by the Owner is acceptable to the Contractor.

It is further agreed and understood that the Contractor shall not use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner, arising from or by reason of any variance which may exist between the information made available and the actual subsurface conditions or other conditions or structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

7. Project Architect or Engineer

There ___ is ___ is not a project architect-engineer for this project who is _____. Except as otherwise indicated in the Contract Documents, the Architect/Engineer shall be a representative of the Owner and the Contractor shall direct all communications, questions and comments on the work and the performance thereof to the Architect/Engineer. Except as otherwise provided, the Architect/Engineer shall have all the authority of the Owner set forth in the Contract Documents. In general, the Architect/Engineer shall have the authority to review the performance of the work, reject work which is defective or otherwise does not comply with the Contract Documents and to order the Contractor to remedy defective work and take such actions which are necessary to make the work conform to the Contract Documents.

8. Wage Rates

Prevailing Wage Rates as determined by the Commissioner of the Department of Labor and Workforce Development under the provisions of Massachusetts General Laws, Chapter 149, Section 26 to 27G, as amended, apply to this project. It is the responsibility of the Contractor to provide the Town with certified payrolls and to comply with all requirements of the above-cited statutes.

The schedules of prevailing wage rates are included in the Contract Documents.

9. Payments to the Contractor

Within fifteen (15) days after receipt from the Contractor of a proper and satisfactory periodic estimate requesting payment of the amount due for the preceding month, the Owner shall have fifteen (15) days to make payment for:

A. The work performed during the preceding month.

B. The materials not incorporated in the Work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title, or to which a Subcontractor has title and has authorized the Contractor to transfer title to the Owner.

C. Less the following retention items:

1. A retention based on an estimate of the fair value of the Owner's claims against the Contractor.

2. A retention for direct payments to Subcontractors, if any, based on demands for same in accordance with the provisions of Section 39F of Chapter 30 of the General Laws.

3. A retention not exceeding five percent (5%) of the approved amount of the periodic payment.

D. After the receipt of a periodic estimate requesting final payment and within sixty-five (65) days after the Contractor fully completes the Work, or substantially completes the Work so that the value of the Work remaining to be done is, on the estimate of the Owner, less than 1% of the original Contract Price, or substantially completes the Work and the Owner takes possession or occupancy, whichever occurs first, the Owner shall pay the Contractor the entire balance due on the Contract less:

1. A retention based on an estimate of the fair value of the Owner's claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work.

2. A retention for direct payments to Subcontractors, if any, based on demands of same in accordance with the provisions of Section 39F of Chapter 30 of the General Laws, or based on the record of payments by the Contractor to the Subcontractors under this Contract if such record of payment indicates that the Contractor has not paid Subcontractors as provided in Section 39F of Chapter 30 of the General Laws.

If the Owner fails to make payment as herein provided, there shall be added to each such payment, daily interest at the rate of 3 percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston, commencing on the first day after said payment is due, and continuing until the payment is delivered or mailed to the Contractor; provided that no interest shall be due, in any event, on the amount of a periodic estimate for final payment until fifteen (15) days after receipt of such a periodic estimate by the Owner as provided in the first paragraph of this Article. The Contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The Owner may make changes in any periodic estimate submitted by the Contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, and such changes and any requirements for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided further, that the Owner may, within seven (7) days after receipt, return to the Contractor for correction, any periodic estimate which is not in acceptable form or which contains computations not arithmetically correct, and in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter.

E. Changes in the Work: No changes in the work covered by the approved Contract Documents shall be made without prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of the following methods:

(a) Unit bid prices previously approved.

(b) An agreed lump sum.

(c) The actual cost of:

(1) Labor.

(2) Materials entering permanently into the work.

(3) The ownership or rental cost of construction equipment during the time of use on the extra work.

(4) Power and consumable supplies for the operation of power equipment.

(5) Wages to be paid.

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

F. Claims for Additional Costs: If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the Owner written notice thereof within twenty days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the Work, except in an emergency endangering life or property. No such claim shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

The Contractor hereby agrees that the Contractor shall have no claim for damages of any kind against the Town on account of any delay in the commencement or performance of the work and/or any hindrance, delay or suspension of any portion of the work including, but not limited to, any claims or damages on account of having to perform out of sequence work, claims for damages on account of loss of production or other interference with the work whether such delay is caused by the Town or otherwise, except as and to the extent expressly provided under G.L. c.30, §39O in the case of written orders by the Town. The Contractor acknowledges that the Contractor's sole remedy for any such claim will be an extension of time as provided herein.

10. Final Payment, Effect

The acceptance of final payment by the Contractor shall constitute a waiver of all claims by the Contractor arising under the Agreement.

11. Contract Documents

The Contract Documents consist of the following, together with this Agreement:

Invitation to Bid
Instructions to Bidders
This Contract Form
Bid Form
Payment Bond
Non-Collusion Certificate
Tax Compliance Certificate
Clerk's Certificate of Corporate Vote
Certificate of Insurance
General Conditions
Supplementary General Conditions
General Requirements
Specifications and Addenda
Contract Drawings
Schedule of Prevailing Wages

12. Terms Required By Law

This Agreement shall be considered to include all terms required to be included in it by the Massachusetts General Laws, and all other laws, as though such terms were set forth in full herein.

13. Indemnification

The Contractor shall indemnify and hold harmless the Owner from and against any and all claims, damages, losses, and expenses, including attorney's fees, arising out of the performance of this Agreement when such claims, damages, losses, and expenses are caused, in whole or in part, by the acts, errors, or omissions of the Contractor or his employees, agents, subcontractors or representatives.

14. Insurance

The Contractor shall purchase and maintain such insurance as will protect both the Owner and the Contractor from claims which may arise under the Agreement, including operations performed for the named insured by independent contractors and general inspection thereof by the named insured. In addition, the Contractor shall require its subcontractors to maintain such insurance. Coverage shall be provided for:

.1 claims under workers' or workmen's compensation, disability benefit and other applicable 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 usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person;

.5 claims for damages, including damages to the Work itself, because of injury to or destruction of tangible property, 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.

.7 claims involving contractual liability applicable to the Contractor's obligations under Article 13.

The limits of liability for coverage required under the preceding paragraph are specified at the end of this section.

Except for Workmen's Compensation, all liability coverage shall name the Town as an additional insured and shall provide for 30 days prior written notice to the Town of any modification or termination of coverage provided thereby. The Contractor shall provide the Owner with appropriate certificate(s) of insurance evidencing compliance with this provision prior to the commencement of any work under this Agreement.

15. Notice

All notices required to be given hereunder shall be in writing and delivered to, or mailed first class to, the parties' respective addresses stated above. In the event that immediate notice is required, it may be given by telephone or facsimile, but shall, to the extent possible, be followed by notice in writing in the manner set forth above.

16. Termination

A. Each party shall have the right to terminate this Agreement in the event of a failure of the other party to comply with the terms of the Agreement. Such termination shall be effective upon seven days' notice to the party in default and the failure within that time of said party to cure its default.

B. The Owner shall have the right to terminate the Agreement without cause, upon ten (10) days' written notice to the Contractor. In the event that the Agreement is terminated pursuant to this subparagraph, the Contractor shall be reimbursed in accordance with the Contract Documents for all Work performed up to the termination date, and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. Payment for material or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interests.

17. Miscellaneous

A. Royalties and Patents: The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified; but if the Contractor believes or has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible

for such loss unless he promptly gives such information to the Owner, and thereafter the Owner insists on the use of the design, process or products specified.

B. Assignment: The Contractor shall not assign or transfer any of its rights, duties or obligations under this Agreement without the written approval of the Owner.

C. Governing Law: This Agreement shall be governed by and construed in accordance with the law of the Commonwealth of Massachusetts.

D. By its signature hereon, the Contractor certifies, under the pains and penalties of perjury, that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

[Remainder of page intentionally blank.]

AGREED:

TOWN OF _____, MASSACHUSETTS
(Owner)

By its _____

_____

CONTRACTOR: _____

By_____

_____
(Name)

_____
(Title)

_____
(Address)

_____
(City and State)

Approved as to Form:

By_____
(Owner's Counsel)

In accordance with G.L. c.44, Section 31C, this is to certify that an appropriation in the amount of this contract is available therefor and that the _____ has been authorized to execute the contract and approve all requisitions and change orders.

By_____
(Owner's Accountant)

_____
(Name)

INSURANCE REQUIREMENTS

A. **Comprehensive General Liability, Completed Operations Coverage and Umbrella Liability Insurance**
Coverage for Bodily Injury and Property Damage as follows:

Limits of General Liability & Completed Operations Coverage	*Limits of Umbrella Liability Coverage*
$1 Million each occurrence	*$2 Million each occurrence*
$3 Million annual aggregate	*$2 Million aggregate*

The Comprehensive General Liability and Completed Operations Coverage Policy (3 years) shall provide insurance for the Contractor for Bodily Injury and Property Damage to third parties arising out of:

1. Work performed by the Contractor himself with his own employees; "premises-operations" line.
2. Work performed by his Subcontractors; Contractor's Protective Liability; ("sublet work" or "Independent Contractors") line. Use of subcontractor(s) may be subject to the prior approval of the Town as described more fully in applicable contract terms and conditions. All subcontractors must also provide Certificates of Workers' Compensation, General Liability, Completed Operations and Umbrella Liability Coverage.
3. The Contractor's liability assumed under the Contract Terms; "hold harmless" or "indemnity agreement" line also known as Contractual Liability Insurance. This coverage must be explicitly stated on the Contractor's Insurance Certificate to indemnify and hold harmless the Town.

B. **Comprehensive Automobile Liability Insurance**

All minimum coverage as required under Massachusetts General Laws for operation and registration of motor vehicles, and excess Bodily Injury and Property Damage coverage as follows:

Limits of Liability
Bodily Injury and Property Damage combined single limit of $1 Million

The insurance is to include all owned or hired vehicles of the contractor and non-ownership protection for all employees of the Contractor engaged in the performance of the Contract.

C. **Worker's Compensation and Employer's Liability Insurance**

Coverage as required by the Worker's Compensation laws of the Commonwealth of Massachusetts, MGL Ch149 §34A, including both statutory lines and Coverage B with a 100,000/500,000/100,000 limit of liability.

D. **Owner's Protective Liability Insurance**

The Contractor shall furnish to the Town Certificates of Insurance naming the Town of North Reading as an additional insured as their interest may appear and maintain said during the life of this Contract complete General Liability Insurance in amounts set forth above for Bodily Injury and Property Damage Liability.

E. **Architects and Engineers Professional Liability**

$1 Million each occurrence / *$3 Million* aggregate

F. **General Requirements for All Lines of Insurance Furnished**

Contractor will furnish a Certificate of Insurance form incorporated into and made a part of this Agreement naming the Town of North Reading as an "Additional Insured" on the appropriate insurance policies. Properly executed certificates must be on file with the Municipality prior to commencement of this Agreement, including a copy of the endorsement to their insurance policy naming the Town as an Additional Insured.

All insurance policies must state to indemnify and save harmless the TOWN and all of its officers, agents and employees for any suits, causes of action, claims, judgments or other liability that may arise as a result of the Contractor's action or failure to act. Mutual indemnification will not be accepted. No waivers of subrogation are implied or will be accepted. When higher limits are required, such provisions will be listed in the project specs.

The cost of such insurance, including required endorsements or amendments, certificates and renewals, shall be the sole responsibility of the Contractor. All policies shall be written so that the Town of North Reading shall be notified of cancellation or the addition of "restrictive amendments" by Registered Mail or by FAX not later than twenty (20) days prior to the effective date of such cancellation or amendment.

The Contractor shall, when subcontractors are permitted by the agreement, require that each subcontractor procure and maintain, until the completion of that subcontractor's work, insurance of the types and to the limits set forth in the above sections. All such coverage by

subcontractors shall be in favor of the Contractor and the Town shall be indemnified and held harmless from liability in all such policies and named as an additional insured.

North Reading, Massachusetts 01864
INSURANCE REQUIREMENTS

Attachment A-1

A. Contractor's Certification

A contractor will not be eligible for award of a contract unless such contractor has submitted the following certification, which is deemed a part of the resulting contract:

Contractor's Certification

_____
Name of the General Contractor

Certifies that:

1. It intends to use the following listed construction trades in the work under contract:

_____

_____

_____

_____

2. Will comply with the minority workforce ratio and specific affirmative action steps contained herein: and

3. Will obtain from each of its subcontractors and submit to the contracting or administering agency prior to the award of any subcontract under this contract the subcontractor's certification required by these bid conditions.

_____
Signature of Authorized Representative or Contractor

SECTION 00610
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____
(Name of Contractor)

a _____ hereinafter called "Principal" and
(Corporation, Partnership, Joint Venture or Individual)

_____of _____, State of _____
(Surety) (City & State)

_____ hereinafter called the "Surety" and licensed by the State Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the City/Town of _____, Massachusetts, hereinafter called "Owner", in the penal sum of
_____ Dollars
($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20___ (the "Construction Contract"), for the construction described as follows: _____
_____.

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of the Construction Contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under the Construction Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the Surety's obligation under this Bond shall arise after (1) the Owner has declared the Principal in default of the Construction Contract or any provision thereof or (2) has declared that the Principal has failed, or is otherwise unable or unwilling, to execute the work consistent with, and in conformance to, the Construction Contract (collectively referred to as a "Contractor Default"). The determination of a Contractor Default shall be made solely by the Owner. The Owner need not terminate the Construction Contract to declare a Contractor Default or to invoke its rights under this Bond.

When the Surety's obligation under this Bond arises, the Surety, at its sole expense and at the consent and election of the Owner, shall promptly take one of the following steps: (1) arrange for the Principal to perform and complete the work of the Construction Contract: (2) arrange for a contractor other than the Principal to perform and complete the work of the Construction Contract; (3) reimburse the Owner, in a manner and at such time as the Owner shall decide, for all costs and expenses incurred by the Owner in performing and completing the work of the Construction Contract. Surety will keep Owner reasonably informed of the progress, status and results of any investigation of any claim of the Owner.

If the Surety does not proceed as provided in this Bond with due diligence and all deliberate speed, the Surety shall be deemed to be in default of this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner.

After the Surety's obligation under this Bond arises, the Surety is obligated, to the limit of the amounts of this Bond, for (1) the correction of defective work and completion of the Construction Contract; (2) additional design, professional services, and legal costs, including attorneys' fees, resulting from the Contractor Default or from the default of the Surety under this Bond; (3) any additional work beyond the Construction Contract made necessary by the Contractor Default or default of the Surety under this Bond; (4) indemnification obligation of the Principal, if any, as provided in the Construction Contract; and (5) liquidated damages as provided in the Construction Contract, or if none are so specified, actual and foreseeable consequential damages resulting from the Contractor Default or default of the Surety under this Bond.

Any proceeding, legal or equitable, under this Bond shall be instituted in any court of competent jurisdiction in the Commonwealth of Massachusetts.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Construction Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Construction Contract or to the work or to the specifications.

IN WITNESS WHEREOF, this instrument is executed in _____ ( ) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20___.

ATTEST:

_____
Principal

_____ By _____
(Principal Secretary)

_____

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

_____

_____
(Address-Zip Code)

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

SECTION 00600
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we _____

_____ a_____ _____
(Name of Contractor) (Corporation, Partnership, Joint Venture or Individual)

hereinafter called "Principal" and _____ of _____,
(Surety)

State of _____ hereinafter called the "Surety" and licensed by the State
(City and State)

Division of Insurance to do business under the laws of the Commonwealth of Massachusetts, are held and firmly bound to the City/Town of _____, Massachusetts, hereinafter called "Owner", in the penal sum of _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the _____ day of _____, 20___, for the construction described as follows:

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of this contract or to the work or to the specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in ____ ( ) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST:

_____
Principal

_____ By _____
(Principal Secretary)

_____

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Principal

_____

_____
(Address-Zip Code)

ATTEST:

_____
Surety

_____ By _____
(Attorney-in-Fact)

_____

_____
(Address-Zip Code)

_____ (SEAL)
Witness as to Surety

_____

_____
(Address-Zip Code)

NOTE: Date of Bond must not be prior to date of Contract. If Contractor is a Partnership, all partners should execute Bond.

NOTICE TO PROCEED

To: Date:

Project:

You are hereby notified to commence Work in accordance with the Agreement dated _____, on or before _____, and you are to complete the Work within the agreed upon timeframe set up between the Town and Contractor using no more than 5 on-site working days thereafter. The date of completion of all Work is therefore _____.

By its Town Administrator

_____
Michael P. Gilleberto

Acceptance of Notice to Proceed:

Receipt of the above Notice to Proceed is hereby

acknowledged by _____,

this _____day of _____, 20___

By _____

Title _____

CHANGE ORDER FORM

Date: _____

Change Order Number: _____

Contract Number: _____

Project: _____

Engineer: _____

Owner: **Town of North Reading, Massachusetts**

Contractor: _____

Contract Date: _____

To: _____
(Contractor)

You are hereby authorized and directed to make the changes noted below in the subject Contract.

Approved By: _____
(Owner)

_____

_____

_____

_____

_____
(Date)

Description and Reason for Change:
These changes result in the following adjustment of Contract Price and Contract Time:

Original Contract Price: $ _____

Contract Price prior to this Change Order: $ _____

The Contract Price due to this Change Order will be
(Increased) (Decreased) by: $ _____

The New Contract Price including this Change Order: $ _____

This Change Order (Increases) (Decreases) the Contract Time by:
_____ Calendar Days and/or _____ Working Days

The revised Contract Completion Date is: _____

Other Contracts affected (if any): _____

Reviewed By:

_____
(Signature)

_____
(Date)

Accepted By: _____
(Contractor)

_____
(Signature)

_____
(Date)

Certification of Appropriation under M.G.L. c.44, s.31c: Adequate funding in an amount sufficient to cover the total cost of this change order is available.

By: _____ _____
Certification Officer Date

CERTIFICATE OF SUBSTANTIAL COMPLETION

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

Project: **_____, North Reading Massachusetts**

Contractor _____

Contract for _____ Contract Date _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

To _____
Owner

And To _____
Contractor

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

_____
Date of Substantial Completion

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of Contractor to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by Contractor within _____ days of the above date of Substantial Completion.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as follows:

Responsibilities:

Owner: _____

_____

_____

Contractor: _____

_____

_____

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

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

Executed by Engineer on _____, 20____

_____
Engineer

By _____

Contractor accepts this Certificate of Substantial Completion on _____, 20___

_____
Contractor

By _____

Owner accepts this Certificate of Substantial Completion on _____, 20___

_____ _____
Owner

_____

_____ By _____

WAIVER OF LIENS

Contract No.: _____ **Agreement Date:** _____

Owner: **Town of North Reading, Massachusetts**

Project Name: _____

Completion Date per Agreement and Change Orders: _____

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

Obligation	Bond

_____ _____
Date Contractor

_____
Signed by Officer of Corporation

_____
Title

COUNTY OF _____

STATE OF _____

Before me on this _____ day of _____, 20 ___ personally appeared _____ known to me, who being duly sworn, did depose and save that he is the _____ (Officer) of the Contractor above mentioned; that he executed the above statement on behalf of said Contractor and that all of the statements contained therein are true, correct and complete.

_____
NOTARY PUBLIC

CERTIFICATE OF FINAL PAYMENT AND COMPLETION OF WORK

Contract No.: _____ Agreement Date: _____

Owner: **Town of North Reading, Massachusetts**

Project Name**:** _____

Completion Date per Agreement and Change Orders: _____

FINAL CERTIFICATION OF CONTRACTOR

Name: _____

Address: _____

_____

agrees to accept $ _____as full and final payment for all work completed under this Contract dated _____ with the Town of North Reading, Massachusetts (Owner) for

_____ **(Project)**

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

_____ _____
Date Contractor

_____
Signed by Officer of Corporation

_____
Title

DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 PURPOSE

The purpose of this bid is to provide all labor, materials, equipment, and to perform all the work for the bridge replacement at Chestnut Street over Ipswich River in North Reading, MA in conformance with the Contract Documents prepared by TEC, Inc.

1.02 SCOPE

The Scope of work under this contract shall include but is not limited to the following items and all incidental work as shown on the attached Contract Documents.

A. **Any provisions presented in the General Conditions, Supplementary Conditions, or Special Conditions shall supersede the conditions presented in the Standard Specifications.**

B. The Contractor is responsible for identifying and locating all underground utilities and above ground utilities and service lines prior to any below or above ground site alterations. The Contractor is responsible for notifying concerned utilities, at least 72 hours prior to excavation in the proximity of telephone, gas and electric utilities, by calling Dig Safe at 1-888-344-7233.

C. The Contractor is responsible for all earthwork including clearing and grubbing, excavation, grading, and backfilling as indicated on the Contract Documents, and specified herein. Earthwork activities shall only occur within the Limit of Work provided in the Contract Documents.

D. The Contractor is responsible for the off-site disposal of all material generated during clearing and grubbing activities, excavations and other construction activities. To the extent possible, all trees and brush shall be disposed on site, typically chipped and spread in place. When not feasible, Contractor shall identify proposed location for disposal and provide written notification to the Engineer for approval. Disposal shall be in North Reading, or at a minimum, within Middlesex County.

E. Any ledge encountered during excavation that will interfere with the placement of specified devices or obtaining finished grades as specified on the Documents will be brought to the attention of the Engineer.

F. The Contractor is responsible for furnishing and installing temporary site barriers and traffic controls (as shown on the plans and approved permits); restoring all grass and landscape areas disturbed through the project; and all other tasks and costs incidental thereto unless otherwise specified.

G. The Contractor is responsible for returning the construction area and surrounding area to its pre-construction condition.

H. The Contractor shall provide as-built documents of the construction site, prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

I. The Contractor is to perform the work of this contract in accordance with applicable State and Federal laws and regulations. In the event the Owner is required to pay any fines, administrative penalties or damages to anyone, including governmental agencies, due to the Contractor's failure to perform in accordance with this contract and/or regulations, the Contractor will indemnify and hold harmless the Owner and reimburse Owner for all such payments plus reasonable legal fees and expenses incurred.

J. All labor, materials, tools, equipment, and incidentals required to complete the work shall be provided by the Contractor.

K. The detour shall only be implemented with prior approval from the Engineer, Town of North Reading, and North Reading Police Department. A one-week advance notice shall be provided to the Engineer, Town and Town Police Department prior to any approved detours.

The Contractor shall implement and maintain throughout the construction period all temporary traffic control signs, devices, and setups in accordance with the latest edition of MassDOT Traffic Management Plans and Detail Drawings, the design plans, and as required by the Engineer.

L. Contractor shall refer to the Special Provisions for additional project requirements related to this Contract.

1.03 SITE VISIT

A. Before submitting a Bid, the Contractor shall visit the site, examine existing conditions and become thoroughly acquainted with the effort required to perform the Work.

B. The Contractor shall study the Contract Documents and compare the same with the information gathered during examination of the site, as no extra compensation will be authorized for extra Work caused by unfamiliarity with the site and/or Contract Documents or the conditions peculiar to this Project.

1.04 PROJECT SCHEDULE

The work of this project may start April 1, 2025. Submittals, material approvals, and material procurement, etc. are expected to occur immediately upon contract procurement to facilitate April 2025 contractor mobilization/road closure.

Substantial Completion on or before November 8, 2025 (Substantial completion shall mean all work with the exception of permanent pavement markings within the public roadways, loam and seed, punch list items, and final clean-up has been completed and as described within these contract documents)

Final completion on or before November 28, 2025. Final completion shall mean all remaining work and punch list items have been satisfactorily completed and accepted by the Town and as described within these contract documents.

Contractor shall be aware of the time constraints related to the gas utility work at this location:

- Permanent utility supports shall be installed no later than October 1st to facilitate National Grid's work to install the permanent gas line.
- Permanent gas line shall be relocated and active for the beginning of heating season (November 15th), as required by National Grid Gas.
- Refer to Item 992.321 for additional contingency measures that the Contractor shall be aware of during bidding.
- Contractor shall be responsible for all coordination with National Grid Gas.

The Town of North Reading may authorize work to continue during these specified time periods if it is determined that the work will not negatively impact the traveling public.

Work may be performed at the site on Mondays through Fridays between 7:00 am and 5:00 pm unless otherwise directed by the Owner/Engineer. Construction equipment shall be operated in accordance with local ordinances.

Work may be permitted on weekends and legal holidays if the Contractor obtains written approval from the Engineer. The request shall be made 72 hours in advance of the work. The Contractor and any subcontractors shall only work overtime as approved by the Engineer. The Contractor shall coordinate with the Engineer and the North Reading Police Department to obtain a waiver if work on Saturday, Sundays or Holidays is required.

Below are the holiday work restrictions.

<u>New Years Day (Federal Holiday)</u>
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the Town and the local police chief.

<u>Martin Luther King's Birthday (Federal Holiday)</u>
No work restrictions due to traffic concerns, however work on local roadways requires permission by the Town and local police chief.

President's Day (Federal Holiday)
No work restrictions due to traffic concerns, however work on local roadways requires permission by the Town and local police chief.

Patriot's Day (State Holiday)
Work restrictions will be in place for Districts 3, and 6 along the entire Boston Marathon route so as to not impact the marathon. All other districts work restrictions will be as per Town.

Mother's Day
No work restrictions due to traffic concerns however work on local roadways requires permission by the Town and local police chief.

Memorial Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before until the normal start of business on the following day.

Juneteenth
No work restrictions due to traffic concerns, however work on local roadways requires permission by the DHD and local police chief.

Independence Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day. No work on local roadways on the holiday without permission by the Town and local police chief.

Labor Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the Friday before until the normal start of business on the following day.

Columbus Day (Federal Holiday)
No work on major arterials from 5:00 AM on the Friday before until the normal start of business on the following day. The Town may allow work in those areas on a case by case basis and where work is behind barrier and will not impact traffic.

Veterans' Day (Federal Holiday)
No work restrictions due to traffic concerns.

Thanksgiving Day (Federal Holiday)
No work on major arterials from 5:00 AM two days before until the start of business on the following Monday.

Christmas Day (Federal Holiday)
No work on major arterial roadways from 5:00 AM on the day before until the normal start of business on the next subsequent business day.

1.05 Price Adjustments

The contractor shall be aware that this project is subject to price adjustments for Diesel Fuel, and Gasoline in accordance with MassDOT Standard Operating Procedure. See Document 01812 contained within the project manual.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 01020

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

1.01 SCOPE OF WORK

Work under this Section includes control of work and materials during the Project.

1.02 HAULING, HANDLING AND STORAGE OF MATERIALS

The Contractor shall, at their own expense, handle and haul all materials furnished by them or generated by the removal of existing materials. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by them that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

1.04 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.

B. Where prescribed by the Engineer, excavations shall be completely closed at the end of each workday. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

C. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as prohibiting stockpiling excavated material in the roadway.

1.05 REJECTED MATERIALS AND DEFECTIVE WORK

A. Materials furnished by the Contractor and rejected by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.

B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.

C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

1.06 SANITARY REGULATIONS

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers, in such manner, and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committance of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

1.07 SAFETY AND HEALTH REGULATIONS

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (Industrial Bulletin No. 12)." Contractors shall be familiar with the requirements of these regulations.

1.08 MAINTENANCE OF DRAINAGE FACILITIES

All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs through circumstances beyond his control, any of the aforesaid drainage facilities, he shall repair the same within the same day.

1.09 SITE INVESTIGATION

The Contractor acknowledges that he has satisfied himself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Documents and specifications made a part of this contract. Any failure of the Contractor to acquaint himself with available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.10 CUTTING, FITTING AND PATCHING

A. The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors, as shown upon or reasonably implied by

the Documents and the specifications for the completed structure, including all existing work.

B. The Contractor shall not endanger any work by cutting, digging, or otherwise, and shall not cut or alter the work of any other Contractor, save with the consent of the Engineer.

C. All holes or openings required to be made in new or existing work, particularly at pipe, conduit, or other penetrations not covered by escutcheons or plates, shall be neatly patched. All such holes shall be made completely watertight as approved by the Engineer.

D. Workmanship and materials of patching and repair work shall match the adjacent similar work, and shall conform to the applicable sections of the specification. Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

1.11 WEATHER PROTECTION

In conformance with Section 44C of Chapter 149 of the General Laws of Massachusetts, the General Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March.

1.12 ELECTRICAL SERVICES

A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

1.13 ACCEPTANCE OF THE WORK

Until the final acceptance of the Work, it shall be under the care and charge of the Contractor and every precaution shall be taken necessary against injury or damage to the Work by the action of the elements or any other causes. The Contractor shall rebuild, repair, restore and make good, at their own expense, all injuries or damages to any portion of the Work before its completion and acceptance.

1.14 REGULATORY COMPLIANCE

A. The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations bearing on the Work as drawn and specified. If the contractor performs any Work contrary to such laws, ordinances, rules and regulations, the Contractor shall bear all cost arising therefrom.

B. The Contractor shall secure and pay for all other necessary permits for this Work.

1.15 PERMANENT FEATURES PROTECTION

A. The Contractor shall maintain and protect existing pipes, poles, wires, fences, curbing, property-line markers, and other structures which, in the opinion of the Engineer, must be preserved in place without being temporarily or permanently relocated. In case of damage, the Contractor shall notify the Engineer so that the proper steps may be taken to repair any and all damage done. When the Engineer does not wish to make the repairs itself, all damage shall be repaired by the Contractor; or, if not promptly done by him, the Engineer may have the repairs made at the expense of the Contractor.

B. During execution of any and all items of the Work, extreme care shall be exercised by the Contractor to preclude any interferences/disturbances of existing structures, roadways, above-grade and below-grade utilities, or other features not associated with the Work. These interferences/disturbances shall include but not be limited to damage, movement, or collapse of the structures, roadways, and utilities. The Contractor shall assume the liability for any and all said damage, movement, settlement or collapse and promptly repair same at no cost to the Owner.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 PAYMENT

A. All Work shall be completed in compliance with the Contract Documents and shall be in accordance with the prices bid.

B. Unless otherwise noted, all excavation, removal of excavated material, and furnishing and placement of fill materials shall be included under any item requiring excavation. Unless otherwise noted, each item shall be furnished and installed in accordance with the technical section whether a specific application payment item exists or not.

C. As to all measurement and payment items described herein, the Contractor is responsible for verifying the types and quality of equipment, fixtures, steel, hardware, pipe, excavate, and any other items required to complete the work under this contract.

1.02 LUMP SUM ITEMS

A. Lump sum payment shall be full compensation for: providing all submissions required prior to the start of work; insurance, permits, licenses, and approvals required for the performance of the work; contract close out procedures including the submission of required documentation, including any transport/disposal fees and taxes; and all other tasks and costs incidental to the project unless otherwise specified.

B. Payment shall also fully compensate the Contractor for any other work that is not specified or shown, but that is necessary to complete the Work.

C. Payment for Work performed shall be in accordance with the breakdown of the lump sum price shown in the Bid Schedule.

D. Should any equipment or material be eliminated under a lump sum item then a Change Order shall be issued.

1.03 UNIT PRICE ITEMS

A. Payments for Work performed shall be in accordance with the unit prices bid on the Bid Form and shall be full compensation for all labor, materials, equipment, taxes and fees, testing, onsite handling, and transport of materials covered under the unit price bid item.

B. Both the unit price categories and quantities contained in the Bid Form represent estimates. The Owner maintains the option of including: none, a portion, all or exceeding the estimated quantities listed under this contract. Should the Owner elect not to include any of the unit price categories and/or quantities as a part of

this contract, the Contractor is not entitled to any compensations for loss of revenue or profit. Work shall be performed in accordance with the specifications.

C. Should any unit price items contained in the proposal form be found unnecessary for the proper completion of work contracted, the Owner may eliminate such unit price items from the Contract, and such action shall in no way invalidate the Agreement, and no allowance will be made for items so eliminated in making final payment to the Contractor.

1.04 DESCRIPTION

A. The following subsections describe the measurement of one payment for the work to be done under the items listed in the Bid Proposal.

B. Each price stated in the Bid Proposal constitutes full compensation as herein specified for each item of work completed in accordance with the specifications.

C. The Contractor shall be responsible for any damage incurred due to this work on abutting or adjacent properties, private or public.

PART 2 - MATERIALS

Not Used

PART 3 – BID ITEMS

Not Used

END OF SECTION

SECTION 01110

ENVIRONMENTAL PROTECTION PROCEDURES

PART 1 – GENERAL

1.01 SCOPE OF WORK:

A. The work covered under this Section consists of furnishing all labor, materials, and equipment and performing all work required for the prevention of environmental pollution in conformance with applicable laws and regulations, during and as the result of construction operations under this Contract. For the purpose of this Specification, environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic and/or recreational purposes.

B. The control of environmental pollution requires consideration of air, water, and land, and involves management of noise and solid waste, as well as other pollutants.

C. Schedule and conduct all work in a manner that will minimize the erosion of soils in the area of the work. Provide erosion control measures such as diversion channels, sedimentation or filtration systems, berms, staked hay bales, seeding, mulching, or other special surface treatments as are required to prevent silting and muddying of streams, rivers, impoundments, lakes, etc. All control measures shall be in place in an area prior to any construction activity in that area.

D. These Specifications are intended to ensure that construction is achieved with a minimum of disturbance to the existing ecological balance between a water resource and its surroundings. These are general guidelines. It is the Contractor's responsibility to determine the specific construction techniques to meet these guidelines.

E. All phases of sedimentation and erosion control shall comply with and be subject to the approval of the Massachusetts Department of Environmental Protection and local Conservation Commission.

F. Schedule and conduct all work in a manner that will minimize the level of noise escaping the site, especially at night and on weekends.

1.02 APPLICABLE REGULATIONS:

A. Comply with all applicable Federal, State, and local laws and regulations concerning environmental pollution control and abatement.

1.03 NOTIFICATIONS:

A. The Engineer will notify the Contractor in writing of any non-compliance with the foregoing provisions or of any environmentally objectionable acts and corrective action to be taken. State or local agencies responsible for verification of certain aspects of the environmental protection requirements shall notify the Contractor in writing, through the Engineer, of any non-compliance with State or local requirements. The Contractor shall, after receipt of such notice from the Engineer or from the regulatory agency through the Engineer, immediately take corrective action. Such notice, when delivered to the Contractor or its authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails or refuses to comply promptly, the Owner may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No

part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the Contractor unless it is later determined that the Contractor was in compliance.

1.04 IMPLEMENTATION:

A. Prior to commencement of the work, meet with the Engineer to develop mutual understandings relative to compliance with this provision and administration of the environmental pollution control program.

B. Remove temporary environmental control features, when approved by the Engineer, and incorporate permanent control features into the project at the earliest practicable time.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 EROSION CONTROL:

A. Provide positive means of erosion control such as shallow ditches around construction to carry off surface water. Control measures such as siltation basins, hay check dams, mulching, jute netting, and other equivalent techniques shall be used as appropriate. Offsite surface water shall be diverted around the site to a downstream channel ahead of siltation barriers. Flow of surface water into excavated areas shall be prevented. Ditches around construction areas shall also be used to carry away water resulting from dewatering of excavated areas. At the completion of work, ditches shall be backfilled and the ground surface restored to original condition.

3.02 PROTECTION OF STREAMS, WETLANDS, AND SURFACE WATER:

A. Care shall be taken to prevent or reduce to a minimum any damage to any stream, drainage ditch or storm drain from pollution by debris, sediment, or other material, or from the manipulation of equipment and/or materials in or near such streams. Water that has been used for washing or processing, or that contains oils or sediments that will reduce the quality of the water in the stream, shall not be directly returned to the stream. Such water will be diverted through a settling basin or filter before being directed into the streams.

B. The Contractor shall not discharge water from dewatering operations directly into any perennial or intermittent stream, channel, wetlands, surface water, or any storm sewer. Water from dewatering operations shall be treated by filtration, settling basins, or other approved method to reduce the amount of sediment contained in the water to allowable levels.

C. All preventative measures shall be taken to avoid spillage of petroleum products and other pollutants. In the event of any spillage, prompt remedial action shall be taken in accordance with a contingency action drawing or plan approved by the Massachusetts Department of Environmental Protection. Contractor shall submit copies of approved contingency drawings or plans to the Engineer.

D. Water being flushed from structures or pipelines after disinfection, with a chlorine residual of 0.2 mg/l or greater, shall be treated with a dechlorination solution, in a method approved by the Engineer, prior to discharge.

3.03 PROTECTION OF LAND RESOURCES:

A. Land resources within the project boundaries and outside the limits of permanent work shall be restored to a condition, after completion of construction, that will appear to be natural and not detract from the appearance of the project. Confine all construction activities to areas shown on the Drawings.

B. Outside of areas requiring earthwork for the construction of the new facilities, the Contractor shall not deface, injure, or destroy trees or shrubs, nor remove or cut them without prior approval. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorage unless specifically authorized by the Engineer. Where such special emergency use is permitted, first wrap the trunk with a sufficient thickness of burlap or rags over which softwood cleats shall be tied before any rope, cable, or wire is placed. The Contractor shall in any event be responsible for any damage resulting from such use.

C. Where trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment, dumping or other operations, protect such trees by placing boards, planks, or poles around them. Monuments and markers shall be protected similarly before beginning operations near them.

D. Any trees or other landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition. The Engineer will decide what method of restoration shall be used and whether damaged trees shall be treated and healed or removed and disposed of.

E. The locations of the Contractor's storage, and other construction building, required temporarily in the performance of the work, shall be cleared portions of the job site or areas to be cleared and shall require written approval of the Engineer and shall not be within wetlands or floodplains. The preservation of the landscape shall be an imperative consideration in the selection of all sites and in the construction of buildings. Drawings showing storage facilities shall be submitted for approval of the Engineer.

F. Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess of waste materials, or any other vestiges of construction as directed by the Engineer. It is anticipated that excavation, filling, and plowing of roadways will be required to restore the area to near natural conditions which will permit the growth of vegetation thereon. The disturbed areas shall be prepared and seeded as approved by the Engineer.

G. All debris and excess material will be disposed of outside wetland or floodplain areas in an environmentally sound manner.

3.04 PROTECTION OF AIR QUALITY:

A. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

B. The Contractor will be required to maintain all excavations, embankments, stockpiles, access roads, plant sites, waste areas, borrow areas, and all other work areas within or without the project boundaries free from dust which could cause the standards for air pollution to be exceeded, and which would cause a hazard or nuisance to others.

C. An approved method of stabilization consisting of sprinkling of water or other similar methods will be permitted to control dust. The use of chlorides may be permitted with approval from the Engineer.

D. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs, as determined by the Engineer.

3.05 NOISE CONTROL:

A. The Contractor shall make every effort to minimize noises caused by its operations. Equipment shall be equipped with silencers or mufflers designed to operate with the least possible noise in compliance with State and Federal (OSHA) regulations.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 – GENERAL

1.01 DESCRIPTION:

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals.

1. Shop Drawings.
2. Product Data.
3. Samples.
4. Mock Ups.
5. Construction Photographs.
6. Construction or Submittal Schedules.

B. Additional general submission requirements are contained in the General Conditions.

C. Detailed submittal requirements will be specified in the special provisions section.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES:

A. Shop Drawings:

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to: custom-prepared data such as fabrication and erection/installation (working) drawings of concrete reinforcement, structural details and piping layout, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications as applicable to the work.

2. All shop and working drawings shall be prepared on standard size, 24-in. by 36-in. sheets, except those which are made by changing existing standard shop or working drawings.

3. All shop drawings shall be submitted using the transmittal form furnished by the Engineer.

4. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

5. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, material, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings

found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

6. All details on shop drawings submitted for approval shall show clearly the relation of the various parts of the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements; such measurements shall be made and noted on the drawings before being submitted for approval.

B. Product Data:

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and printed installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances including certificates of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications and recommended spare-parts listing, and printed product warranties, as applicable to the Work.

C. Samples:

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.03 CONTRACTOR'S RESPONSIBILITIES:

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements.

2. Field construction criteria.

3. Catalog numbers and similar data.

4. Conformance with the Specifications.

B. Each shop drawing, sample, and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in. X 17-in. and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of

all items within the package. Provide to the Engineer a copy of each submittal transmittal form for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

C. If a shop drawing shows any deviation from the requirements of the Contract Documents, the Contractor shall make specific mention of the deviations in the Transmittal Form furnished by the Engineer and provide a description of the deviations in a letter attached to the submittal.

D. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will not have responsibility therefor.

E. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

F. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1. Manufacturer's printed installation instructions, a part of product data submitted to the Engineer will not be reviewed and are for informational purposes only.

1.04 SUBMISSION REQUIREMENTS:

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. All submittals shall be submitted sufficiently in advance of construction requirements to provide no less than ten days, including Saturdays, Sundays and legal holidays for review from the time received at the Engineer's reviewing office. For submittals of major equipment, that require more than ten days to review, due to its sheer complexity and amount of detail and also requiring review by more than one engineering discipline, a letter will be sent by the Project Manager or his/her designee to the Contractor informing him/her of the circumstances and the date it is expected the submittal will be returned to the Contractor.

C. Number of submittals required:

1. Shop Drawings: Contractor shall submit shop drawings electronically to the Town and the Town’s representatives for their review. If the Town requires, the Contractor shall submit hard copies, the number of copies will be determined by the Town, if deemed necessary.

2. Product Data: Contractor shall submit product data electronically to the Town and the Town’s representatives for their review. If the Town requires, the Contractor shall submit hard copies, the number of copies will be determined by the Town, if deemed necessary.

3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in. X 3-in. blank space for Contractor and Engineer stamps.

E. Each shipment of drawings shall be accompanied by a transmittal form furnished by the Engineer giving a list of the drawing numbers and the names mentioned above.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES:

A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments shall not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of shop drawings, data, and samples will be general. They shall not be construed:

1. As permitting any departure from the Contract requirements;

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the action codes indicated and defined on the transmittal form furnished by the Engineer.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing, on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.06 DISTRIBUTION:

A. Electronically distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. .

1.07 GENERAL PROCEDURES FOR SUBMITTALS:

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval resubmittal (if required), coordination with other submittals, inspection, testing (off-site and on-site), purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

1.08 CERTIFICATION FORMS:

A. If specifically specified in other Sections of these Specifications, the Contractor shall submit the applicable certification form for each item required, and in the form attached to this Section, completely filled in and stamped.

1.09 CERTIFICATES OF COMPLIANCE:

A. Certificates of Compliance specified in the specifications shall include and mean certificates, manufacturer's certificates, certifications, certified copies, letters of certification and certificate of materials.

B. The Contractor shall be responsible for providing Certificates of Compliance requested and specified in the technical specifications. Certificates are required for demonstrating proof of compliance with specification requirements and shall be executed in 6 copies unless otherwise specified. Each certificate shall be signed by an official authorized to certify on behalf of the manufacturing company and shall contain the name and address of the Supplier, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Supplier from furnishing satisfactory material, if after tests are performed on selected samples, the material is found not to meet the specific requirements.

END OF SECTION

SECTION 01300

CERTIFICATE OF DESIGN

The undersigned hereby certifies that he/she is a Professional Engineer registered in the state of _____ and that he/she has been employed by (Name of Contractor) _____ to design _____ in accordance with Specifications Section for_____ in North Reading, Massachusetts. The undersigned further certifies that he/she has performed similar designs previously and has performed the design of the _____; that said design is in conformance with all applicable local, state, and federal codes, rules, and regulations and professional practice standards; that his/her signature and Professional Engineer (P.E.) Stamp have been affixed to all calculations and drawings used in, and resulting from, the design; and that the use of that stamp signifies the responsibility of the undersigned for that design.

The undersigned hereby certifies that he/she has Professional Liability Insurance with limits of $1,000,000.00 and a Certificate of Insurance is attached.

The undersigned hereby agrees to make all original design drawings and calculations available to the Town of North Reading or Owner's representative within seven (7) days following written request therefore by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Title	Title
_____	_____
Address	Address

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SCOPE OF WORK:

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:

1. Closeout procedures.

2. Final cleaning.

3. Adjusting.

1.02 RELATED WORK:

A. Warranties and Bonds are included in Section.

1.03 CLOSEOUT PROCEDURES:

A. Submit written certification that the Contract Documents have been reviewed, the work has been inspected, and that the work is complete in accordance with the Contract Documents and ready for the Engineer's inspection.

B. Provide submittals to the Engineer that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.

1.04 FINAL CLEANING:

A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

1. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

END OF SECTION

SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by it; shall remove all temporary works, tools, and machinery or other construction equipment furnished by it; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by it; shall remove all rubbish from any grounds which it has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by its operations in a neat and satisfactory condition.

D. The Contractor shall restore or replace, when and as directed, any public or private property damaged by its work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

END OF SECTION

DOCUMENT 00812
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE
ENGLISH UNITS
Revised: 02/01/2021

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in MassDOT's web site https://www.mass.gov/service-details/massdot-current-contract-price-adjustments for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation: and Borrow Work: Items 120.1, 127.1, 151 and 151.2 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.86 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DIVISION 2

SPECIFICATIONS

SECTION 02010

SPECIAL PROVISIONS

SCOPE OF WORK

All work under this Contract shall be done in conformance with the *2024 Standard Specifications for Highways and Bridges*, the *2017 Construction Standard Details*, the *Traffic Management Plans and Detail Drawings*, *MassDOT Work Zone Safety Temporary Traffic Control,* the *1990 Standard Drawings for Signs and Supports*; the *2015 Overhead Signal Structure and Foundation Standard Drawings*, the *2009 Manual on Uniform Traffic Control Devices (MUTCD) with Revisions 1, 2, and 3 and the November 2022 Massachusetts Amendments to the MUTCD*; the *1968 Standard Drawings for Traffic Signals and Highway Lighting*; *The American Standard for Nursery Stock*; the Plans and these Special Provisions.

The proposed bridge replacement project includes the full replacement of Chestnut Street over the Ipswich River, N-18-003 in North Reading, MA. The bridge is currently closed to traffic after a bridge inspection identified structural deficiencies. The bridge replacement includes, but is not limited to, demolition of the existing twin culverts, construction of new bridge abutments, wingwalls, precast concrete deck beams, concrete topping slab, bridge railing, and utility supports. The work also includes the temporary control of water, construction of rip-rap, modified rockfill slope, full depth pavement, HMA pavement mill and overlay, cement concrete sidewalk, sidewalk flumes, clearing and grubbing, wetland replication and other incidental work.

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 and other material testing (including cast-in-place concrete) 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. All material testing shall be performed in accordance with the relevant MassDOT Specifications.

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.

SECTION 02010

EQUIVALENT POLICY

Any reference as to a specific type or manufacturer in these specifications is for identification purposes only. Equivalent products will be considered. In the event demonstrations or specifications on equivalent products are required, it will be at the vendor's expense. The Town of North Reading will have the sole discretion on whether or not a product is considered an equivalent.

WORK SCHEDULE

Refer to section 01010 for information and restrictions for the work schedule.

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.
Kasey Provost, 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.

This project includes the temporary and permanent relocations of water and gas services, owned by the Town of North Reading Water Department and National Grid Gas, respectively. The contractor is responsible for coordinating all temporary and permanent relocations with the respective utility owners. Refer to Items 992.321 and 995.01 for additional information related to this work, including a delineation of Contractor responsibilities and utility owner responsibilities.

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.

DEFINED TERMS (Supplementing Subsection 1.03)

Throughout the MassDOT Standard and Supplemental Specifications, wherever the term "the Department" appears it shall be replaced with the "Owner", which term shall be defined to mean the Town of North Reading, acting through its Department of Public Works.

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 Engineer.

Before commencing work on service connections, the Contractor shall be responsible for contacting the Electric Company servicing the area to obtain construction requirements, standards, and to give adequate notice of commencement of work. The Contractor's attention is further directed to the requirements of work in the immediate vicinity of certain underground structures and poles herein as shown on the construction plans.

SECTION 02010

NATIONAL GRID EMERGENCY TELEPHONE NUMBERS

GAS:
Emergency: 1-800-233-5325
New Service: 1- 877-696-4743
Customer Support: 1-800-732-3400

PUBLIC AND PRIVATE UTILITIES

A list of public and private utilities can be found on the MassDOT website at:

http://www.massdot.state.ma.us/

Select Quick Links
Select Doing Business with the Highway Division
Select Design/Engineering
Select Utility Contacts
Select District 4 on top of the webpage, select the City/Town (NORTH READING), and then locate the utility.

The Contractor shall inform the following officials in each area that he assigned to work:

Superintendent, Department of Public Works or Town Engineer,
Superintendent, Water Department,
Superintendent, Sewer Department,
Police and Fire Department,
Electric Department
Town officials are shown at website http://www.mass.gov under the Cities and Towns.
Select “North Reading” from the “pull down” menu.
Press “Go” and locate the official Municipality Home Page.

SECTION 02010

A list of Utility Contracts is below, but completeness of this list is not guaranteed by the Town.

UTILITY CONTACTS

Reading Municipal Light Dept. 230 Ash Street Reading, MA 01867	Paul Carson 781-944-1340
National Grid Gas 40 Sylvan Road Waltham, MA 02451	Melissa Owens 781-907-2845 Melissa.owens@nationalgrid.com
Tennessee Gas Pipeline Company 8 Anngina Drive Enfield, CT 06082	David Wood 860-763-6005 KMEncroachmentsNorth@kindermorgan.com
Enbridge 8 Wilson Way Westwood, MA 02090	Kathy M. Aruda 508-938-7728 Kathleen.aruda@enbridge.com
Verizon 385 Myles Standish Blvd. Taunton, MA 02780	Karen Mealey 774-409-3160 karen.m.mealey@verizon.com
North Reading DPW 235 North Street (Town Hall) North Reading, MA 01864	Joeseph Parisi, Jr.
Comcast Cable. PO Box 6505, 5 Omni Way Chelmsford, MA	Wendy Brown 978-848-5163 Wendy_Brown@comcast.com
Crown Castle 80 Central Street Boxborough, MA 01719	Mark Bonanno 508-616-7818 Mark.bonanno@crowncastle.com
North Reading Fire Department 152 Park Street North Reading, MA 01864	Richard Nash 978-664-3112

SECTION 02010

ITEM 102.511 TREE PROTECTION – ARMORING AND PRUNING EACH

The work under this item shall conform to the relevant provisions of Section 771 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The work shall include furnishing and installation of temporary tree trunk protection and limb pruning to prevent injury to the tree from construction equipment and activities. Trunk armoring is for instances where construction activity (the use of heavy equipment) comes close enough to potentially damage the tree trunk or limbs. It shall be used where shown on the plans and as required by the Engineer.

Trees to be trunk armored and/or limb pruned shall be those identified by the Engineer and/or the Town.

References

If requested, the Contractor shall provide to the Engineer one copy of the latest edition of the American National Standards Institute (ANSI) A300 Standard Practices for Tree, Shrub, and Other Woody Plant Maintenance: Part 1-Pruning and Part 5-Construction Management Standard. Provision of reference shall be incidental to this item.

Materials

Trunk armoring shall be such that it prevents damage to the trunk from construction equipment. Selected materials shall be such that installation and removal will not damage the trunk.

Acceptable materials include 2x4 wood cladding with wire or metal strapping, or, for instances when duration of construction activities is less than three months, corrugated plastic pipe mounted with duct tape. Height of cladding shall be from base of tree (including root flare) to the bottom of the first branch or as recommended by the Engineer and/or Town. Materials and methods shall be approved by the Engineer.

Methods of Work

Prior to construction activities, the Engineer, the Contractor, and the Town Tree Warden shall review trees noted on the plans to be protected. Final decision as to trees armored and/or pruned shall be per the Engineer.

Care shall be taken to avoid damage to the bark during installation and removal of armoring. Trunk armoring shall be replaced and maintained such that it is effective for as long as required and shall be removed immediately upon completion of work activities adjacent to trees.

Pruning of limbs shall conform to the techniques and standards of the most recent ANSI A300 standards.

ITEM 102.511 (Continued)

Damages

In the event that trees designated for protection under this item are damaged, including root damage from unapproved trespassing onto the root zone, the Contractor shall, at his own expense obtain an Arborist.

If, based on the recommendations of the Arborist, the Engineer determines that damages can be remedied by corrective measures, such as repairing trunk or limb injury, soil compaction remediation, pruning, and/or watering, the damage will be repaired as soon as possible within the appropriate season for such work and according to industry standards.

If the Engineer determines that damages are irreparable, the Contractor shall pay for the damages in the amount of $500.00 per diameter inch at breast height (DBH) per tree.

Additionally, if the Engineer determines that the damages are such that the tree is sufficiently compromised as to pose a future safety hazard, the tree shall be removed. Tree removal will include cleanup of all wood parts, grinding of the stump to a depth sufficient to plant a replacement tree or plant, removal of all chips from the stump site, and filling the resulting hole with topsoil.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 102.511 will be measured and paid at the Contract unit price per each, which price shall include all labor, materials, equipment, and incidental costs to complete the work. No separate payment will be made for the removal and disposal of the protective materials upon completion of the Contract, but all costs in connection therewith shall be included in the Contract unit price bid.

Payment under this item will be scheduled throughout the length of contract:

- 40% of value will be paid upon installation of trunk armoring and completion of pruning work, if required.
- 60% will be paid at the end of construction operations that would damage the tree and after protection materials have been removed and properly disposed of by the Contractor. In the event of repairable damages, payment will be made after the completion of remediation measures.

In the event of tree damage, cost of remediation measures, and/or tree removal shall be paid by the Contractor.

In the event of irreparable damage due to lack of proper protective measures being taken there will be no compensation in addition to the $500.00 per diameter inch cost borne by the Contractor.

SECTION 02010

ITEM 115.1 DEMOLITION OF BRIDGE NO. N-18-003 LUMP SUM

GENERAL

The work under this item shall conform to the relevant provision of Section 112 of the Standard Specifications and the following:

The work under this item shall consist of furnishing all labor and materials necessary to perform the full demolition and removal of the existing bridge structure as shown on the Plans, and as required by the Engineer. This shall include, but is not limited to, the existing steel culverts. Except as specified, all material and debris shall become the property of the Contractor and shall be disposed of properly in accordance with the Standard Specifications and with all applicable Local, State, and Federal requirements.

After the temporary gas line is installed and connected to the existing gas line, the existing gas line in conflict will be cut, capped and abandoned in place by others. It will be the responsibility of the Contractor to remove the abandoned pipe in conflict and designated for removal. The existing water line shall be cut and capped prior to any excavation and throughout the duration of the project.

If flame cutting of the existing steel pipe culverts is considered, then a review of potential hazardous materials resultant from such activity shall be investigated and removed accordingly, at the expense of the Contractor.

SUBMITTALS

The Contractor shall prepare and submit a plan indicating the proposed demolition procedures which shall include a schedule of operations and disposal location for the Engineer's review and approval. The demolition procedure and any necessary calculations and drawings shall be stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

The following information shall be included in the submittal:

1. Plan showing the location of all roadways, utilities and other appurtenances in the area of demolition.
2. The location of cranes, excavators, or other machinery to be used and their operating radii.
3. Lifting equipment information, including rating data. Information shall include counterweights to be used and boom capability. Crane capacity shall be adequate for 150% of the total pick weight.
4. The type, size and arrangement of slings, shackles or other lifting and connecting devices, including relative technical data.

Work under this item may not commence until the Engineer has given written approval.

ITEM 115.1 (Continued)

The Contractor shall take care not to damage any newly constructed structural components as shown on the Plans. Any structural components so designated that are damaged or otherwise made unsatisfactory for continued use by the Contractor's operations, as determined by the Engineer, shall be replaced or repaired to the satisfactory of the Engineer by the Contractor at their own expense.

It is the Contractor's responsibility to maintain the integrity of the existing culvert during the first construction stage proposed on the project. All additional work required to maintain the integrity of the structure during construction will be incidental to this Item.

The demolition, removal and disposal of the existing structures are to be completed "in the dry." For more information on control of water, see Special Provision Item 991.1 Control of Water – Structure No. N-18-003.

The Contractor is advised to conduct a field investigation prior to bidding. The Contractor shall verify all conditions and materials in the field and shall base his/her bid on his/her own findings without any additional compensation for variance from the plans or these special provisions regarding actual conditions for Items to be removed.

BASIS OF PAYMENT

Item 115.1 Demolition of Bridge No. N-18-003 will be paid for at the Contract LUMP SUM bid price, which price shall include all labor, materials, equipment, and incidental costs required to complete the work to the satisfaction of the Engineer as indicated on the Contract Documents, as specified herein. All costs for permits, dump fees, special handling of hazardous materials, etc. shall be included in the bid price of this demolition Item. No additional payment will be made for any additional work required to maintain the integrity of the structure during construction.

The Town of North Reading does not guarantee or represent that the bridge materials will actually coincide with any descriptions contained herein or represented on the plans. The Contractor shall be satisfied by the Contractor's own investigation and research, regarding all conditions and materials affecting the work to be done. No additional compensation other than the LUMP SUM bid price for this Item will be made if the materials or work prove to be different than inferred or described herein, or shown on the Plans.

SECTION 02010

ITEM 153.1 CONTROLLED DENSITY FILL – NON-EXCAVATABLE CUBIC YARD

GENERAL

Work under this item shall conform to the relevant provisions of Section 150 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The work shall include the placement of Controlled Density Fill (CDF) – Non – Excavatable below the precast concrete footings and at the precast highway guardrail transitions as indicated on the Plans and as required by the Engineer.

MATERIALS

CDF Non-Excavatable shall be either Type 1, 1E, 2 or 2E depending on the applications and as required by the Engineer. Type 1 and Type 2 shall have a compressive strength of 200 pounds per square inch (psi) required at 28 days. Type 1E and 2E shall have a compressive strength of 80 psi required at 28 days.

All CDF materials under this item shall conform to Section M4.08.0 and shall be by a Mass-DOT approved fabricator listed on the Qualified Construction Materials List.

Water used in mixing flowable fill shall be clean and free from deleterious materials.

METHODS

Conveyance by Chutes:

When CDF is conveyed by chutes, the equipment shall be of such size and U-shaped design as to insure a continuous flow in the chute. Flat chutes shall not be employed. The chutes shall be of metal, metal lined or other smooth material, and the different portions shall have approximately the same slope.

Conveyance by Pumping:

Equipment and procedures for pumped CDF shall be suitable and adequate to maintain a steady flow at the discharge end of the pipe, and to maintain the specified properties of compressive strength, unit weight, slump and air content. The CDF shall be flowable, and require no vibrating. The material shall flow under and around the highway guardrail transition and footings, sufficient to hold it in place.

Curing:

Newly placed CDF shall be protected against any damage due to low and extremely high temperatures, rapid loss of moisture, and against any foot and vehicular traffic.

No bituminous concrete or cement concrete pavements shall be laid on CDF until such CDF has been cured as determined and accepted by the Engineer.

ITEM 153.1 (Continued)

Inspection and Testing:

The Engineer will make on-site inspections of the placing of the CDF, and may direct the Contractor to perform slump tests as required. The Contractor shall make such tests at its own expense. Such inspection and testing does not relieve the Contractor of his responsibility to provide his own inspection, testing, and quality control as necessary to complete the work in accordance with the requirements of the Contract Documents.

The Contractor shall notify the Engineer prior to the placement of CDF. Such notification shall be made at least 24 hours in advance.

Slump test shall consist of a 6-inch long with a 3-inch diameter hollow metal cylinder rested on its base on a flat clean surface. The cylinder shall be filled to the top with CDF and then slowly raised. As it is being raised a CDF "pancake" is formed. The diameter of the resulting "pancake" shall be measured. The diameter shall be compared to the specified diameter of "pancake". The slump testing shall be performed as frequently as required and determined by the Engineer to ensure that furnished flowable fill is acceptable.

SUBMITTALS

Prior to the commencement of any work under these items, the Contractor shall submit to the Engineer for review and approval a submittal containing the following information:

1. Cement: A Certificate by the manufacturer of cement certifying its conformity to the type and quality specified herein.
2. Fly Ash: A Certificate prepared by the flowable fill supplier attesting that fly ash is in compliance with the specified properties.
3. The manufacturer of the flowable fill shall furnish to the Engineer with each batch of material delivered before unloading at the site, a delivery ticket on which is printed, stamped or written information concerning said flowable fill with the following:
    a. Name of ready-mix batch plant.
    b. Serial number of ticket.
    c. Date.
    d. Name of purchaser.
    e. Name & Number of Project.
    f. Quantity in cubic yards of the delivered flowable fill.
    g. Type and Compressive Strength of flowable fill.
    h. Name and signature of ready mix representative.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 153.1 will be measured and paid for at the Contract unit price per Cubic Yard, complete in place, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment will be made for testing, but all costs in connection therewith shall be included in the Contract unit price bid.

SECTION 02010

ITEM 180.01 ENVIRONMENTAL HEALTH AND SAFETY PROGRAM LUMP SUM

The work under this item shall consist of ensuring the health and safety of the Contractor's employees and subcontracting personnel, the Engineer, their representatives, the environment, and public welfare from any on-site chemical contamination present in air, soil, water, and sediment.

GENERAL

The Contractor shall prepare and implement a site-specific Environmental Health and Safety Plan (EHASP) which has been approved and stamped by a Certified Industrial Hygienist (CIH) and includes the preparer's name and work experience. The EHASP shall include appropriate components required by OSHA Standard 29 CFR 1910.120(b) and the Massachusetts Contingency plan (MCP) 310 CMR 40.0018 and must comply with all applicable state and federal laws, regulations, standards and guidelines, and provide a degree of protection and training appropriate for implementation on the project. The EHASP shall be a dynamic document with provision for change to reflect new information, new practices or procedures, changing site environmental conditions or other situations which may affect site workers and the public.

Health and safety procedures provided by the Contractor shall comply with all the appropriate regulations that address employee working conditions, including but not limited to standards established by OSHA and National Institute for Occupational Safety and Health (NIOSH). Equipment used for the purpose of health and safety shall be approved by and meet pertinent standards and specifications of the appropriate regulatory agencies.

A copy of the most up-to-date version of the EHASP shall be maintained on-site at all times by the Contractor. The on-site copy shall contain the signature of the Engineer and each on-site employee of the Town, Contractor, and Subcontractors involved with on-site activities. The employee's signature on the EHASP shall be deemed prima facie evidence that the employee has read and understands the plan. Updated copies of signature sheets shall be submitted to the Engineer.

The EHASP shall specify a Contractor Site Safety and Health Officer responsible for implementation of the EHASP and to oversee all construction activities, including handling, storage, sampling and transport, which require contact with or exposure to potentially hazardous materials.

The level of protection required to ensure the health and safety of on-site personnel will be stipulated in the EHASP. The Site Safety and Health Officer shall implement the EHASP based on changing site and weather conditions, type of operation or activity, chemical compounds identified on-site, concentration of the chemicals, air monitoring data, physical state of the hazardous materials, potential duration of exposure to hazardous materials, dexterity required to perform work, decontamination procedures, necessary personnel and type of equipment to be utilized.

ITEM 180.01 (Continued)

During implementation of the EHASP, a daily log shall be kept by the Site Safety and Health Officer and a copy shall be provided weekly to the Engineer. This log shall be used to record a description of the weather conditions, levels of personal protection being employed, screening data and any other information relevant to on-site environmental safety conditions. The Site Safety and Health Officer shall sign and date the daily log.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Preparation and implementation of the Environmental Health and Safety Program, including the monitoring, protection and storage of all contaminated materials, as well as subsequent modifications to the EHASP, shall be paid for at the Lump Sum bid price.

Payment of 50% of the Environmental Health and Safety Program contract price will be made upon the initial acceptance of the EHASP by the Engineer. Payment of the remaining 50% of the Environmental Health and Safety Program contract price will be made upon completion of the work. The bid price shall include preparation and implementation of the EHASP as well as the cost for its enforcement by the Site Safety and Health Officer along with any necessary revisions and updates. The work of implementing the Environmental Health and Safety Program includes work involving, but not limited to, the monitoring, protection, and storage of all contaminated materials.

ITEM 180.02 PERSONAL PROTECTION LEVEL C UPGRADE HOUR

The work under this item shall consist of providing appropriate personal protective equipment (PPE) for all personnel in an area either containing or suspected of containing a hazardous environment.

GENERAL

Contingencies for upgrading the level of protection for on-site workers will be identified in the EHASP and the Contractor shall have the capability to implement the personal protection upgrade in a timely manner. The protective equipment and its use shall be in compliance with the EHASP and all appropriate regulations and/or standards for employee working conditions.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 180.02 will be measured and paid only upon upgrade to Level C and will be at the contract unit price, per Hour, per worker, required in Level C personal protection. No payment will be made to the Contractor to provide Level D PPE.

ITEM 180.03 LICENSED SITE PROFESSIONAL SERVICES HOUR

GENERAL

Within limited areas of the project site, soils, sediments and/or groundwater may be contaminated. A Licensed Site Professional (LSP) shall be required to provide the services necessary to comply with the requirements of the Massachusetts Contingency Plan (MCP). These services may include sampling, analysis and characterization of potentially contaminated media, preparation of Immediate Response Action (IRA) Plans, Utility-Related Abatement Measure (URAM) and Release Abatement Measure (RAM) Plans, Imminent Hazard Evaluations, status reports, transmittal forms, release notification forms, risk assessments, completion statements, and related documents required pursuant to the MCP. LSP hours related to the characterization and disposal of contaminated soil and/or sediment are incidental to the disposal items. An estimate of LSP services to be provided shall be submitted to the Engineer for approval before any LSP activity begins.

The name and qualifications of the LSP and all environmental technicians to be assigned to the project shall be submitted to the Engineer for approval at least four weeks prior to initial site activities. The LSP shall have a current, valid license issued by the Massachusetts Board of Registration of Hazardous Waste Site Cleanup Professionals. The LSP shall have significant experience in the oversight of MCP activities at active construction sites. Qualification packages for the LSP and each technician shall include a resume, all recent work assignments with responsibilities identified (previous 5 years), and applicable training and certifications. A list of all Notices of Noncompliance, Notice of Audit Findings and Enforcement Orders issued by the DEP shall be submitted for all work assignments listed for the LSP and environmental technicians.

The LSP shall evaluate soil and/or sediment with discoloration, odor, and presence of petroleum liquid or sheening on the groundwater surface, or any abnormal gas or materials in the ground which are known or suspected to be oil or hazardous materials. Excavated soil and sediment which is suspected of petroleum contamination shall be field screened using the jar headspace procedures according to established DEP Guidance. All field screening equipment must be pre-approved by the Engineer. The LSP shall ensure proper on-site calibration of all field screening instrumentation.

The Engineer shall be contacted immediately when observations or any field screening results verify contamination requiring further analysis, and/or enhanced management of suspect soil and/or sediment. Any enhanced management of contaminated soil to ensure proper stockpiling and storage is incidental to the LSP Services item. The LSP shall adequately characterize subsurface conditions prior to backfill in areas where contaminated material has been excavated. The Engineer shall approve the locations of the testing sites prior to the sampling.

ITEM 180.03 (Continued)

Contaminated soil, sediment and/or groundwater shall be handled in accordance with all applicable state and federal statutes, regulations and policies. The LSP shall adequately characterize contaminated media for comparison to the requirements of the MCP. The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations. The LSP shall maintain written records in a clear and concise format which tracks the excavation, stockpiling, analysis and reuse/disposal of all suspect contaminated soils, sediments and groundwater. These records shall be up-to-date and available to the Engineer on a bi-weekly basis. The LSP shall review and summarize the laboratory data from any analyses performed on contaminated media. A report shall be delivered to the Engineer outlining the material sampling methods, laboratory analysis results and proposed course of action. The laboratory report together with Chain of Custody forms for all analytical results shall be submitted to the Engineer within 14 days after completion of such analyses.

The LSP and Contractor shall be held responsible for the submission of all MCP-related documents to the Engineer at least 14 days in advance of any timeframe specified in the MCP and for the timely submission of data and tracking information as noted within this Item. All documents prepared under this Item must be reviewed and signed by the approved LSP. The Contractor and LSP shall be responsible for all fines, penalties and enforcement requirements imposed by applicable regulatory agencies for failure to meet regulatory and contract timeframes. No compensation will be provided for such fines, penalties and enforcement actions.

The Contractor and the LSP shall be aware of the reporting requirements for releases of oil and/or other hazardous material (OHM) as set forth in federal and state laws and regulations, and shall both be held responsible for performing the work in accordance with all applicable Federal and State laws and regulations.

If the Contractor causes a release of OHM, the Contractor shall be responsible for assessing and remediating the release in accordance with all pertinent State and Federal regulations, including securing the services of a LSP, at his own expense.

Any notification of release shall be approved by the Town before submittal to the DEP, except if an imminent hazard condition exists as defined in 309 CMR 4.03(4)(b).

ITEM 180.03 (Continued)

LABORATORY TESTING IN SUPPORT OF LSP SERVICES

Laboratory testing provides for analytical testing in support of LSP services related to maintaining MCP compliance, such as delineating the extent and type of contamination present. Sampling and testing for disposal purposes are not included.

In order to maintain compliance with the MCP or other regulatory requirements, the LSP shall request approval from the Engineer to obtain samples from various locations and depths within the project area and to perform laboratory analyses on those samples. The samples shall be delivered to a DEP-certified laboratory using proper chain-of-custody documentation for analyses which, depending upon site conditions and suspected and/or identified contaminants of concern, may include, but are not limited to, metals, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polycyclic aromatic hydrocarbons (PAHs), extractable petroleum hydrocarbons (EPHs) and volatile petroleum hydrocarbons (VPHs). Subsequent testing, depending upon initial results, may be required for Toxicity Characteristic Leaching Procedure (TCLP) analyses (EPA Method 1311) for metals.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

LSP Services for work under this item will be measured per person, per Hour of service provided by LSP, Environmental Technicians and other approved personnel. Travel time shall not be included in the billable hours. LSP hours related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

The quantity and type of laboratory tests must be approved by the Engineer beforehand. The contractor will be reimbursed upon satisfactory written evidence of payment. The contractor may be required to obtain cost estimates from three DEP certified laboratories for the Engineer to choose the service provider. Laboratory testing related to soil/sediment disposal (disposal characterization, landfill acceptance, disposal package preparation, etc.) shall be incidental to disposal items.

SECTION 02010

ITEM 181.11	**DISPOSAL OF UNREGULATED SOIL**	**TON**
ITEM 181.12	**DISPOSAL OF REGULATED SOIL IN-STATE FACILITY**	**TON**
ITEM 181.13	**DISPOSAL OF REGULATED SOIL OUT-OF-STATE FACILITY**	**TON**
ITEM 181.14	**DISPOSAL OF HAZARDOUS WASTE**	**TON**

The work under these Items shall include the transportation and disposal of contaminated material excavated or excavated and stockpiled. It shall also include the cost of any additional laboratory analyses required by a particular disposal facility beyond the standard disposal test set.

GENERAL

Excavation of existing subsurface materials may include the excavation of contaminated soils. The Contractor shall be responsible for the proper coordination of characterization, transport and disposal, recycling or reuse of contaminated soils. Disposal, recycling or reuse will be referred to as “disposal” for the purposes of this specification. However, regardless of the use of the term herein, there will be no compensation under these items for reuse within the project limits. The Contractor will be responsible for coordinating the activities necessary for characterization, transport and disposal of contaminated soils. Such coordination will include the Engineer and his/her designee overseeing management of contaminated materials. Contaminated soils must be disposed of in a manner appropriate for the soil classification as described below and in accordance with the applicable laws of local, state and federal authorities. The Contractor shall be responsible for identifying disposal facility (ies) licensed to accept the class of contaminated soils to be managed and assure that the facility can accept the anticipated volume of soil contemplated by the project. The Contractor shall be responsible for hiring a Licensed Site Professional (LSP) and all ancillary professional services including laboratories as needed for this work. The Contractor will be responsible for obtaining all permits, approvals, manifests, waste profiles, Bills of Lading, etc. subject to the approval of the Engineer prior to the removal of the contaminated soil from the site. The Contractor and LSP shall prepare and submit to the Engineer for approval all documents required under the Massachusetts Contingency Plan (MCP) and related laws and environmental regulations to conduct characterization, transport, and disposal of contaminated materials.

CLASSES OF CONTAMINATED SOILS

The Contractor and its LSP shall determine if soil excavated or soil to be excavated is unregulated soil or contaminated soil as defined in this section. Such materials shall be given a designation for purposes of reuse or disposal based on the criteria of the MCP. Soils and sediments which are not suitable for reuse will be given a designation for purposes of off-site disposal based on the characterization data and disposal facility license requirements. The Classes of Contaminated Soils are defined as follows:

ITEMS 181.11 - 181.14 (Continued)

Unregulated Soil consists of soil, fill and dredged material with measured levels of oil and hazardous material (OHM) contamination at concentrations below the applicable Reportable Concentrations (RCs) presented in the MCP. Unregulated soil consists of material which may be reused (or otherwise disposed) as fill within the Commonwealth of Massachusetts subject to the non-degradation criteria of the MCP (310 CMR 40.0032(3), in a restricted manner, such that they are sent to a location with equal or higher concentrations of similar contaminants. Disposal areas include licensed disposal facilities, approved industrial settings in areas which will be capped or covered with pavement or loamed and seeded, and for purposes of this project should be reused as fill within the project site construction corridor whenever possible. The material cannot be placed in residential and/or environmentally sensitive (e.g. wetlands) areas. Under no circumstances shall contaminated soils be placed in an uncontaminated or less contaminated area (including the area above the groundwater table if this area shows no sign of contamination).

The Contractor shall submit to the Town the proposed disposal location for unregulated soils for approval. If such a disposal location is not a licensed disposal facility, the Contractor shall submit to the Engineer analytical data to characterize the disposal area sufficiently to verify that the unregulated material generated within the project limits is equal to or less than the contaminant levels at the disposal site and meets the non-degradation requirements of the MCP. In addition, the Contractor shall provide written confirmation from the owner of the proposed disposal location that they have been provided with the analytical data for both the materials to be disposed as well as the disposal site characterization and that s/he agrees to accept this material. A Material Shipping Record or Bill of Lading, as appropriate, shall be used to track the off-site disposal of unregulated soil and a copy, signed by the disposal facility or property owner, shall be provided to the Engineer in order to document legal disposal of the unregulated material.

The cost of on-site disposal of unregulated soil within the project area will be considered incidental to the item of work to which it pertains.

ITEMS 181.11 - 181.14 (Continued)

Regulated Soil consists of materials containing measurable levels of OHM that are equal to or exceed the applicable Reportable Concentrations for the site as defined by the MCP, 310 CMR 40.0000. Regulated soil which meets the MCP reuse criteria of the applicable soil/groundwater category for this project area may be reused on site provided that it meets the appropriate geotechnical criteria established by the Engineer. Regulated Soil may be reused (as daily or intermediate cover or pre-cap contouring material) or disposed (as buried waste) at lined landfills within the Commonwealth of Massachusetts or at an unlined landfill that is approved by the Massachusetts Department of Environmental Protection (DEP) for accepting such material, in accordance with DEP Policy #COMM-97-001, or at a similar out-of-state facility. It should be noted that soils which exceed the levels and criteria for disposal at in-state landfills, as outlined in COMM-97-001, may be shipped to an in-state landfill, but require approval from the DEP Division of Solid Waste Management and receiving facility. An additional management alternative for this material is recycling into asphalt. Regulated Soils may also be recycled at a DEP approved recycling facility possessing a Class A recycling permit subject to acceptance by the facility and compliance with DEP Policy #BWSC-94-400. Regulated Soil removed from the site for disposal or treatment must be removed via an LSP approved Bill of Lading, Manifest or applicable material tracking form. This type of facility shall be approved/permitted by the State in which it operates to accept the class of contaminated soil in accordance with all applicable local, state and federal regulations.

Hazardous Waste consists of materials which must be disposed of at a facility permitted and operated in full compliance with Federal Regulation 40 CFR 260-265, Massachusetts Regulation 310 CMR 30.000, Toxic Substances Control Act (TSCA) regulations, or the equivalent regulations of other states, and all other applicable local, state, and federal regulations. All excavated materials classified as hazardous waste shall be disposed of at an out-of-state permitted facility. This facility shall be a RCRA hazardous waste or TSCA facility, or RCRA hazardous waste incinerator. This type of facility shall be approved/permitted by the State in which it operates to accept hazardous waste in accordance with all applicable local, state and federal regulations and shall be permitted to accept all contamination which may be present in the soil excavate. The Contractor shall ensure that, when needed, the facility can accept TSCA waste materials i.e. polychlorinated biphenyls (PCBs). Hazardous waste must be removed from the site for disposal or treatment via an LSP approved Manifest.

MONITORING/SAMPLING/TESTING REQUIREMENTS

The Contractor shall be responsible for monitoring, sampling and testing during and following excavation of contaminated soils to determine the specific class of contaminated material. Monitoring, sampling and testing frequency and techniques should be performed in accordance with Item 180.03 – LSP Services. Additional sampling and analysis may be necessary to meet the requirements of the disposal facility license. The cost of such additional sampling and analysis shall be included in the bid cost for the applicable disposal items. The Contractor shall obtain sufficient information to demonstrate that the contaminated soil meets the disposal criteria set by the receiving facility that will accept the material.

ITEMS 181.11 - 181.14 (Continued)

No excavated material will be permanently placed on-site or removed for off-site disposal until the results of chemical analyses have been received and the materials have been properly classified. The Contractor shall submit to the Engineer results of field and laboratory chemical analyses tests within seven days after their completion, accompanied by the classification of the material determined by the Contractor, and the intended disposition of the material. The Contractor shall submit to the Engineer for review all plans and documents relevant to LSP services, including but not limited to, all documents that must be submitted to the DEP.

WASTE TRACKING

Copies of the fully executed Weight Slips/Bills of Lading/ Manifests/Material Shipping Records or other material tracking form received by the Contractor from each disposal facility and for each load disposed of at that facility, shall be submitted to Engineer and the Contractor's LSP within three days of receipt by the Contractor. The Contractor is responsible for preparing and submitting such documents for review and signature by the LSP or other appropriate person with signatory authority, three days in advance of transporting soil off-site. The Contractor shall furnish a form attached to each manifest or other material tracking form for all material removed off-site, certifying that the material was delivered to the site approved for the class of material. If the proposed disposition of the material is for reuse within the project construction corridor, the Contractor shall cooperate with the Town to obtain a suitable representative sample(s) of the material to establish its structural characteristics in order to meet the applicable structural requirements as fill for the project.

All material transported off-site shall be loaded by the Contractor into properly licensed and permitted vehicles and transported directly to the selected disposal or recycling facility and be accompanied by the applicable shipping paper. At a minimum, truck bodies must be structurally sound with sealed tail gates, and trucks shall be lined and loads covered with a liner, which shall be placed to form a continuous waterproof tarpaulin to protect the load from wind and rain.

DECONTAMINATION OF EQUIPMENT

Tools and equipment which are to be taken from and reused off site shall be decontaminated in accordance with applicable local, state and federal regulations. This requirement shall include, but not be limited to, all tools, heavy machinery and excavating and hauling equipment used during excavation, stockpiling and handling of contaminated material. Decontamination of equipment is considered incidental to the applicable excavation item.

ITEMS 181.11 - 181.14 (Continued)

REGULATORY REQUIREMENTS

The Contractor shall be responsible for adhering to regulations, specifications and recognized standard practices related to contaminated material handling during excavation and disposal activities. The Town shall not be responsible at any time for the Contractor's violation of pertinent State or Federal regulations or endangerment of laborers and others. The Contractor shall comply with all rules, regulations, laws, permits and ordinances of all authorities having jurisdiction including, but not limited to, Massachusetts DEP, the U.S. Environmental Protection Agency (EPA), Federal Department of Transportation (DOT), Massachusetts Water Resources Authority (MWRA), the Commonwealth of Massachusetts and other applicable local, state and federal agencies governing the disposal of contaminated soils.

All labor, materials, equipment and services necessary to make the work comply with such regulations shall be provided by the Contractor without additional compensation. Whenever there is a conflict or overlap within the regulations, the most stringent provisions shall apply. The Contractor shall reimburse the Town for all costs it incurs, including penalties and/or for fines, as a result of the Contractor's failure to adhere to the regulations, specifications, recognized standard practices, etc., that relate to contaminated material handling, transportation and disposal.

SUBMITTALS

I. Summary of Sampling Results, Classification of Material and Proposed Disposal Option.

The following information, presented in tabular format, must be submitted to the Engineer for review and approval prior to any reuse on-site or disposal off-site. This requirement is on-going throughout the project duration. At least two weeks prior to the start of any excavation activity, the Contractor shall submit a tracking template to be used to present the information as stipulated below. Excavation will not begin until the format is accepted.

Characterization Reports will be submitted for all soil, sediment, debris and groundwater characterized through the sampling and analysis program. Each report will include a site plan which identifies the sampling locations represented in the Report. The Construction Plan sheets may be used as a base plan to record this information.

The Sampling Results will be presented in tabular format. Each sample will be identified by appropriate identification matching the sample identification shown on the Chain of Custody Record. The sample must also be identified by location (e.g. grid number or stockpile number). For each sample, the following information must be listed: the classification (unregulated, regulated, etc.), proposed disposal option for the stockpile or unit of material represented, and, all analytical results.

ITEMS 181.11 - 181.14 (Continued)

Each Characterization Report will include the laboratory analytical report and Chain of Custody Record for the samples included in the Report.

II. Stockpiling, Transport, and Disposal.

At least two weeks prior to the start of any excavation activity, the Contractor shall submit, in writing, the following for review and shall not begin excavation activity until the entire submittal is accepted.

Excavation and Stockpiling Protocol:
Provide a written description of the management protocols for performing excavation and stockpiling and/or direct loading for transport, referencing the locations and methods of excavating and stockpiling excavated material.

Disposal and Recycling Facilities:
Provide the name, address, applicable licenses and approved waste profile for disposal and/or recycling location(s) where contaminated soil will be disposed. Present information substantiating the suitability of proposed sites to receive classifications of materials intended to be disposed there, including the ability of the facility to accept anticipated volumes of material.

Provide a summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. Material should not be sent to facilities which are actively considered by the DEP, USEPA or other responsible agency to be in violation of federal, state or local hazardous waste or hazardous material regulations. The Town reserves the right to reject any facility on the basis of poor compliance history.

Transportation:
The name, address, applicable license and insurance certificates of the licensed hauler(s) and equipment and handling methods to be used in excavation, segregation, transport, disposal or recycling.

III. Material Tracking and Analytical Documentation for Reuse/Disposal.

The following documents are required for all excavation, reuse and disposal operations and shall be in the format described. At least two weeks prior to the start of any excavation or demolition activity, the Contractor shall submit the tracking templates required to present the information as stipulated below. Excavation or demolition will not begin until the format is accepted.

All soils, sediments and demolition debris must be tracked from the point of excavation to stockpiling to onsite treatment/processing operations to off-site disposal or onsite reuse as applicable.

ITEMS 181.11 - 181.14 (Continued)

Demolition Debris:
Demolition debris must be tracked if the debris is stockpiled at a location other than the point of origin or if treatment or material processing is conducted. Identification of locations will be based on the station-offset of the location. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations/comments, quantity, and stockpile ID/processing operation location. For each unit of material tracked, the table will also track reuse of the material on-site, providing reuse date, location of reuse as defined by start and end station, width of reuse location by offset, the fill elevation range, quantity, and finish grade for said location. For demolition debris which is not reused on site, the table will also track disposal of the material as defined by disposal date, quantity and disposal facility. The table must provide a reference to any analytical data generated for the material.

Soil/Sediment:
Soil excavation will be identified based on the station-offset of the excavation location limits. The tracking table will identify date and point of generation, any field screening such as PID or dust monitoring, visual observations, quantity, and stockpile number/location. For each unit of material tracked, the table will also track reuse of the material on-site and disposal of the material off-site using the same categories identified for demolition debris above.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 181.11 – 181.14 shall be measured for payment by the Ton of actual and verified weight of contaminated materials removed and disposed of. The quantities will be determined only by weight slips issued by and signed by the disposal facility. The most cost-effective, legal disposal method shall be used. The work of the LSP for disposal under all of these items shall be incidental to the work with no additional compensation.

Item 181.11 Measurement for Disposal of Unregulated Soil shall be under the Contract Unit Price by the weight, in Tons, of contaminated materials removed from the site and transported to and disposed of at an approved location or licensed facility, and includes any and all costs for approvals, permits, fees and taxes, additional testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

Item 181.12 Measurement for Disposal of Regulated Soil – In-State Facility shall be under the Contract Unit Price by the weight in Tons of contaminated materials removed from the site and transported to and disposed of at an approved in-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

Item 181.13 Measurement for Disposal of Regulated Soil - Out-of-State Facility shall be under the Contract Unit Price by the weight in Tons of contaminated materials removed from the site and transported to and disposed of at an approved out-of-state facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

ITEMS 181.11 - 181.14 (Continued)

Item 181.14 Measurement for Disposal of Hazardous Waste shall be under the Contract Unit Price by the weight in Tons of hazardous waste removed from the site and transported to and disposed of at the licensed hazardous waste facility, and includes any and all costs for approvals, permits, fees and taxes, testing/characterization required by the facility beyond the standard disposal test set, decontamination procedures, transportation and disposal.

SECTION 02010

ITEM 280.5 **SIDEWALK FLUME** **LUMP SUM**

The work under this item shall conform to the relevant provisions of Sections 201, 280, 701, 901, and 960 of the MassDOT Standard Specifications for Highways and Bridges and the following:

This work under this item includes the construction of a sidewalk section with a drainage flume with cast iron frame & covers. The work also includes but is not limited to the preparation of subgrade and borrow foundation; fine grading, and adjustment of the first 6" of roadway gutter pavement, jointing and protective coatings.

The Contractor shall verify all dimensions for the constructability of the sidewalk flume and shall submit shop drawings for approval by the Engineer. Only after approval shall any reinforcement, frames, or covers be ordered. The Contractor shall confirm elevations at the invert-in, the roadway gutter, the invert-out, and the top of the walk. Storm water drainage is to be away from the roadway. The sidewalk flume shall be constructed such that the longitudinal slope and cross slope of the sidewalk surface and the frames & covers shall comply with ADA/AAB guidelines and shall meet and match adjacent sidewalk slopes. Covers are not bolted down.

References

In addition to the MassDOT Standard Specifications, the Contractor may refer to the following MassDOT Construction Standard Drawings:

E 201.6.0 Catch Basin Frame
E 203.1.0 Drop Inlets – Frame Sections and 2-3 flange 4" C.I. Frames E 203.2.0 Drop Inlets Type AF – Precast

Submittals

Submit shop drawings for the castings and concrete work. Provide invert elevations and flume drainage slopes, roadway cross slopes, sidewalk longitudinal and cross slopes, and top of cover elevations and slopes. Indicate non-skid treatment for the cover. Identify steel reinforcement. Identify concrete mix.

Submit weigh slips for cement concrete (if casting in place) with mix design on the slip. Submit delivery slips for steel reinforcing (if casting in place).

Materials

Materials are as shown on the construction detail in the plans. Otherwise, comply with MassDOT material specifications.

Castings shall comply with MassDOT Section 201.40 of the MassDOT Standard Specifications for Highways and Bridges.

ITEM 280.15 (Continued)

Cement Concrete, if cast in place, shall be from an approved supplier. Precast items, if used, shall be from an approved supplier.

Steel shall be from an approved metal supplier. Pattern on steel plate shall be non- skid. Alternatively, provide a non-skid surface.

Construction Methods

Coordinate sidewalk and roadway construction with flume construction. Confirm elevations and dimensions prior to ordering castings. The sidewalk flume shall be constructed such that the longitudinal slope and cross slope of the cement surface and the frames & covers shall comply with ADA/AAB guidelines and shall meet and match adjacent sidewalk slopes. Construction must otherwise comply with the details depicted on plans.

For excavation and placement of subgrade material, comply with Section 140.60 of the MassDOT Standard Specifications. For Fine grading, comply with Sections 170.60 and 170.61 of the MassDOT Standard Specifications.

For installation of the castings and flume box, comply with relevant provisions for drainage, concrete, and steel, from Sections 201, 280, 901, and 960 of the MassDOT Standard Specifications.

For construction of the sidewalk section, comply with relevant provisions from Section 701 of the MassDOT Standard Specifications. Width from face of curb to back of sidewalk may vary.

BASIS OF PAYMENT

Item 280.15 will be paid for at the contract LUMP SUM price, which price shall include all labor, materials, equipment, installation of the sidewalk section with a sidewalk flume with cast frame and covers, regardless of depth or slope; steel reinforcement and structural steel; joint filler, coatings, sealers, adjustment of the roadway gutter, all fittings, and all concrete.

No separate payment will be made for excavation, fine grading, sawcutting, or hot mix asphalt, but all costs in connection therewith shall in included in the lump sum bid price.

ITEM 375.08 8 INCH INSERTION VALVE AND BOX EACH

The work under this item shall conform to the relevant provisions of Sections 120 and 301 of the MassDOT Standard Specifications for Highways and Bridges, the North Reading Water Construction Standards, and the following:

The work shall include furnishing and installing insertion valves in the existing water main, where shown on the plans or as required by the Town of North Reading. The contractor shall install new valves by the means of an inserting machine manufactured by Advance Valve Installations, AP Smith Co., Acme Valve Installers, or approved equal and must have sleeves to accommodate the existing water main pipe type.

The contractor shall submit cut sheets to the Engineer and Town of North Reading Water Department for approval prior to furnishing.

The Contractor shall arrange for a representative from the manufacturer and the Town of North Reading to oversee the inserting equipment and installation of the insertion valve.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Tiem 375.08 will be measured and paid for at the Contract unit price per each measured complete in place, which price shall include all labor materials, equipment and incidental costs required to complete the work.

ITEM 504.2 GRANITE CURB TYPE VA4 – SPLAYED END EACH

The work under this item shall conform to the relevant provisions of Section 500 of the MassDOT Standard Specifications for Highways and Bridges and the following:

Granite curb shall be 6' minimum in length and machine cut to match existing granite edging, existing hot mix asphalt berm or existing concrete curb. Refer to the construction detail in the contract drawings.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 504.2 will be measured and paid for at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

ITEM 620.12 GUARDRAIL, TL-2 (SINGLE FACED) FOOT

The work under this item shall conform to the relevant provisions of Section 600 of the MassDOT Standard Specifications for Highways and Bridges and the following.

The work shall include furnishing and installing TL-2 guardrail in locations shown on the plans and to conform with section 400 of the MassDOT Construction Standard Details, dated October 2017.

The work shall include installing TL-2 guardrail with half post spacing at the locations shown on the plans and required by the Engineer.

Submittals

The Contractor shall submit shop drawings, depicting the intended post spacing, for review prior to furnishing the guardrail.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 620.12 will be measured and paid for at the Contract unit price per foot of guardrail installed, which price shall include all labor, materials, equipment, transport and incidental costs required to complete the work.

No separate payment will be made for additional posts required to construct guardrail at half post spacing.

SECTION 02010

ITEM 697.1 **SILT SACK** **EACH**

The work under this item shall conform to the relevant provisions of Sections 227 and 670 of the MassDOT Standard Specifications for Highways and Bridges, and the following:

The work under this item includes the furnishing, installation, maintenance, and removal of a reusable fabric sack to be installed in drainage structures for the protection of wetlands and other resource areas and the prevention of silt and sediment from the construction site from entering the storm water collection system. Devices shall be ACF Environmental (800)-448-3636; Reed & Graham, Inc. Geosynthetics (888)-381-0800; BMP Supplies (855)-422-0066; or approved equal.

CONSTRUCTION

Silt sacks shall be installed in retained existing and proposed catch basins within the project limits and as required by the Engineer.

The silt sack shall be as manufactured to fit the opening of the drainage structure under regular flow conditions and shall be mounted under the grate. The insert shall be secured from the surface such that the grate can be removed without the insert discharging into the structure. The filter material shall be installed and maintained in accordance with the manufacturer's written literature and as directed by the Engineer.

Silt sacks shall remain in place until the placement of the pavement overlay or top course and the graded areas have become permanently stabilized by vegetative growth. All materials used for the filter fabric shall become the property of the Contractor and shall be removed from the site.

The Contractor shall inspect the condition of silt sacks after each rainstorm and during major rain events. Silt sacks shall be cleaned periodically to remove and dispose of accumulated debris as required. Silt sacks which become damaged during construction operations, shall be repaired or replaced immediately at no additional cost to the Town.

When emptying the silt sack, the contractor shall take all due care to prevent sediment from entering the structure. Any silt or other debris found in the drainage system at the end of construction shall be removed at the Contractors expense. The silt and sediment from the silt sack shall be legally disposed of offsite. Under no condition shall silt and sediment from the insert be deposited on site and used in construction.

All curb openings shall be blocked to prevent stormwater from bypassing the device. All debris accumulated in silt sacks shall be handled and disposed of as specified in Section 227 of the standard specification.

ITEM 667.1 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 667.1 will be measured and paid at the Contract unit price per each, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

No separate payment will be made for removal and disposal of the sediment from the insert, regardless of the frequency of removal and disposal, but all costs in connection therewith shall be included in the Contract unit price bid.

SECTION 02010

ITEM 697.2 FLOATING SILT FENCE FOOT

The 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 further dispersing. The work shall be in accordance with the relevant provisions of Section 670 for Sedimentation Fence of the MassDOT Standard Specifications for Highways and Bridges and the following:

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 North Reading Conservation Commission Agents after installation and prior to commencement of further construction activities.

The Contractor shall inspect the silt fence at least weekly to ensure continuous effectiveness. Fence shall be maintained for effective performance at all times. If any 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 AND BASIS OF PAYMENT

Item 697.2 will be measured and paid for at the Contract unit price per Foot of fence installed, complete in place, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

SECTION 02010

ITEM 698.1	**GEOTEXTILE FABRIC FOR STABILIZATION**	**SQUARE YARD**
ITEM 698.3	**GEOTEXTILE FABRIC FOR SEPARATION**	**SQUARE YARD**
ITEM 698.4	**GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL**	**SQUARE YARD**

The work under these items shall conform to the requirements of Materials Subsection M9.50.0 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The work under Geotextile Fabric for Stabilization includes furnishing and installing geotextile fabric below slopes greater than two-foot horizontal per one foot vertical (2H:1V), under the modified rockfill slope as shown on the plans or as required by the Engineer.

The work under Geotextile Fabric for Separation includes furnishing and installing geotextile fabric below stone for pipe ends as shown on the plans and as required by the Engineer.

The work under Geotextile Fabric for Permanent Erosion Control includes furnishing and installing geotextile fabric below the proposed 12” of crushed stone, below proposed bridge foundations, as shown on the plans and as required by the Engineer.

All geotextile fabrics shall be handled and installed per the manufacturer’s instructions and AASHTO M-288, Class 3, whichever is more stringent. All geotextile fabrics shall be selected from the MassDOT Qualified Construction Materials List.

At locations of fabric installation, the subgrade shall first be graded and compacted. All rocks, vegetation, and other obstructions shall be removed before the placement of fabric. The fabric shall be installed and fastened in place in conformance with the manufacturer's recommendations for installation on slopes.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Items 698.1, 698.3, and 698.4 will be measured and paid at the Contract unit price per square yard, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment will be made for material required for overlap areas, but all costs in connection therewith shall be included in the Contract unit price bid.

SECTION 02010

ITEM 751.7 **COMPOST BLANKET** **CUBIC YARD**

The work under this Item shall conform to the relevant provisions of Subsection 751 and M1.06.0 Organic Soil Additives of the MassDOT Standard Specifications for Highways and Bridges and the following:

Work shall consist of furnishing and pneumatically applying compost as a thin mulch blanket (1/2-1 inch depth) over prepared soil to provide temporary soil stabilization and organic matter for plant growth.

Submittals and Materials

No materials shall be delivered until the required submittals have been approved by the Engineer. Delivered materials shall match the approved samples. Approval of test results does not constitute final acceptance.

Contractor shall submit to the Engineer samples and certified test results no sooner than 60 days prior to application of compost. Vender certification that material delivered meets the test results shall be submitted if requested.

Compost may be a blended product of compost and fine wood chips. No kiln-dried wood, construction debris or ground palette is allowed. Material shall meet the following criteria:

- Organic matter content shall be minimum 30 percent (dry weight basis)
- Moisture content shall be 30-60 percent (wet weight basis)
- Bulk Density <1000 lb/cy
- pH shall be 5.5-7.5
- Conductivity shall be a maximum of 4 mmhos
- Stability test shall produce a maximum of 8mg CO2-C/gram of organic material per day
- Particle size shall not exceed ¾ inch
- Compost may be a blended product of compost and fine wood chips.

Compost testing shall be by a laboratory approved by the US Compost Council using the Testing Method for the Examination of Compost and Composting (TMECC) protocols.

The Engineer shall approve the Contractor's equipment for application.

Construction Methods

Application of compost material shall not begin until the Engineer has approved the site and soil conditions. Soil preparation shall be as specified under the applicable item for soil placement or for seeding. The Contractor shall notify the Engineer when areas are ready for inspection and application of compost blanket.

Compost blanket shall be pneumatically applied (blown on) to a depth of one half to one inch unless specified otherwise on the plans.

When compost blanket is proposed with seeding, seed shall be broadcast and shall occur in conjunction with compost topdressing, as specified under the relevant item for seeding.

ITEM 751.72 (Continued)

When compost blanket is proposed for areas with planting, compost (and seed if applicable) shall be applied after planting. If compost and seed occur prior to planting, areas shall be regraded and compost and seed reapplied to the satisfaction of the Engineer and at the Contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 751.72 will be measured and paid for at the Contract unit price per Cubic Yard which price shall include all labor, materials, equipment, and all incidental costs required to complete the work of pneumatically applying compost.

Surface preparation of substrate receiving compost blanket shall be compensated under the applicable item for placement of loam, sand, ordinary borrow, wetland soil, topsoil rehandled and spread, tilled existing soil, or other specified substrate.

Seeding will be compensated for under the appropriate seeding Items

SECTION 02010

ITEM 755.35 INLAND WETLAND REPLICATION AREA LUMP SUM

The work under this item shall conform to the relevant provisions of Sections 120, 770, 771 of the MassDOT Standard Specifications for Highways and Bridges 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 as specified under that item.

Description of Work

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

Area A (Station: 11+70 to 12+70) Area = 1,500 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).

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; including but not limited to damage to soils or vegetation due to erosion, 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 contractor shall use equipment that is small and tracked to avoid impacts.

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

Request for Certificate of Compliance (Partial or Full): As specified below, shall be submitted to the Engineer and Wetland Specialist 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 and the Wetland Specialist.

ITEM 755.35 (Continued)

Submittals - Materials

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 or other noxious plants.

At least sixty (60) days prior to installation and prior to ordering, the Contractor shall submit for approval sources of soil, compost, and amendments. Submittal shall include the supplier and location of the source. 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, guaranteed percentages of purity, weed content and germination of the seed, and the net weight. Seed tag 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. The document shall include date of sale, quantity, lot number, and address of Supplier. This shall match the seed tag. Notary shall not work for either the contractor or seed supplier.

ITEM 755.35 (Continued)

Plant Certification

Plant Certification shall be per the applicable requirements of Subsection 771, PLANTING TREES, SHRUBS AND GROUNDCOVER, of the MassDOT Standard Specifications for Highways and Bridges. The nursery source shall certify the provenance or origin of all plants.

Other Material: Submittals shall be per the respective item.

Materials

Sediment Control Barrier and Erosion Prevention Measures
Sediment control barriers shall be per Item 767.121.

Erosion prevention measures for disturbed areas adjacent to the Replication Area shall include but not necessarily be limited to compost blankets, seeding, and/or combinations thereof as approved by the Engineer.

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

Wetland Soil

Soil appropriate for the Replication Area may be either hydric soil excavated from the impacted wetland, a manufactured mix of compost and on-site borrow, or a combination thereof, as approved by the Wetland Specialist.

Hydric soil from the impacted wetland area may be spread on the surface of the constructed Replication Area as an inoculant or can be placed in a bulk fashion in a roughly 1:1 ratio of area and depth. Soil shall be handled such that the original soil structure is preserved and shall not be compacted, screened, or otherwise processed.

Hydric soil from the impacted wetland that is infested with invasive plant species identified on the Massachusetts Invasive Plant Advisory Group (MIPAG) shall not be used in the Replication Area unless approved by the Wetland Specialist and Engineer. To the extent possible, infested soil shall be disposed of within the project limits in an upland area outside of regulated areas and as approved by the Engineer.

A manufactured mix suitable for wetlands shall consist of on-site borrow from the proposed Replication Area (if approved by the Wetland Specialist and Engineer) thoroughly mixed with compost to achieve a target organic carbon content of 10-12% (up to 21% percent organic matter) by dry weight. The organic material used for mixing shall be well or partially decomposed. Clean leaf compost is the preferred soil amendment to achieve these standards though other materials may be used if approved by the Wetland Specialist and Engineer. Note that “clean” refers both to a negligible amount (<1%) of physical contaminants such as plastic and to the lack of chemical contaminants that might pose a hazard to plants or animals. Off-site borrow may be used for mixing if approved in advance by the Engineer.

ITEM 755.35 (Continued)

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.

Seed Mix

Seeding shall conform to the Standard Specifications Section M6, Roadside Development Materials.

Mix 765.553 Wetland – Riparian Mix

	Botanical Name	Common Name	% PLS By Weight
Grass			
	Sorghastrum nutans NY Eco	Indiangrass NY Ecotype	14.00%
	Schizachyrium scoparium	Little Blue Stem	14.00%
	Elymus riparius	Riverbank Wild Rye	10.00%
	Elymus virginicus	Virginia Wild Rye	10.00%
	Panicum clandestinum 'Tioga'	Deer Tongue 'Tioga'	9.00%
	Andropogon gerardii NY Eco	Big Bluestem NY Eco	8.00%
	Carex vulpinoidea	Fox Sedge	7.00%
	Panicum virgatum	Switchgrass	3.00%
	Juncus effusus	Soft Rush	2.00%
	Agrostis perennans	Upland Bentgrass	2.00%
	Scirpus atrovirens	Green Bulrush	1.00%
			80.00%
Herb/Forb			
	Chamaecrista fasciculata	Partridge Pea	3.00%
	Verbena hastata	Blue Vervain	3.00%
	Asclepias incarnata	Swamp Milkweed	3.00%
	Heliopsis helianthoides	Ox-Eye Sunflower	2.00%
	Eupatorium perfoliatum	Boneset	2.00%
	Aster umbellatus	Flat Topped White Aster	1.00%
	Aster prenanthoides	Zig Zag Aster	1.00%
	Aster puniceus	Aster – Swamp	1.00%
	Aster novae-angliae	New England Aster	1.00%
	Eupatorium maculatum	Joe-pye Weed	1.00%
	Monarda fistulosa	Wild Bergamot	1.00%
	Vernonia noveboracensis	New York Ironweed	1.00%
			20.00%
			100.00%

Wetland Seed – Riparian Mix shall be used within the proposed wetland replication area. Species ecotype shall be as native to New England region as possible. Apply this mix at 20 lbs PLS/acre.

ITEM 755.35 (Continued)

FOR USE WITH SLOPES: Add 30 lbs/acre of a cover crop if erosion is a concern. For a cover crop use either grain oats (1 Jan to 31 July) or grain rye (1 Aug to 31 Dec). Cover crop shall be incidental to Wetland Replication

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/Compost Blanket for Seeding

Hydromulch shall be per the manufacturer's recommendations and shall be wood fiber or straw mulch only. Mulch shall be incidental to seeding.

Compost Blanket may be used in lieu of mulch for seeding. Compost Blanket shall meet the material and submittal requirements of that Item and shall be applied as specified below. Compost Blanket will be compensated under that item.

CONSTRUCTION METHOD & SEQUENCE

The following is a proposed sequence of construction for the completion of the wetland replication:

1. A pre-construction conference with the Contractor and a qualified Wetland Specialist shall be conducted to ensure all aspects of the project, as well as any Order of Conditions, are understood. Equipment needs and access routes to the proposed replication area and stockpile areas shall be firmly established.
2. The boundary of vegetated wetland shall be re-established in the field as needed.
3. Erosion control barriers shall be installed along the existing wetland edge of the replication areas. This erosion control barrier shall also serve as a limit of work.
4. Vegetation shall be cleared from the replication areas, with the exception of any native trees listed as FAC or Wetter in the 2020 Northcentral and Northeast Regional Wetland Plant List from the US Army Corps of Engineers. These trees may be tagged and remain in place at the discretion of the Wetland Specialist.

ITEM 755.35 (Continued)

5. Topsoil within the replication area shall be excavated and stockpiled for re-use. Re-use of wetland soil at the impact area is not permitted due to the potential for contamination by non-native and invasive species present along the roadside. The replication area shall then be excavated to an elevation approximately 12 inches below final grade, as shown on the plans. The excavated area shall be "feathered" into the surrounding landscape so as not to create abrupt changes in grade and to meet the lines and grades shown on the plans. All excavation equipment operating within the replication area shall be small and on tracks to reduce soil compaction. Machine movement shall be minimized to the extent practicable.
6. Topsoil from the replication area shall be supplemented as needed with clean compost blanket. Leaf compost shall be used to amend compost blanket to achieve desired organic matter content. Topsoil shall be placed within the replication area to a minimum depth of 12 inches. Should it be necessary to stockpile soil, it shall remain covered and stockpiled a minimum of 25 feet from the wetland edge.
7. The replication area shall be gently compacted, and hand raked to enhance surface water retention. Spot elevations shall be taken to confirm desired elevations.
8. Plantings shall be obtained as container grown nursery stock. Substitutions may be required depending on availability and cost. A native wetland seed mix shall be hand sown as an understory cover to provide short-term erosion control, wildlife food, and cover and to discourage the establishment of invasive, non-native species such as purple loosestrife (Lythrum Salicaria) and common reed (Phragmites Australis).
9. Any disturbance to banks and adjacent buffer zone areas shall be restored and raked as needed. Additional wetland seed mix of a shade-tolerant conservation seed mix, Woodland Edge Shade seed mix, may be applied in surrounding areas at the discretion of the Wetland Specialist to restore any damage to vegetation.
10. The replication area shall be monitored in coordination with the North Reading Conservation Commission and Mass DEP.
11. Water by flooding twice in first two hours after planting. Water and maintain as per Standard Specifications. Shrubs shall be planted so the crown is 2 inches above finished grade after settlement.

ITEM 755.35 (Continued)

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.

Wetland topsoil shall be deposited and graded in the Replication Area in a manner that minimizes travel and subsequent compaction of the subgrade (including any specified pit and mound topography) to the extent practicable, including use of track mounted excavators as appropriate. Should soils be compacted, they shall be loosened by a method such as disking, spring-tooth harrowing and/or rototilling. The Contractor shall use boards, timber or composite mats, or other approved materials 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 at least 100 feet from the edge of the bordering and isolated vegetated wetlands and inland banks, unless approved otherwise by the Engineer. Stockpiled soils shall be securely stabilized and contained. Any areas of exposed soil or stockpiles within and adjacent to the Replication Area that will remain inactive for more than 7 calendar days shall be sown with a mix of rapid germinating annual grasses (e.g., annual rye) covered with a layer of straw mulch applied at a rate of 90 pounds per 1,000 square feet. As necessary, the mulch shall be anchored with a tacking coat (non-tar) applied by a hydro seeder or other method recommended by the Wetland Specialist in consultation with the Engineer. In the event that there is excess borrow, it shall be disposed of under Excavation, Item 120..

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.

ITEM 755.35 (Continued)

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 routes may be adjusted as required.

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 directed by the Wetland Specialist. 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 course 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.

ITEM 755.35 (Continued)

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 to achieve the desired hydrology and micro-habitat. 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.

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.

Replication area shall be excavated as shown on the drawings. Where replication area is adjacent to existing reference wetland, finish grade of replication shall generally match existing grades and micro-topography, notwithstanding any deviations that are necessary to achieve the desired hydrology and habitat in the Replication Area.

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

Placement of Wetland Soil

Following excavation, scarification, and grading of sub-grade, and after the sub-grade elevations are approved by the Wetland Specialist, suitable soil previously removed or an evenly mixed organic/mineral soil created on-site shall be spread to the design depth and thickness 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 an unrestricted 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 relative to the impacted reference 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.

ITEM 755.35 (Continued)

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

Placement 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.

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 GROUNDCOVER of the MassDOT Standard Specifications for Highways and Bridges and as amended below.

Planting Season shall be May 15-June 15 and September 1-November 1 unless otherwise specified in applicable permit conditions. All plant material shall have tags indicating common name, botanical name and size.

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. Plants shall be placed according to the planting details and 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 and shall be replaced at the Contractor's expense.

ITEM 755.35 (Continued)

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 are not available at the time of planting, the Wetland Specialist may propose substitutions relative to species, size, and quantities for review and approval by the Town. Upon approval by the Town, substitutions shall be approved by the regulating authority, if and as necessary. Provisions shall be made for a growth warranty of at least two (2) calendar years from the date of Conditional Acceptance as described below or as required by permits.

Soils shall be transported in vehicles that have been washed such that no exotic/invasive seeds from other sites get mixed in. Trucks that have previously been on other sites shall be washed prior to introduction to the restoration/replication site such that mud/dirt with exotic/invasive seeds is not inadvertently brought to the restoration site.

Seeding

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

- Broadcast by hand or with a hand-held spreader followed by application of straw mulch. If necessary, seed shall be lightly raked to insure good seed-to-soil contact.
- Hand broadcast seed with Compost Blanket pneumatically applied at the same time to ensure light cover of soil topdressing over seed.
- Compost Blanket can be either straw or compost.

If spring conditions are drier than usual, supplemental watering may be required. If sowing during the summer months, supplemental watering will likely be required until germination.

Wetland seeding shall be by broadcast method only.

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 establish according to the conditions of acceptance below shall be over-seeded as required by the Engineer. Washouts and channels shall be repaired and stabilized prior
to overseeding. Excessive weed growth shall be pulled out by the roots or, with approval from the Engineer, cut prior to over-seeding. Soil repair and weed control are 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

ITEM 755.35 (Continued)

Invasive Plant Advisory Group (MIPAG) and the US Army Corp of Engineer's New England District's Compensatory Mitigation Guidance.

The strategy for chemical and/or manual removal shall be as directed by the Wetland Specialist, shall continue for the duration of the monitoring period, and shall be incidental to this item.

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 Specialist demonstrating that the wetland replication 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. At a minimum, 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 relative to the approved plans and reference wetland. 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, the Town will issue a letter of Conditional Acceptance. If the Wetland Replication work is not approved, the Engineer 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 will 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.

ITEM 755.35 (Continued)

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.

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 prepared as a 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.

- 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.
- The desired seeded species are establishing well and cover at least 95 percent of the Replication 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, the Town 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.

ITEM 755.35 (Continued)

Wetland Specialist shall be compensated under Item 755.75.

BASIS OF PAYMENT

Item 755.35 will be paid for at the Contract unit 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, 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.
Sediment Control Barrier will be paid under Item 767.121
Wetland Specialist will be paid under Item 755.75
Compost Blanket will be paid under Item 751.72
Seeding required for disturbed area outside of the proposed replication area will be paid for under Item 765.453.

SECTION 02010

ITEM 755.75 **WETLAND SPECIALIST** **HOUR**

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 Mitigation" shall be used herein for applicable wetland work. For this project, applicable wetland work is for: Item 755.35 Inland Wetland Replication Area (creation of a new wetland) and/or Item 765.453 Woodland Edge Shade Seed Mix (restoration after temporary impacts).

The Wetland Specialist shall demonstrate knowledge and expertise to coordinate and oversee all work associated with the Wetland Mitigation as defined herein, as shown on the Plans, as required by permits, and as specified under the relevant Wetland Mitigation items.

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, at least 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 described below. Documentation shall include photos that are clear and legible. Photos are incidental to this item.

- *Site Walk Prior to Disturbance and Construction of Wetlands:* Provide brief assessment with photos, including documentation of the existing wetlands to be impacted (both permanent and temporary), proposed wetland replication area, and reference/model wetland areas (typically an adjacent undisturbed wetland or the existing wetland to be impacted). Photos of existing wetlands that will be temporarily impacted shall include a view from at least 3 angles.
- *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/replication areas, photos shall show soil preparation (i.e, tilling and grading), if applicable.
- *Approval of Subgrades:* The Wetland Specialist shall inspect the sub-grade of the Replication Area to ensure that proper hydrology is likely to be established and shall provide the Engineer with written confirmation and photographs upon completion of subgrade excavation work. Written confirmation shall include recommended field adjustments, based on field observations, to achieve the desired hydrology and designed wetland system.
- *Seeding:* Provide assessment and photos of vegetation upon completion of 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 if and as specified herein and under Item the relevant Wetland Mitigation items:

- 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.

ITEM 755.75 (Continued)

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.

Inspections & Construction Oversight

The Wetland Specialist shall be responsible for, 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 the Mitigation Area, target elevations and grades, location of tree protection associated with the Mitigation Area, and final layout and limits of clearing for 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.
    - Provide summary report if and as specified under Wetland Mitigation items.
- 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.
    - Adjust grades as required and approve microtopography. 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.
- Soil Protection and Restoration Measures for Restoration Areas
    - Review and approve methods of soil protection and restoration if required.
    - Confirm decompaction will adequately restore appropriate wetland hydrology. If decompaction measures need to be adjusted, submit an RFI to the Engineer.
- Re-vegetation of Mitigation Area
    - 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

ITEM 755.75 (Continued)

methods, and collect seed tags to submit with Request for Conditional Acceptance.
- Review planting methods (if applicable) prior to installation and oversee layout of wetland 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 the Wetland Mitigation items. 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. Photos of completed Restoration areas shall include the same views as the pre-construction reference photos.

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 the Wetland Mitigation items.

Upon approval, the Town 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.

Request for Certificate of Compliance

If required, a Request for Certificate of Compliance shall be prepared and submitted to the Engineer immediately following Conditional Acceptance. Request shall be as specified under the relevant Wetland Mitigation items.

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 the relevant Wetland Mitigation items.

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

ITEM 755.75 (Continued)

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 755.75 will be measured and paid for at the Contract unit bid price per or fraction thereof, hour for on-site service provided by the Wetland Specialist. The 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.

SECTION 02010

ITEM 756. NPDES STORMWATER POLLUTION PREVENTION PLAN **LUMP SUM**

This item addresses the preparation and implementation of a Storm Water Pollution Prevention Plan required by the National Pollutant Discharge Elimination System (NPDES) and applicable Construction General Permit (CGP) issued by the U.S. Environmental Protection Agency (EPA).

Pursuant to the Federal Clean Water Act, construction activities which disturb one acre or more are required to apply to the EPA for coverage under the NPDES General Permit for Storm Water Discharges from Construction Activities. On February 16, 2017 (82 FR 6534), EPA issued the final NPDES Construction General Permit (CGP) for construction activity; said permit was subsequently modified effective June 27, 2019. The Contractor shall be fully responsible for compliance with the CGP, as modified. Should a fine or penalty be assessed against it, or MassDOT, as a result of a local, state, or federal enforcement action due to non-compliance with the CGP, the Contractor shall take full responsibility.

The NPDES CGP requires the submission of a Notice of Intent (NOI) to the EPA prior to the start of construction (defined as any activity that disturbs land, including clearing and grubbing). There is a 14-day review period commencing from the date on which EPA enters the Notice into their database. The Contractor is advised that, based on the review of the NOI, EPA may require additional information, including but not limited to, the submission of the Storm Water Pollution Prevention Plan (SWPPP) for review. Work may not commence on the project until final authorization has been granted by EPA. Any additional time required by EPA for review of submittals will not constitute a basis for claim of delay.

In addition, if the project discharges to an Outstanding Resource Water, vernal pool, or is within a coastal ACEC, as identified by the Massachusetts Department of Environmental Protection (DEP), a separate notification to DEP is required. DEP may also require submission of the SWPPP for review and approval. Filing fees associated with the notification to DEP and, if required, the SWPPP filing to DEP shall be paid by the Contractor.

The CGP also requires the preparation and implementation of a SWPPP in accordance with the aforementioned statutes and regulations. The SWPPP shall include the CGP conditions and detailed descriptions of controls of erosion and sedimentation to be implemented during construction. It is the responsibility of the Contractor to prepare the SWPPP to meet the requirements of the most recently issued CGP. The Contractor shall submit the SWPPP to the Engineer for approval at least 4 weeks prior to any site activities. It is the responsibility of the Contractor to comply with the CGP conditions and the conditions of any state Wetlands Protection Act Order, Water Quality Certification, Corps of Engineers Section 404 Permit and other environmental permits applicable to the project and to include in the SWPPP the methods and means required to comply with applicable conditions of said permits.

It is the responsibility of the Contractor to complete the SWPPP in accordance with the EPA CGP, provide all information required, and obtain any and all certifications as required by the CGP. Any amendments to the SWPPP required by site conditions, schedule changes, revised work, construction methodologies, and the like are the responsibility of the Contractor. Amendments will require the approval of the Engineer prior to implementation.

ITEM 756. (Continued)

Included in the CGP conditions is the requirement for inspection of all erosion controls and site conditions on a weekly basis as well as after each incidence of rainfall exceeding 0.25 inches in twenty-four hours. For multi-day storms, EPA requires that an inspection shall be performed during or after the first day of the event and after the end of the event. The CGP requires that inspections be performed by a qualified individual. MassDOT requires proof of completion of a 4-hour minimum sedimentation and erosion control training class current to the latest CGP. This individual can be, but not limited to, someone that is either a certified inspector, certified professional, or certified storm water inspector. The documentation shall be included as an appendix in the SWPPP. The Engineer shall approve the contractor's inspector. This individual shall be on-site during construction to perform these inspections. In addition, if the Engineer determines at any time that the inspector's performance is inadequate, the Contractor shall provide an alternate inspector. Written weekly inspection forms, storm event inspection forms, and Monthly Summary Reports shall be completed and provided to the Engineer. Monthly Summary Reports shall include a summary of construction activities undertaken during the reporting period, general site conditions, erosion control maintenance and corrective actions taken, the anticipated schedule of construction activities for the next reporting period, any SWPPP amendments, and representative photographs.

The Contractor is responsible for preparation of the Plan, all SWPPP certifications, inspections, reports and any and all corrective actions required to comply with the provisions of the CGP. Work associated with performance of inspections is not included under this Item. The Standard Specifications require functional erosion control for the duration of the Contract. All Control measures shall be selected, installed, and maintained in accordance with manufacturer specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or is no longer functional, it is the responsibility of the Contractor to replace or modify the control for site conditions at no additional cost to the Department. The Contractor shall maintain all control measures and other protective measures in effective operating condition and shall consider replacement of erosion controls for each construction season.

This Item addresses acceptable completion of the SWPPP, any revisions/amendments required during construction, and preparation of monthly reports. In addition, any erosion controls beyond those specified in bid items elsewhere in this contract which are selected by the Contractor to facilitate and/or address the Contractor's schedule, methods and prosecution of the work shall be considered incidental to this item.

The Contractor is advised The CGP provides specific requirements for temporary and final stabilization. This shall be incorporated into the project schedule. The permit defines specific deadline requirements for Initial Stabilization ("immediately", i.e., no later than the end of the next work day following the day when earth-disturbing activities have temporarily or permanently ceased) and for Complete Stabilization Activities (no later than 14 calendar days after the initiation of stabilization). Stabilization criteria for vegetative and non-vegetative measures are provided in the CGP.

ITEM 756. (Continued)

The CGP requires the submission of a Notice of Termination (NOT) from all operators when final stabilization has been achieved, as well as removal and proper disposal of all construction materials, waste and waste handling devices, removal of all equipment and construction vehicles, removal of all temporary stormwater controls, etcetera. Approval of final stabilization by the Engineer and confirmation of submission of the NOT will be required prior to submission of the Resident Engineer's Final Estimate. The permittee is required to use EPA's electronic NOI system or "eNOI system" to prepare and submit a NOT. The eNOI login can be found at https://cdxnodengn.epa.gov/oeca-cgp-web/action/login. If you are given approval by the EPA Regional Office to use a paper NOT, you shall complete the form in Appendix K of the 2017 CGP.

BASIS OF PAYMENT

Item 756. will be paid for at the Contract unit price per lump sum, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

Payment of 50% of the Contract price will be made upon acceptance of the Storm Water Pollution Prevention plan. Payment of 40% of the Contract price will be made in equal installments for implementation of the Stormwater Pollution Prevention plan. Payment of the final 10% of the Contract price will be paid upon submission of a Notice of Termination (NOT) when final stabilization has been achieved.

SECTION 02010

ITEM 765.453 WOODLAND EDGE SHADE MIX POUND

Work under this item shall consist of furnishing the mix specified below in the required quantity. This seed mix shall be used around the upland edges of the Replication Area and to restore the temporary wetland impacts as shown on the plans and as required by the Engineer.

SUBMITTALS

1) Pre-Verification of Seed Availability. Within 30 days after the Notice to Proceed, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species in the required quantities and for the anticipated date of seeding. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Species not expected to be available should be noted and substitutions recommended.

2) Final Verification of Seed Availability. No earlier than 21 days prior to ordering, the Contractor shall submit to the Engineer the supplier's verification of availability of seed species and in the required quantities. Verification shall be on the supplier's letterhead and notarized by the supplier's notary. Substitutions or changes in the mix at this time must be approved by the Wetland Specialist.

3) Seed Worksheet provided herein shall be submitted to the Engineer prior to ordering seed to determine the number of pounds of Pure Live Seed required.

4) Seed Tags. The contractor shall submit original seed tags from each bag of seed used on the project or ensure that each tag is photo documented by the Engineer while on the unopened bag.

   Number of tags submitted must correspond to number of bags delivered.

   Species listed on the seed tag shall match the Final Verification of Seed Availability (Submittal #2) unless approved otherwise. Tag must include: variety and species name; lot number; purity; percentage of inert matter; percentage of weeds, noxious seeds, and other crop seeds; germination, dormant or hard seed; total viability; origin of seed; germination test date, net weight, and name and address of seller. The origin of seed must be listed on the seed tag for all species in the mix to provide verification of original (generation 0) seed source. The smallest known geographic area (township, county, ecotype region, etc.) shall be listed. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

ITEM 765.453 (Continued)

5) Verification of Seed Delivery. Prior to payment, contractor shall submit the Seed Delivery Verification form contained within the contract or the Supplier's Verification on company letterhead or a bill of lading. Supplier verification must include all information requested on the Verification form within this contract. The bill of lading must include variety and species name, lot number, net weight shipped, date of sale, invoice, project or seeding location, and name and address of Supplier. All information must be filled in and complete for acceptance. Information must match the seed tags and quantity of seed used on the job.

6) Seed Sample. If requested or if seed is from a previously opened bag, the contractor may be asked to submit to the Engineer a sample of seed from the seed bag (1-2 cups) at the time of seeding.

SEEDING SEASON

The appropriate seeding seasons are:
Spring: April 1 - May 15
Fall: October 1 - December 1 for dormant seeding

PERMANENT SEED MIX

Calculating Pure Live Seed (PLS)

Quantities specified are PURE LIVE SEED. Greater quantities of ordered seed may be required to achieve actual specified seeding rates.

Pure Live Seed (PLS) is defined as a percentage calculated by multiplying the percent of pure seed by the percent of viable seed (total germination, hard seed, and dormant seed). For example:

If a seed label indicates 90% purity, 78% germination, 10% hard seed, and 2% dormancy,
it is calculated to be 90% x [78 + 10 + 2]% = 81% PLS.

Therefore, each pound of PLS would be 1 pound / 0.81 = 1.2 pounds of seed with 90% purity and 90% total germination

Seed Mix shall be as specified below. Ecotypes and cultivars shall be as close to Massachusetts as possible and appropriate to the site conditions.

Woodland Edge Shade Seed Mix shall be used for this project in the areas specified on the plans; upland of the wetland replication area and in the restoration areas of temporary wetland impacts.

Application Rate

Woodland Edge Shade Seed Mix seeding rate: 15.0 lbs/acre PLS. No cover crop shall be applied.

ITEM 765.453 (Continued)

Any species substitutions shall be with a species having similar characteristics and function.

50% Increase Adjustment for Field Conditions

Seeding under the following conditions requires a 50% increase in the permanent mix at the time of construction:

- Seeding out of season
  OR
- Seeding after Compost Blanket has been applied (unless already increased for out of season).

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 765.453 will be measured for payment by the pound of Pure Live Seed delivered and complete in place.

Item 765.453 will be paid at the contract unit price per pound of Pure Live Seed delivered upon approval of all Seed Submittal Documentation. Overseeding required to correct poor germination or establishment shall be incidental to the item.

Application and care of native seed mix will be paid for separately under Item 735.635 Native Seeding and Establishment.

SECTION 02010

ITEM 765.635 NATIVE SEEDING AND ESTABLISHMENT SQUARE YARD

The work under this Item shall conform to the relevant provisions of Subsections 765 and 767 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The work under this item shall consist of seeding, mowing, and other care to establish a stand of grass in the areas shown on the plans or as required by the Engineer. For the purposes of these specifications, the term “grass” shall apply to all the forbs, grasses, sedges, and rushes included in the materials.

QUALIFICATIONS

Seeding shall be done by a company having a minimum of five years of experience with native seed establishment. Prior to beginning work, the seeding Contractor shall furnish proof of qualifications to the Engineer for approval. Proof of qualifications shall include providing documentation (photos and contacts) to demonstrate knowledge and expertise with native seeding and establishment and proof of having completed successful native seeding projects.

SEEDING SEASON

Seeding seasons for native mixes is April 1 - May 15 and October 1 - December 1 for dormant seeding. Written approval must be obtained for seeding outside the seeding season and, if approved, the permanent seed rate shall be increased by 50%.

Seeding season for cover crops shall be grain oats January 1 – July 31 and grain rye August 1 – December 1.

MATERIAL AND SUBMITTALS

Seed Mixes and Submittals shall be per the item(s) for permanent and annual (cover crop) seed mixes.

Compost Blanket, if used, shall meet the material and submittal requirements for that item.

Hydromulch shall be wood fiber or straw applied per the Standard Specifications and at the rates specified below and per the manufacturer.

A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of hydromulch, tackifier, and seed, per 100 gallons of water and as applicable to products used. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above.

Fertilizer

No fertilizers shall be applied.

ITEM 765.635 (Continued)

Water

Water, including hose and all other watering equipment required for the work, shall be furnished by the Contractor to the site at no additional cost. Water shall be suitable for irrigation and free from ingredients harmful to plant life. All plants injured or work damaged due to the lack of water or the use of too much water shall be the Contractor's responsibility to correct.

SEEDING

Hand broadcast method shall be used for all areas smaller than half an acre and when specified on the plans for areas over half an acre.

Seeding shall occur within 72 hours of placement of loam and final grading or the Contractor shall propose a reasonable, alternative schedule that shall be approved by the Engineer.

Surface Preparation

No seeding or soil preparation shall be done if soils are muddy or dry and compacted. Bare soils shall be raked to remove large stiff clods, lumps, brush, roots, stumps, litter and other foreign matter. Ruts and depressions shall be filled with additional loam or compost and the soil shall be re-graded to a relatively smooth finish corresponding to the required grades.

When seeding over existing or compacted soil or soil that has sat bare for more than 30 days, surface will be prepared by tilling or raking to a minimum depth of 2 inches prior to seeding and prior to Compost Blanket application (when applied).

Surface preparation shall be compensated for under for loam placement or topsoil rehandled and spread as appropriate to the project.

Jute or coir mesh, when specified in the contract, shall be placed after seeding and per the Standard Specifications and the manufacturer’s instructions.

Surface preparation shall be approved by the Engineer prior to seeding.

Seeding over Various Substrates

Loam: Seeding shall occur within 72 hours of loam placement to prevent loss of topsoil. Seed shall be manually broadcast for areas less than half an acre (each area, not cumulative area) and when specified on the plans. Broadcasting shall be immediately followed by hydromulching as specified below. When not specified on the plans, larger areas may be hydroseeded as specified below.

Compost Blanket: Compost Blanket shall be applied as specified under that item. Seed should be hand broadcast at the same time as compost application to ensure a thin cover of compost over seed.

ITEM 765.635 (Continued)

When seeding is done after application of Compost Blanket the rate shall be increased by 50%. If the Compost Blanket is applied after December 1, seed shall be broadcast or hydroseeding over the compost in the Spring and the rate increased by 50% specified under Seed Application.

Compost Mulch over Modified Rock: Compost Mulch and seed shall be applied as specified under that item. No hydromulch is required.

Cover Crop

Cover crop shall be used when seeding out of season, when specified with the permanent native seed mix under that item, and as required to prevent erosion until the permanent seed establishes.
A cover crop should not be used with a steep slope mix or other permanent mix which already contains either cereal rye or oats in the composition of the mix. A cover crop is not necessary for wetland seeding and is not typically necessary for soil stabilization when seeding in conjunction with a compost blanket application.

Seed Application

All seed shall be mulched as specified herein.

Seed application shall be by broadcast seeding or by hydroseeding as described below.

Broadcast Seeding

Seed shall be broadcast spread using a cyclone or whirlwind seeder or hand broadcast. Small or light-seeded species such as bluestem may be mixed with approved filler to achieve an even distribution. Seed shall not be broadcast when wind velocities are greater than 15 mph.

Broadcast seeding shall be undertaken in two separate passes at ninety degrees to each other. One-half the seeding rate shall be applied in each direction (horizontally and vertically). To ensure seed to soil contact with broadcasting of seed, seeding shall be followed by rolling or tracking with equipment approved by the Engineer.

Broadcast seed shall be mulched with weed-free straw mulch unless seeding is done as part of Compost Blanket in which case it shall be as specified above under seeding with Compost Blanket application. Hydromulching shall be as specified under Hydromulching.

Hydroseeding and Hydromulching

Hydroseed and mulching shall be per the manufacturer's directions and as follows.

Hydroseeding shall only be used for sites over half an acre in size or with permission of the Engineer.

ITEM 765.635 (Continued)

Tank and hoses shall be cleaned from all previous hydroseeding and hydromulching projects. Seed shall be mixed into the slurry immediately before application and slurry applied within 30 minutes after seeds have been placed in the tank. Once seed has been placed in the tank, tank shall be agitated only enough to mix the seeds and keep slurry from separating.

A 2-step process shall be used for seeding in conjunction with hydromulch. Seed shall be applied with 500 lbs/acre of hydromulch in the first pass. A second pass with 1,000 lbs/ acre of hydromulch shall be applied in a second pass. Each pass shall be applied in a different direction.

Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour has passed the excess mixture must be discarded.

For broadcast seeding, hydromulch shall be applied immediately following seeding at a rate of 1,000 lbs/acre. Tank shall be cleaned from any previous hydroseeding.

CARE DURING GERMINATION AND ESTABLISHMENT

Contractor shall care for seeded areas as necessary for successful germination. Care will include watering and weed control as necessary to achieve establishment of the specified seeded species after one growing season as specified below.

The contractor shall maintain the stand of grasses to ensure healthy growth of the seeded species. Work shall include mowing or weed-whacking for weed control, watering if necessary, and removal of invasive plants.

Watering shall be sufficient to achieve soil moisture to a depth of 2 inches or more and such moisture is uniform. Method of watering shall not erode or damage soil or grassed surfaces.

General Weed Control: Unless otherwise directed, mowing shall be as specified under Mowing for Weed Control for seed establishment. Weeds shall be mowed prior to weeds setting seed (by the end of July unless otherwise approved).

Control of Invasive and Aggressive Weeds: Invasive and aggressive weeds, including but not limited to mugwort, ragweed, knapweed, foxtail, crabgrass, and chicory must be cut or treated prior to going to seed. Herbicide treatment must be coordinated with the Town. Undesired species (such as chicory) introduced due to use of incorrect seed mix shall be removed at the Contractor's expense.

MOWING FOR WEED CONTROL

Mowing for weed control shall be completed after weeds have sprouted and show leaf and bud growth, but prior to setting seed, generally between July 7th and August 1st, unless directed otherwise by the Engineer.

ITEM 765.635 (Continued)

Mowing height shall be as needed for weed control, generally to a height of 8 inches and not below 4 inches, unless directed otherwise. Mowing shall be with a brush hog mower or string trimmer other approved equipment. Conventional lawn mowers which cannot achieve the appropriate cut shall not be used.

Contractor shall give 48-hour notice prior to mowing work. Mowing shall only occur in dry sunny weather. Litter pickup should occur prior to mowing in all areas. If required, cut grass shall be raked and removed. Litter pickup and raking and removal of grass shall be incidental to the work.

Mowing equipment shall be approved by the Engineer prior to work.

OVER-SEEDING

Areas of bare ground greater than 2-3 feet in diameter shall be over-seeded with the specified mix during the appropriate season for seeding. Where required for overseeding mowing shall be as close to the soil as possible. Soil that is compacted shall be raked or otherwise roughened prior to over-seeding.

Over-seeding rates and methods shall those specified above under Materials and Methods. Following over-seeding, soil shall be lightly tamped to ensure seed to soil contact and areas shall be mulched with straw mulch and watered with a fine mist to moisten soil to a depth of at least 2 inches.

Over-seeding, mulch, watering, and all work for over-seeding shall be incidental.

DETERMINING SATISFACTORY GRASS ESTABLISHMENT

A well-established stand of the specified seeded species as determined by the Engineer and the will be required for Final Acceptance. The expectation is that an acceptable number and variety of the desired permanent seeded species (not the cover crop) will be visible. Generally:

- A minimum of 75% coverage by the specified permanent seeded species after one growing season. Of that percentage, generally, depending on the mix species:
    - At least 3 types of the permanent seeded grass species shall be visible.
    - At least 3 species of wildflowers shall be visible.
- There will be no significant gaps or bare soil (generally 2-3 feet in diameter or greater).
- There will be no more than 25% coverage by weed species.
- All soil shall be stabilized and there shall be no channeling or erosion.
- There will be no invasive or aggressive species within the stand at the time of acceptance.
- There shall be no evidence of seed from non-native mixes (i.e., clover) due to failure to clean the hydroseeding tank or using incorrect mix.

ITEM 765.635 (Continued)

Invasive and aggressive weeds (such as mugwort, ragweed, knapweed, and chicory) must be cut or treated prior to going to seed for Interim Acceptance. Herbicide treatment must be coordinated with the Town.

A warm-season grass mix with perennials will not have uniform growth. A uniform stand of grass may indicate use of an incorrect mix.

ACCEPTANCE OF SEEDING AND ESTABLISHMENT WORK

Conditional Acceptance shall be based on proper application of seed as specified herein.

Interim Acceptance of Care. Seeding will be inspected by mid-July to assess germination and Establishment conditions as described above. When necessary for Interim Acceptance, areas shall be mowed prior to weed species producing seed and as specified above under Weed Control. ***Areas requiring weed control that are not mowed prior to weed seed dispersal will not be approved for Interim Acceptance.*** Seeding that shows good germination and is determined by the Engineer to not require weed control at time of inspection shall be accepted for Interim Acceptance payment.

Final Acceptance of Establishment shall be given upon satisfactory Establishment as described above.

If the seeded area fails to meet the requirements of Establishment by the end of the growing season, contractor shall propose and implement remediations and site shall be inspected during the following growing season after July 1st. All remediation shall be at the contractor's expense.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 765.635 will be measured for payment by the square yard, complete in place.

Native Seeding and Establishment will be paid at the Contract unit price by the square yard upon Conditional, Interim, and Final Acceptances as described above. This price shall include all submittals, seeding, rolling to ensure seed-to-soil contact, weed control other than mowing, water, over-seeding, labor, materials, equipment, and all incidental costs required to complete the work of establishing a satisfactory stand of grass.

Native seed and cover crop mixes shall be compensated under the respective items.

Site preparation, including raking, tilling, removal of debris and stones, and other work to the prepare site for seeding shall be compensated under loam placement or topsoil rehandled and spread as relevant to the project. Compost Blanket shall be compensated under the respective item.

Mowing for weed control will be incidental to this item.

ITEM 765.635 (Continued)

Schedule of payment shall be as follows:

30% upon Conditional Acceptance

20% upon Interim Acceptance of Care, except this amount will be reduced to zero and final payment will be reduced accordingly when areas requiring weed control are not mowed as specified in the Interim Acceptance criteria.

50% upon Final Acceptance of Establishment

SECTION 02010

ITEM 767.121 SEDIMENT CONTROL BARRIER FOOT

The work under this item shall conform to the relevant provisions of Sections 670, 751 and 767 of the MassDOT Standard Specifications for Highways and Bridges and shall include the furnishing and placement of a sediment control barrier. Sediment control barrier shall be installed prior to disturbing upslope soil.

The purpose of the sediment control barrier is to slow runoff velocity and filter suspended sediments from entering storm water flow. Sediment barrier may be used to contain stockpile sediments, to break slope length, and to slow or prevent upgradient or water off road surfaces from flowing into a work zone. Contractor shall be responsible for ensuring that barriers fulfill the intent of adequately controlling siltation and runoff.

Twelve-inch diameter (after installation) compost filter tubes with biodegradable natural fabric (i.e., cotton, jute, burlap) are intended to be the primary sedimentation control barrier. Photo-biodegradable fabric shall not be used.

For small areas of disturbance with minimal slope and slope length, the Engineer may approve the following sediment control methods:

- 9-inch compost filter tubes
- Straw bales which shall be trenched

No straw wattles may be used. Additional compost filter tubes (adding depth or height) shall be used at specific locations of concentrated flow such as at gully points, steep slopes, or identified failure points in the sediment capture line.

When required by permits, additional sediment barrier shall be stored on-site for emergency use and replacement for the duration of the contract.

Sediment control barriers shall be installed in the approximate location as shown on the plans and as required so that no excavated or disturbed soil can enter mitigation areas or adjacent wetlands or waterways. Barriers shall be in place prior to excavation work. No work shall take place outside the barriers.

MATERIALS & CONSTRUCTION

Prior to initial placement of barriers, the Contractor and the Engineer shall review locations specified on the plans and adjust placement to ensure that the placement will provide maximum effectiveness.

Barriers shall be stacked, trenched and/or wedged as specified herein and according to the Manufacturer’s instructions. Barriers shall be securely in contact with existing soil such that there is no flow beneath the barrier.

ITEM 767.121 (Continued)

Compost Filter Tube

Compost material inside the filter tube shall meet M1.06.0, except for the following: no peat, manure or bio-solids shall be used; no kiln-dried wood or construction debris shall be allowed; material shall pass through a 2-inch sieve; and the C:N ratio shall be disregarded.

Outer tube fabric shall be made of 100% biodegradable materials (i.e., cotton, hemp or jute) and shall have a knitted mesh with openings that allow for sufficient water flow and effective sediment capture.

Tubes shall be tamped, but not trenched, to ensure good contact with soil. When reinforcement is necessary, tubes shall be stacked as shown on the detail plans.

Straw Bales

Straw bales shall be used if shown on the plans or when specified by Orders of Condition or other permit requirements.

Bales should be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. All bales should be either wire-bound or string-tied. Straw bales should be installed so that bindings are oriented around the sides (rather than along the tops and bottoms) of the bales in order to prevent deterioration of the bindings.

The barrier should be entrenched and backfilled. A trench should be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. The trench must be deep enough to remove all grass and other material which might allow underflow. After the bales are staked and chinked (filled by wedging), the excavated soil should be backfilled against the barrier. Backfill soil should conform to the ground level on the downhill side and should be built up to 4 inches against the uphill side of the barrier.

Each bale should be securely anchored by at least 2 stakes or re-bars driven through the bale. The first stake in each bale should be driven toward the previously laid bale to force the bales together. Stakes or re-bars should be driven deep enough into the ground to securely anchor the bales. For safety reasons, stakes should not extend above the bales but should be driven in flush with the top of the bale.

The gaps between the bales should be chinked (filled by wedging) with straw to prevent water from escaping between the bales. Loose straw scattered over the area immediately uphill from a straw bale barrier tends to increase barrier efficiency. Wedging must be done carefully in order not to separate the bales.

When used in a swale, the barrier should be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale to assure that sediment-laden runoff will flow either through or over the barrier but not around it.

Silt Fence

Materials and Installation shall be per Subsection 670.40 and 670.60 of the Standard Specifications and the following:

ITEM 767.121 (Continued)

Silt fence shall only be used if shown on the plans or when specified by Orders of Conditions or other permit requirements.

When used with compost filter tubes, the tube shall be placed on a minimum of 8 inches of folded fabric on the upslope side of the fence. Fabric does not need to be trenched.

When used with straw bales, an 8-inch deep and 4-inch wide trench or V-trench shall be dug on the upslope side of the fence line. One foot of fabric shall be placed in the bottom of the trench followed by backfilling with compacted earth or gravel. Stakes shall be on the down slope side of the trench and shall be spaced such that the fence remains vertical and effective.

Width of fabric shall be sufficient to provide a 36-inch high barrier after fabric is folded or trenched. Sagging fabric will require additional staking or other anchoring.

Stakes

Stakes for anchoring compost filter tubes and straw bales shall be as shown on the plans and shall be a minimum of 1x1 inch diameter x 4 feet hardwood stakes.

When used with silt fence, stakes for compost filter tubes shall be driven 12 inches into the ground. Stakes for straw bales shall be driven 16 inches into the ground.

Stakes of other material of equivalent strength may be used if approved by the Engineer.

MAINTENANCE

Maintenance of Sediment Control Barriers shall be per Subsection 670.60 of the Standard Specifications or per the Stormwater Pollution Prevention Plan (SWPPP), whichever is more restrictive.

The contractor shall inspect the sediment barrier in accordance with relevant permits. At a minimum, barriers shall be inspected at least once every 7 calendar days and after a rain event resulting in 0.25 inches or more of rainfall. Contractor shall be responsible for ensuring that an effective barrier is in place and working effectively for all phases of the Contract.

Barriers that decompose such that they no longer provide the function required shall be repaired or replaced as directed. If the resulting berm of compost within the fabric tube is sufficiently intact and continues to provide effective water and sediment control, barrier does not necessarily require replacement.

DISMANTLING & REMOVING

Barriers shall be dismantled and/or removed, as required, when construction work is complete and upslope areas have been permanently stabilized and after receiving permission from the Engineer.

ITEM 767.121 (Continued)

Regardless of site context, nonbiodegradable material and components of the sediment barriers, including photo-biodegradable fabric, plastic netting, nylon twine, and silt fence, shall be removed and disposed off-site by the Contractor.

For naturalized areas, biodegradable, natural fabric and material may be left in place to decompose on-site. In urban, residential, or other locations where aesthetics is a concern, the following shall apply:

- Compost filter tube fabric shall be cut and removed, and compost shall be raked to blend evenly (as would be done with a soil amendment or mulch). No more than a 2-inch depth shall be left 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 a seed mix matching adjacent seeding or existing grasses (i.e., lawn or native grass mix).
- Sedimentation fence, stakes, and other debris shall be removed and disposed off-site. Ste shall be restored to a neat and clean condition.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.121 will be measured and paid for at the contract unit price per foot of sediment control barrier which price shall include all labor, equipment, materials, maintenance, dismantling, removal, restoration of soil, and all incidental costs required to complete the work.

No separate payment will be made for silt fence, when used in conjunction with compost filter tubes or straw bales.

Additional barrier, such as double or triple stacking of compost filter tubes, will be paid for per foot of tube installed.

Barriers that have been driven over or otherwise damage by construction activities shall be repaired or replaced as directed by the Engineer at the Contractors expense.

SECTION 02010

ITEM 767.78 COMPOST MULCH OVER MODIFIED ROCK SQUARE YARD

GENERAL

The purpose of this item is to provide compost mulch for mixing with seed, to be placed on designated modified rockfill slopes in areas where establishment of vegetation in the rock slope is desired. This item shall conform to the requirements of Section 767 and 765 of the MassDOT Standard Specifications for Highways and Bridges and the following.

MATERIALS

Composted mulch

Composted Mulch shall be an aged organic substance meeting the requirements of M1.06.0 of the Supplemental Standard Specifications. No manure, bio-solids, kiln dried wood, or construction debris shall be allowed.

Organic matter content shall be between 20-100% (dry weight basis) as determined by ASTM D2974 (method A) Standard Test Methods for Moisture, Ash and Organic Matter of Peat and Other Organic Soils.

Moisture content shall be <15% by dry weight (<60% by wet weight) as measured by ASTM D2216 Standard Test Method for Laboratory Determination of Water Content of Soil and Rock and ASTM D2974 (cited above).

Particle size as measured by sieving shall be as follows:

Sieve Size	% Passing
2 in	100%
¾ in	70-100%
#4	30-75%
#20	20-40%

Soluble salts shall be <5.0 mmhos/cm (dS/m). The pH shall be between 5.5 and 8.0.

Seed

Seed shall be in accordance with Subsection 765 of the Standard Specifications.

CONSTRUCTION METHODS

Methods of installation shall be reviewed and approved by the Engineer prior to placement of material.

Placement of compost mulch shall be as shown on the plans and as directed by the Engineer. Compost mulch material shall be applied pneumatically. Material shall be placed so that settled material is at or slightly below the surface plane of the stone. Contractor shall ensure that there will be adequate quantity, including adjustment for settlement.

ITEM 767.78 (Continued)

Seeding shall be done at the same time as compost topsoil is being applied and shall be in accordance with Subsection 765 of the Standard Specifications and such that a very thin blanket of material covers the seed.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 767.78 will be measured and paid for at the Contract unit price per Square Yard which price shall include all labor, materials, equipment, site preparation, and all incidental costs required to complete the work.

Seed shall be compensated at the bid price per the seeding Item 765.

ITEM 874.2 TRAFFIC SIGN REMOVED AND RESET EACH

Work under this item shall conform to the relevant provisions under Section 828 of the MassDOT Standard Specifications for Highways and Bridges and the following:

The Contractor shall carefully remove and reset all designated existing signs including attachment hardware and sign support posts located as needed and where required by the Engineer.

The work includes the dismantling, removal, transporting, storing and resetting of existing traffic signs at the locations shown on the plans. The Contractor shall completely remove the sign and post and reset said sign and post at the new location. If existing sign and/or post are not suitable for reuse as determined by the Engineer, the Contractor shall provide a new sign and/or post under Items 832. and/or 847.1 respectively. New attachment hardware shall be furnished and installed as required to replace any missing or unusable existing hardware. Work shall also include the removal and disposal of footings up to a depth of 12 inches below the proposed surface of sidewalks and driveways as well as up to 36 inches below the proposed roadway.

Existing signs and/or post damaged by the Contractor's operations shall be replaced in-kind by the Contractor at no additional compensation.

Included under this item are warning, regulatory, and route marker signs and miscellaneous directional signs.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 874.2 will be measured and paid for by each traffic sign removed and reset, complete in place, which price shall include all labor, materials, equipment, and incidental costs required to complete the work.

No separate payment will be made for gravel backfill, excavation and disposal of existing footings, if required, or all material required to restore the damaged area to its existing conditions but all costs in connection therewith shall be included in the Contact unit price bid.

No separate payment will be made for furnishing and installing new attachment hardware, as required, but all costs in connection therewith shall be included in the Contact unit price bid.

ITEM 874.8 MISCELLANEOUS SIGN REMOVED AND RESET EACH

GENERAL

Work under this item shall conform to the relevant provisions under Section 828 of the MassDOT Standard Specifications for Highways and Bridges and the following:

Work shall include removing, transporting, protection, temporary storage and resetting of the "Town of North Reading Conservation Land" sign as shown on the plans including all posts and hardware. The sign shall be reset at the location shown on the plans, in coordination with the Town of North Reading. Work shall also include the removal and disposal of footings up to a depth of 12 inches below the proposed surface of sidewalks and driveways as well as up to 36 inches below the proposed roadway.

If the Town determines the sign to be unsuitable for reuse, the Contractor shall stack the sign at the Town of North Reading Department of Public Works yard, 166 Chestnut Street, North Reading, MA, at no additional compensation.

The Contractor shall completely remove the sign and posts. If existing sign and/or post are damaged by the Contractor's operations, a new sign and/or post of the same size and material shall be provided to the Town at the Contractor's expense.

The Contractor shall backfill with compacted gravel all holes resulting from the removal of the existing signs and their foundations and restore the area to match existing conditions of adjacent areas.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Item 874.8 will be measured and paid for at the Contract unit price per each, which price shall include all labor, materials, equipment and incidental costs required to complete the work.

No separate payment will be made for gravel backfill or excavation and disposal of existing footings, if required, but all costs in connection therewith shall be included in the Contract unit price bid.

SECTION 02010

ITEM 991.1 **CONTROL OF WATER – STRUCTURE NO/ N-18-003** **LUMP SUM**

All work to be done under this Item shall conform to the relevant provisions of Sections 140.60 of the MassDOT Standard Specifications, the Plans and the following:

The work under this item shall consist of all work and dewatering necessary to control water during the excavation and demolition of the existing structure and the construction of the proposed structure. River water shall be diverted and controlled in such a way that all existing and proposed bridge elements are removed and constructed completely in the dry.

The operations of Control of Water neither shall cause the accumulation of siltation nor any adverse effect to the water or the environment. As much work as possible shall be conducted from outside the river banks.

All work-in-water operations shall be completed in accordance all applicable environmental permits.

The temporary control of water systems shall be non-permanent, except for the steel sheeting to remain (sheeting to be cut off to the elevations shown on the plans and left in place), which does not harm the ecology of the river, land under water, and surrounding land and shall be comprised bulk sand bags or portable cofferdams or other approved impervious curtains, and dewatering to facilitate construction activities. Operations of Control of Water shall not adversely affect the quality of the required construction.

Work under this Item also includes pumping operations, steel sheeting, sandbags, portable cofferdams, filter fabrics, stone, sedimentation/retention tanks and all other means to collect, settle, and discharge water into the Ipswich River during construction.

As part of the work under this item, it is the responsibility of the Contractor to determine the need and extent of dewatering required.

The Contractor shall coordinate his/her control of water system with the temporary utility bridge for the 4”ø gas line to ensure there is no conflict. No protrusions in the control of water system will be allowed.

Special care shall be given to minimize disturbance to the river and adjacent banks.

ITEM 991.1 (Continued)

Submittals

Prior to the commencement of any work at the site, the Contractor shall submit to the Engineer for review and approval, a detailed plan for water control, including the construction of the water control system, design of the interim sheeting, and an abutment and wingwall footing placement sequence plan with a timetable and details specific to each of the phases of construction. The submittals shall include working drawings and calculations. Detailing the methods and materials proposed to account for all anticipated loads and construction conditions necessary to permit the work while maintaining a safe work area and protecting property from damage.

Any drawings and calculations prepared as part of the submittal must be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

The Contractor's attention is directed to the Temporary Water Control Measures Memorandum included herein, for additional information on submittal requirements and Control of Water design criteria.

The Water Control Plan shall include a Sedimentation and Erosion Control Plan and a Water Flow Diversion and Containment Plan. The plans shall be adequate in detail to define specifics regarding materials, sizes, connections and incidental items associated with the work. The furnishing of such plans shall not serve to relieve the Contractor's responsibility for the safety of the work or his/her responsibility for the successful completion of the project. The proposed plans submitted shall be designed and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

The Contractor shall make his/her own evaluation of existing conditions, groundwater level, water flow, the effects of his/her proposed temporary works and construction methods, and shall provide in his/her design for all loads and construction conditions necessary to permit construction of the specified structures while maintaining public safety, and protecting completed work and all third party property from damage due to his operations.

Steel Sheeting:

Work for Steel Sheeting shall confirm to the relevant provisions of Sections 140 and 950, of the Standard Specifications and the following:

Steel Sheeting shall be installed between the two existing CMP pipe culverts to support the remaining culvert cell as shown on the Plans. Sheeting shall remain in place between the various stages of demolition and construction and shall be compatible with the Control of Water Plan to assist in diverting flow as shown on the Plans.

Sheeting shall be an inter-locking type and shall be cut off at the elevations shown on the Plans.

Sheeting and excavation support details shown on plans are for estimating purposes only. The Contractor is responsible for submitting the design and details for the Engineer's approval. The exact layout and location of the system may be altered as necessary to accommodate specific site conditions and contractor operations.

ITEM 991.1 (Continued)

The design of the Steel Sheeting shall be completed and stamped by a Professional Engineer registered in Massachusetts. Prior to installation, the plans and calculations shall be submitted to the Engineer for approval, and as evidence that the requirements of these provisions have been fulfilled. Furnishing such plans and calculations shall not relieve the Contractor of the sole responsibility for safety of the public, personnel, equipment, and structures, as well as successful project completion.

The design documents prepared by the Contractor shall show the horizontal and vertical extents of the Steel Sheeting, the sizes and dimensions of the components of the system, its proposed method of bracing, construction notes, and any other necessary measures required to allow for the proposed construction.

The Steel Sheeting shall not be installed until the Contractor's design has been approved by the Engineer and all utilities proposed for relocation have been successfully relocated. Any work done or materials ordered for the work involved prior to acceptance of the design calculations, plans, and detailed drawings shall be at the Contractor's own risk.

Sedimentation and Erosion Control Plan:

The Contractor shall submit to the Engineer, plans and details of the intended sedimentation/retention tank system that will be used along with dewatering techniques, and its location at the bridge site. All discharge resulting from dewatering activities shall be directed to temporary sedimentation/retention tank at locations approved by the Engineer. At no time shall said discharge be directly released into the river. The proposed plan shall include methods and equipment necessary to discharge water from the sedimentation treatment basins. Sedimentation/retention tank shall be sized appropriately to adequately dewater from the proposed work zone while allowing sufficient time for sediments to settle out of the water, and with a depth such that a minimum of 18 inches of freeboard is maintained throughout its use.

ITEM 991.1 (Continued)

Water Flow Diversion and Containment Plan:

The Contractor shall submit plans and details along with a complete description showing any proposed systems for control of water and dewatering plan to the Engineer for his approval prior to the start of the work. The proposed plan shall include methods and equipment necessary to perform the work and shall include water discharge methods and equipment to bring water from the work zone to sedimentation/retention tank.

Methods

This work shall also include dewatering the existing culverts and proposed abutment and wingwall footing areas, as needed to conduct the work.

The Contractor shall follow the construction staging plan presented in the Bridge Plans. No deviation from the staging plan or alternate method shall be permitted unless first approved by the Engineer and any applicable environmental agencies having jurisdiction.

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 river water before any adjacent properties are inundated.

Where sandbags are used, the bags shall not decay nor rip or tear during the installation, its service life within the waterway, or during the removal process. The Contractor shall not disturb the river bed in order to avoid migration of silts and sands further downstream. All in-river work required to install, adjust and remove the control of water system must be performed by hand or by hoisting equipment positioned upland. The Contractor is responsible for researching the seasonal groundwater levels and flow characteristics of the Ipswich River to determine appropriate details.

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

1. Site construction areas outside the buffer zones and on relatively flat ground.
2. Management of construction operations involving hazardous materials, such as refueling and maintenance of equipment within the resource areas.
3. Formulation of contingency plans to control accidental spillage from potentially hazardous materials.
4. Installation and continuous maintenance of water control measures throughout the project.
5. 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.
6. Perform as much work as possible outside the river banks.
7. Scheduling of work within the resource areas to avoid periods of high flood (e.g., spring floods) and inclement weather.

ITEM 991.1 (Continued)

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 sumping 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 sumping basin and sedimentation/retention tank. No waters pumped from the work areas shall be discharged back to the river 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:

1. The size and location of the tank shall be determined based on the size of the Contractor's pump and the anticipated groundwater levels.
2. 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.
3. 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.
4. The sedimentation/retention tank shall be designed with a minimum of 18 inches of freeboard, which must be maintained at all times.
5. The Contractor shall inspect the sedimentation/retention tank at least daily when in operation.
6. Damages shall be repaired immediately.
7. The sedimentation/retention outlet shall be cleaned daily.
8. The sediments within the sedimentation/retention tank shall be disposed of as approved by the Engineer.

Upon completion of water control, the materials and equipment used to maintain the cofferdam(s) (if needed) and sumping 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 excavation 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.

ITEM 991.1 (Continued)

BASIS OF PAYMENT

Item 991.1 will be paid for at the Contract unit 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 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.
- 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 incidental 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 price bid.

SECTION 02010

ITEM 992.321 TEMPORARY UTILITY SUPPORT FOR 4" GAS LINE LUMP SUM

The work under this Item shall consist of furnishing all labor and materials necessary to provide a temporary utility bridge (superstructure and substructure) to support the relocated 4" diameter gas line, owned by National Grid, as shown on the Plans. Refer to the division of responsibilities below for more information:

National Grid Responsibilities:

- Mobilize crew and equipment on-site
- Perform mark outs to determine location of existing gas pipes, gas shut-off valves, and other utilities
- Excavate and sheath openings to perform main connections and abandonments
- Provide all materials required for gas main installation, gas main connections and abandonments (including non-conductive 3B support roller assemblies)
- Install gas flow stopper equipment
- Install piping/fittings/valves/offsets
- Perform gas main connections
- Transfer of gas services
- Blow down of residual gas
- Permanently abandon old gas main after making connections
- Remove and installed sheathing
- Provide gravel for backfilling the trench to sub-grade
- Stockpile and remove any excavated materials not used for backfill
- Backfill, compaction, and provide temporary or permanent restoration of work area
- ALL work to be coordinated with the Contractor.

Contractor Responsibilities:

- Provide 30 days notification prior to the required start of any necessary natural gas work
- Provide area to stockpile materials for National Grid's crews, e.g. staging area (if possible)
- Design, construct, and provide access to a temporary utility bridge prior to gas relocation. Temporary utility bridge shall be designed to accommodate the use of non-conductive 3B roller support assemblies (supplied by National Grid). Temporary utility bridge shall provide protection from floating brush or debris.
- Pre-drill holes in temporary utility support bridge for roller assemblies prior to beginning the gas work. Holes shall be slotted 1" in the B direction to allow for slight variation.
- Construct and provide access to the permanent gas main location.
- Provide National Grid with a construction schedule for utility relocations
- Mark out the project stationing on the road and provide the layout for where the gas main will be installed.
- Provide safe access for National Grid crews along the full length of the temporary utility bridge (and permanent bridge) to fasten the roller supports at all locations.

The gas line shall remain active during construction except for as required to accomplish the temporary and permanent relocations (performed by National Grid). No work shall be permitted on or near gas facilities between November 15th and April 15th. All scheduled work shall be completed between April 15th and November 15th.

ITEM 992.321 (Continued)

The Contractor is responsible for the design of the temporary utility bridge (superstructure and substructure) and shall adhere to the spacing and loading requirements provided by National Grid, and specified herein.

- The maximum spacing for each roller support along the bridge shall not exceed 15'-0". There shall be one roller support provided at each end of the temporary utility bridge. These spacing requirements do not excuse the Contractor from coordinating with the utility owner to ensure their specific requirements are being met.
- The weight of the temporary gas pipe and rollers shall be 12plf – this load does not include the self-weight of any structural members.

The approximate locations of all utilities are shown on the Plans, however the Contractor is responsible for confirming the location of all utilities in the field prior to designing the temporary support systems. The Contractor shall be made aware of any existing utility layout plans/geometry prior to designing the temporary support system.

Temporary Utility Bridge Design and Submittals

The temporary utility bridge shall be designed in accordance with the applicable provisions of the latest editions of the AASHTO Construction Handbook for Bridge Temporary Works and the MassDOT LRFD Bridge Manual. All utility loading information shall be as specified or appropriately calculated by the Contractor based on the observed field conditions or existing record information.

Prior to the erection of the temporary support system, the Contractor shall provide design plans, calculations, details, shop drawings, product literature, erection details, etc. to the Engineer for review and approval. The design of the temporary utility support system shall ensure that the Control of Water system can be implemented and that the temporary gas line is protected from floating debris. The design shall ensure that the temporary support system does not extend beyond the existing right of way or temporary easement lines. The design of all temporary utility support structures shall be prepared and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts.

Maintenance

Once the temporary utility supports are installed, the Contractor is fully responsible for maintaining the condition, stability, integrity and full functionality of the temporary supports. Should the utility owner require access to their utilities for any reason, the Contractor shall provide safe means of access.

BASIS OF PAYMENT

Item 992.321 will be paid for at the Contract Lump Sum bid price, which shall include the design, fabrication, installation, maintenance and removal of the temporary utility bridge, as described within this Item. Also included shall be all labor, materials, equipment, and incidental costs required to complete the work as indicated on the Contract Documents, as specified herein.

ITEM 992.321 (Continued)

National Grid will be responsible for furnishing the temporary gas line, temporary roller supports, installing the temporary gas line on the temporary utility bridge, and all other work as previously described. Cost for all work included under the heading “National Grid Gas Responsibilities” is included under this Item and will be paid to National Grid as a reimbursement.

SECTION 02010

ITEM 995.01 BRIDGE STRUCTURE, BRIDGE NO. N-18-003 LUMP SUM

GENERAL

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

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

- Sawing and sealing joints in asphalt pavement at bridges
- Precast concrete abutments with precast footings
- Precast concrete wingwalls with precast footings
- Cast-in-place concrete curtain walls
- Cast-in-place approach slabs
- Precast concrete backwalls
- Cast-in-place concrete CMP voids
- Cast-in-place concrete sidewalk and safety curb
- Cast-in-place concrete wingwall copings
- Precast concrete highway guardrail transitions
- Cast-in-place concrete bridge deck
- Uncoated reinforcement for cast in place approach slabs
- Epoxy coated reinforcement for all proposed concrete components
- Prestressed concrete deck beams (S48-18) and neoprene bearing pads
- Proposed utility supports on fascia beams and wingwalls
- Spray applied membrane waterproofing on the bridge deck and top of backwalls
- Damp-proofing on the abutments, wingwalls and approach slabs
- Metal bridge railing (3 rail), steel (Type S3-TL4)

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.

SAWING & SEALING JOINTS IN ASPHALT PAVEMENT AT BRIDGES

The work to be done under this Heading consists of making a sealed kerf across the full width of the finished asphalt pavement at bridge abutments where called for on the Plans. The shape, width, and depth of the kerf shall be as shown on the Plans.

ITEM 995.01 (Continued)

Prior to the start of the asphalt pavement operation, the Contractor shall place a mark on each curb or barrier on either side of the paved roadway. These marks shall be aligned with the actual end of the bridge deck and shall be placed so that they will not be covered or otherwise obscured by the asphalt pavement.

After the completion of the paving operation, the Contractor shall snap a straight chalk line on the pavement between these two marks. The Contractor shall then saw cut the pavement along this line to the depth, width and shape as shown on the Plans. The equipment shall be approved by the Engineer prior to commencing work.

After completing the saw cutting, the Contractor shall clean the saw groove of any dust and debris with an oil free air blast. If the groove was wet sawn, the groove shall be cleaned with a water blast to remove any remaining slurry and debris, vacuumed with a Wet-or-Dry vacuum to remove any standing water, and then dried with an air blast from a Hot-Air-Lance.

Once the groove is clean and dry, the Contractor shall fill it completely with a hot-applied bituminous crack sealer meeting the requirements of M3.05.3 in accordance with the manufacturer's application instructions and restrictions regarding ambient and material temperatures. The crack sealer shall be thoroughly cured prior to opening the road to traffic. To reduce tackiness, only boiler slag aggregate (black beauty) shall be scattered over the sealer when required by the Engineer. Conventional sand shall not be used for this purpose.

CONCRETE

The work under this Heading shall conform to the applicable provisions of section 901 of the MassDOT Standard Specifications as modified by the following. The various classes of concrete and other materials shall be used as specified on the plans and generally described as follows:

All concrete shall be 5000 PSI HP Cement Concrete except as noted in the plans.

Preformed or premolded filler, joint sealer, paraffin and all other materials (complete in place) at construction joints, deck joints, and all other work considered as incidental to the work involved in furnishing and placing concrete for which payment is not provided elsewhere in the contract, shall be considered as included in the Lump Sum contract price for this item.

All concrete shall be placed in the dry.

ITEM 995.01 (Continued)

STEEL REINFORCEMENT FOR STURCTURES

The work under this Heading shall conform to the applicable provisions of section 901.40, 901.62, 901.80 and 901.81 of the MassDOT Standard Specifications.

All cast in place approach slabs shall be not be coated as noted on the plans.

STEEL REINFORCEMENT FOR STRUCTURES - EPOXY COATED

The work under this Heading shall conform to the applicable provisions of section 901.40, 901.62, 901.80 and 901.81 of the MassDOT Standard Specifications as modified by the following:

Special procedures shall be used during handling, storage, and installation to prevent damaging epoxy coating, as outlined in the Concrete Reinforcing Steel Institute (CRSI) report titled "Guidelines for Inspection and Acceptance of Epoxy Coated Reinforcing Steel at the Jobsite".

Any damage to the epoxy coating shall be repaired following this report. A copy of this report must be available at the jobsite for reference.

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

Accessories supporting epoxy coated bars or welded wire fabric shall be epoxy coated. Individual and continuous slab bolsters and chairs shall be of a type to suit various conditions encountered and must be capable of supporting a 300 lb. load without damage or permanent distortion.

PRECAST ABUTMENT FOOTING UNITS, PRECAST ABUTMENT STEM UNITS, PRECAST ABUTMENT BACKWALL UNITS, PRECAST WINGWALL FOOTING UNITS, PRECAST WINGWALL STEM UNITS, PRECAST HIGHWAY GUARDRAIL TRANSITIONS

A. GENERAL.

The work under this Heading consists of fabricating, transporting and installing precast abutment footing units, precast abutment stem units, precast abutment backwall units, precast wingwall footing units, precast wingwall stem units, precast highway guardrail transitions and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. 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.

ITEM 995.01 (Continued)

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. Contractor and Fabricator Quality Control activities and the Engineer Acceptance activities shall remain independent from one another. The 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
(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.

ITEM 995.01 (Continued)

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. The QC Manager shall be on site while the batch plant is producing and placing concrete for the project.
(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 Ti ≥ 50°F.
(b) Immediately after placement to verify that $T_i \geq 50°F$ 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	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
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 AASHTO T 23	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				
		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 of the Department.

(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 sublot of concrete produced
(p) Non-Conformance Reports (NCRs)
(q) Documentation of Repairs (if applicable)

C. ACCEPTANCE.

The QC Manager will perform Acceptance inspection, sampling, and testing during fabrication and installation, to evaluate the quality and degree of compliance of the fabricated Precast Concrete Bridge Element to MassDOT specifications in conformance with the Fabricator's NPCA or PCI Certification. Acceptance inspection and test results not meeting MassDOT specifications will result in Non-conformance Reports (NCR) being issued by the Engineer to the Fabricator or Contractor for corrective action. Final Acceptance for the fabricated Precast Concrete Bridge Elements shall be determined by the Engineer.

ITEM 995.01 (Continued)

1. Inspection.

Prior to the start of fabrication, the Fabricator shall review the fabrication schedule. Fabrication shall only proceed when:

(a) The QC Inspector is present to inspect the Precast Concrete Bridge Element(s) being fabricated.
(b) The QC Manager is present at the Fabricator's plant.

2. Sampling and Testing.

At a minimum, the QC Inspector will perform random Acceptance sampling and testing for each Sublot of concrete produced as specified in *Table 2: Acceptance Sampling and Testing.* The QC Inspector will also perform Acceptance sampling and testing on concrete that has been retempered with admixtures or hold-back water during production. Test Specimens will conform to the requirements of Section M4.02.13 of the MassDOT Standard and Supplemental Specifications and AASHTO R 60.

ITEM 995.01 (Continued)

Table 2: Acceptance 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	Total Quantity of Concrete (cy) produced on a Contract, per Type of Element fabricated, per Mix Design	20 cy	One (1) per Sublot or fraction thereof	Point of Discharge
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 AASHTO T 23	7-day Cylinders: One (1) set of Three (3) 4 x 8 in.	For Information at 7 days				
		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)

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

ITEM 995.01 (Continued)

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 onto the MassDOT Cement Concrete Mix Design Sheet 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 MassDOT Mix Design Sheet submission to the MassDOT Research and materials Section for review and approval. Fabrication shall not occur without prior MassDOT mix design approval.

The Fabricator shall notify MassDOT RMS to schedule trial batch testing for the new mix design(s). Trial batch testing shall meet the following requirements:

(a) Performed by a qualified laboratory and/or AASHTO accredited laboratory.
(b) Meet the requirements as specified in *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete (SCC) shall meet M4.02.17.

Failure to perform all of the required trial batch testing or provide MassDOT RMS trial batch test results within the Specification Limits (as specified in Table 3) will result in the disqualification of the Fabricator's proposed mix design(s).

ITEM 995.01 (Continued)

Table 3: Trial Batch Sampling and Testing for New Mix Designs

Quality Characteristic	Test Method	Sample Size	Specification Limit	Performed By
Slump [(a)]	AASHTO T 119	Per AASHTO	Max. 8 inches or as approved by the Engineer	Quality Control
Air Content (AC)	AASHTO T 152	Per AASHTO	5% ≤ AC ≤ 8%	Quality Control
Temperature (°F)	AASHTO T 309	Per AASHTO	50°F ≤ °F ≤ 90°F	Quality Control
Compressive Strength [(b)]	AASHTO T 22 AASHTO T 23	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Lab Mixed f'_{cr} = 1.3 f'_c at 28 days Batch Mixed f'_{cr} = 1.2 f'_c at 28 days	MassDOT
Alkali-Silica Reaction (ASR) [(d)]	ASTM C 1567	Per ASTM	M4.02.00	Quality Control
Resistance to Chloride Ion Penetration Chloride Ion Penetration [(e)]	AASHTO T 358 [(f)]	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Resistivity ≥ 21 kΩ-cm at 28 days	MassDOT
Freeze/Thaw Durability [(c)]	AASHTO T 161 (Procedure A)	Per AASHTO	Relative Dynamic Modulus of Elasticity after 300 cycles ≥ 80%	Quality Control

Notes:

(a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
(b) Trial batch compressive strength testing shall be performed by MassDOT. Laboratory mixed trial batch compressive strength results shall achieve 130% Design Strength (f'_c). Batch-mixed trial batch compressive results shall achieve 120% f'_c. Acceptance will be based on compressive strength testing performed by MassDOT.
(c) If an AASHTO accredited laboratory is preparing the trial batch test specimens, MassDOT Acceptance presence is not required. If the Fabricator is preparing the trial batch test specimens, MassDOT Acceptance presence is required during trial batch test specimen preparation.
(d) Alkali Silica Reaction (ASR) testing shall meet the requirements of M4.02.00. Independent laboratories performing ASR testing shall be listed on the MassDOT Quality Construction Materials List (QCML).
(e) Calcium nitrite shall be removed from mix designs containing the admixture and replaced by an equivalent quantity of water when preparing Chloride Ion Penetration resistance trial batch test specimens.
(f) The Wenner probe tip spacing “a” shall be 1.5.

ITEM 995.01 (Continued)

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 of Record 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 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 of Record for review and approval. An approval stamp shall appear on every shop drawing sheet. Wet-stamping or wet-signing is not required, provided that the stamp and reviewer name are legible. The Fabricator's name and address shall appear on each sheet.

ITEM 995.01 (Continued)

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:

(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.

ITEM 995.01 (Continued)

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. 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. DUNNAGE PLAN SHOP DRAWINGS.

At least 30 days prior to the start of fabrication, the Contractor shall submit proposed Dunnage Plan Shop Drawings to the Engineer of Record for review and approval. This shall be an independent submittal, separate from the fabrication shop drawings. Drawings shall include the following:

(a) Proposed layout of the Precast Concrete Bridge Elements for storage in yard and during shipping
(b) Support and blocking point locations
(c) Support and blocking materials

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.

ITEM 995.01 (Continued)

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 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.

ITEM 995.01 (Continued)

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 similar to that of 60 grit sand paper. The exposed reinforcing steel in the precast slab 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 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 similar to that of 60 grit sand paper.

ITEM 995.01 (Continued)

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).

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).

ITEM 995.01 (Continued)

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.

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.

ITEM 995.01 (Continued)

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.

ITEM 995.01 (Continued)

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 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 ft^2/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.

ITEM 995.01 (Continued)

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.

(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.

(a) 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.

(b) 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*).

ITEM 995.01 (Continued)

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

(c) 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.

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 Engineers 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.

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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 ¼-inch deep, except when classified as Category 4
(b) Cracks less than or equal to 0.006 inches wide
(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

ITEM 995.01 (Continued)

(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 Engineer 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

T. LOADING.

Prior to the Fabricator loading the Precast Bridge Element on to the truck for shipping, the Fabricator shall provide the Engineer a minimum seven (7) days' notice of the Fabricator's intent to load the Precast Bridge Element. Inspection by the Town Representative Plant Inspector shall take place while the element is still on dunnage in the yard. The element shall not be loaded onto the truck until the Town Representative Plant Inspector has performed the inspection.

U. 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 Town Representative Plant Inspector.
(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 Town Representative Plant Inspector.
(d) Certificate of Compliance shall be generated by the Fabricator as described under the Fabricator Quality Control section and provided to the Town Representative Plant Inspector.
(e) All approved Corrective Actions submitted on the Non-Conformance Reports (NCR), shall be verified to have been completed by the Town Representative Plant Inspector and Quality Control Manager.

All NCRs shall be signed off by the Quality Control Manager.

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V. DELIVERY.

Upon Delivery, the following documentation shall be provided to 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.

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 Town's direction at no cost to the Town.

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 and Quality Control Plan for Precast Concrete Bridge Element Assembly.

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 Resident Engineer has accepted all Precast Concrete Bridge Elements prior to installation.

B. ERECTION PROCEDURE AND QUALITY CONTROL PLAN FOR PRECAST CONCRETE BRIDGE ELEMENT ASSEMBLY.

Prior to the erection, the Contractor shall submit an Erection Procedure and a Quality Control Plan for Precast Concrete Bridge Element Assembly 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 and Quality Control Plan for Precast Concrete Bridge Element Assembly 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 and Quality Control Plan for Precast Concrete Bridge Element Assembly shall, at a minimum, include the following:

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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, approach slabs and highway guardrail transitions, 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.

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2. Quality Control Plan for Precast Concrete Bridge Element Assembly

The Quality Control Plan for Precast Concrete Bridge Element Assembly is a document prepared and submitted by the Contractor prior to the start of work which requires the Contractor to identify and detail the sequence of construction in accordance with the project schedule and which clearly identifies all stages of field construction. The assembly procedures for the Precast Concrete Bridge Elements shall be submitted on full size 24"x36" sheets. This document will be treated as a Construction Procedure and will be reviewed by both the Designer and the District Construction Office. The approval of this document will serve as a guideline for setting interim concrete and grout strengths and curing procedures to allow construction to proceed without waiting for the final in-service strengths to be achieved.

The following list details the minimum criteria that should be included in the Quality Control Plan for Precast Concrete Bridge Element Assembly:

(a) A detailed schedule showing the sequence of operations that the Contractor will follow. The schedule shall include a timeline for installation of all major elements of the bridge accounting for the installation of temporary works and cure times of grouts or closure pour concrete and other selected materials.

(b) Calculations that support the schedule outlined above should be included verifying that the selected materials have adequate interim strength to proceed from one step to another. Final material strengths are not normally required until the bridge is opened to vehicular traffic. The minimum factor of safety of two (2) will be required for the interim strength of grouts and closure pour concrete before construction is allowed to proceed to subsequent steps. The factor of safety is applied to the service loads that are supported by the elements and materials during various stages of construction. For example, if the Contractor calculates that the grout between the precast pier cap and pier wall requires a strength of 100 psi to support the dead load of the beams in the next step, a cylinder break of 200 psi will be required prior to allowing the pier cap to be loaded with the beams. The required strength of materials for subsequent construction stages shall also be calculated and the material strength verified.

(c) The Contractor is responsible for determining the center of gravity for all elements. Special care shall be used for unusual elements that are not symmetric. These elements may require special lifting hardware to allow for installation in a plumb or flat position.

(d) Plan of the work area, depicting items such as temporary earth support, utilities within the immediate vicinity of the work, drainage structures, etc. The Contractor shall coordinate the various subcontractors that will need to occupy the same area and shall ensure that there are no conflicts. For example, if the Contractor is having different Subcontractors prepare and submit plans for temporary earth support and demolition, and the earth support is required to be installed prior to the demolition, it shall be the Contractor's responsibility to ensure that the Quality Control Plan for Precast Concrete Bridge Element Assembly submission allows both operations to be performed without field modification.

(e) Details of all equipment that shall be employed for the construction of the bridge.

(f) Methods of providing temporary support of the elements. Include methods of adjusting and securing the element after placement.

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(g) Vertical Adjustment Assemblies to be used as a means of setting precast concrete footings to the correct elevations.
(h) Procedures for controlling the overall horizontal dimensions and the vertical elevations as each precast concrete bridge element is erected by using the tolerance limits of the joints as detailed on the plans.
(i) Methods for curing grout.
(j) Proposed methods for installing non-shrink grout and the sequence and equipment for the grouting operation.
(k) Methods for sealing the keyways in preparation for filling with non-shrink grout, including the use of backer rods. The Contractor shall not assume that the backer rods will restrain the pressure from the grout in vertical grout joints. Provide additional forming to retain the backer rod.

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. Town Representative reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

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 and Quality Control Plan for Precast Concrete Bridge Element Assembly. 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.

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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. 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.

After the formwork has been removed, all threaded inserts that have been cast into the precast concrete bridge deck for support of the formwork shall be filled with a grout of the same color as that of the precast concrete.

PRESTRESSED CONCRETE DECK BEAMS (S48-18)

A. GENERAL

The work under this Heading consists of fabricating, transporting and installing Prestressed Concrete Deck Beams (S48-18) and includes all necessary labor, materials, and equipment to complete the work as shown on the Plans. The work shall conform to the MassDOT Standard 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. Contract documents for this project shall take precedence over the AASHTO LRFD Bridge Construction Specifications and PCI MNL-116. Section 930, M4.02.14, and M4.03.00 through M4.03.14 of the MassDOT Standard Specifications are superseded in their entirety by the requirements specified below.

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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). 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.

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 Prestressed Concrete Beam(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 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 Prestressed Concrete Beams, the Fabricator's precast concrete plant shall obtain the following:

a) Certification by the Precast/Prestressed Concrete Institute (PCI) Plant Certification Program, for Prestressed Concrete Beam fabrication, Category B3 level or higher
b) MassDOT Prequalification
c) MassDOT Mix Design Approval

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

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2. Personnel

The Fabricator shall provide adequate training for all QC personnel in accordance with 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 Precast/Prestressed Concrete Institute (PCI) Technician/Inspector Level II or higher, and a minimum of 5 years continuous experience in the manufacture of Prestressed Concrete Beams for state transportation departments.
b) A Technician/Inspector having the Precast/Prestressed Concrete Institute (PCI) Technician/Inspector Level II 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

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5. Inspection

Quality Control personnel shall monitor and inspect the fabrication of each Prestressed Concrete Beam. 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 Ti ≥ 50°F.
b) Immediately after placement to verify that T_i ≥ 50°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 Prestressed Concrete Beam.

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 Prestressed Concrete Beam they represent. If approved by the Engineer, compressive strength cylinder match curing equipment, that maintains the same concrete conditions that the corresponding Prestressed Concrete Beam is exposed to, may be utilized in lieu of Stripping (80% f'_c) field cured cylinders, with the use of thermocouples, controllers, and heaters.

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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	Total Quantity of Beams fabricated on a Contract, per Bid Item, per Mix Design	One (1) Beam	One (1) per Sublot or fraction thereof	Point of Discharge
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 AASHTO T 23	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				
		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.

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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 Town upon the request of the Department.

a) Current MassDOT Approved Mix Design Sheet(s) and Approval Letter(s)
b) PCI 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 Prestressed Concrete Beam
h) Admixture Manufacturer's Certification of Compliance for each approved Admixture
i) Completed QC Inspection Report for each fabricated Prestressed Concrete Beam
j) Identification Number for each fabricated Prestressed Concrete Beam
k) Time and date of casting of each fabricated Prestressed Concrete Beam
l) Date of stripping of each fabricated Prestressed Concrete Beam
m) Batch Ticket Printout reporting the quantity of concrete produced for each batch of concrete produced
n) Concrete temperature records for each fabricated Prestressed Concrete Beam
o) QC Test Report Forms for each sublot of concrete produced
p) Non-Conformance Reports (NCRs)
q) Documentation of Repairs (if applicable)

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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
Prestressing Strands	AASHTO M 203
Reinforcing Bars	M8.01.0
Epoxy Coated Reinforcing Bars	M8.01.7
Welded Wire Reinforcement	M8.01.2
Mechanical Reinforcing Bar Splicer	M8.01.9
Strand Chuck	M8.15.0
Lifting Devices	PCI MNL-116

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. When used, self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.

The Fabricator is responsible for developing the concrete mix to be used for fabricating prestressed beams and having it prequalified by the MassDOT Research and Materials Section. The mix design compressive strength shall be as shown on the plans and as prequalified by the MassDOT Research and Materials Section. Prequalification shall include the trial batch testing shown in Table 3. For previously prequalified mixes, the Fabricator shall perform any tests specified in Table 3 that were not previously performed.

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If the concrete mix has not been prequalified by the MassDOT Research and Materials Section, the Fabricator shall design and submit for approval, the proportions and test results for a concrete mix that shall attain the requirements specified in Table 3. The proposed mix design and all required test results shall be submitted to the MassDOT Research and Materials Section for approval. Requirements for additional testing and receipt of additional documentation from the Fabricator will be determined by RMS. Unsatisfactory results or other conditions identified during this additional testing and additional documentation review, will require re-submission of a new mix design for review and approval.

The mix shall be formulated with calcium nitrite corrosion inhibitors, which shall be added at a rate of 3 gallons per cubic yard of concrete in order to increase the active corrosion threshold to 9.9 pounds of chloride per cubic yard of concrete at the reinforcing bar level. Prior to production of cement concrete, the Fabricator shall report and submit all proposed mix design formulations and its constituent materials onto the MassDOT Cement Concrete Mix Design Sheet to the MassDOT Research and Materials Section 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 MassDOT Mix Design Sheet submission to the MassDOT Research and materials Section for review and approval. Fabrication shall not occur without prior MassDOT mix design approval. All concrete used for prestressed concrete beams shall be batched by the Fabricator producing the prestressed concrete beams. The use of ready-mix concrete batched by others shall not be permitted.

The Fabricator shall notify MassDOT RMS to schedule trial batch testing for the new mix design(s). Trial batch testing shall meet the following requirements:

a) Performed by a qualified laboratory and/or AASHTO accredited laboratory.
b) Meet the requirements as specified in *Table 3: Trial Batch Sampling Testing for New Mix Designs*. Self-consolidating concrete (SCC) shall meet M4.02.17

Failure to perform all of the required trial batch testing or provide MassDOT RMS trial batch test results within the Specification Limits (as specified in Table 3) will result in the disqualification of the Fabricator's proposed mix design(s).

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Table 3: Trial Batch Sampling and Testing for New Mix Designs

Quality Characteristic	Test Method	Sample Size	Specification Limit	Performed By
Slump [(a)]	AASHTO T 119	Per AASHTO	Max. 8 inches or as approved by the Engineer	Quality Control
Air Content (AC)	AASHTO T 152	Per AASHTO	5% ≤ AC ≤ 8%	Quality Control
Temperature (°F)	AASHTO T 309	Per AASHTO	50°F ≤ °F ≤ 90°F	Quality Control
Compressive Strength [(b)]	AASHTO T 22 AASHTO T 23	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Lab Mixed f'_{cr} = 1.3 f'_c at 28 days Batch Mixed f'_{cr} = 1.2 f'_c at 28 days	MassDOT
Alkali-Silica Reaction (ASR) [(d)]	ASTM C 1567	Per ASTM	M4.02.00	Quality Control
Resistance to Chloride Ion Penetration Chloride Ion Penetration [(e)]	AASHTO T 358 [(f)]	28-day Cylinders: One (1) set of Three (3) 4 x 8 in.	Resistivity ≥ 21 kΩ-cm at 28 days	MassDOT
Freeze/Thaw Durability [(c)]	AASHTO T 161 (Procedure A)	Per AASHTO	Relative Dynamic Modulus of Elasticity after 300 cycles ≥ 80%	Quality Control

Notes:

a) Self-consolidating concrete (SCC) shall meet the requirements of M4.02.17.
b) Trial batch compressive strength testing shall be performed by MassDOT. Acceptance will be based on compressive strength testing performed by MassDOT. For mixes requiring f'_c > 8,000 psi, three consecutive trial batches shall be performed, all achieving $f'_{cr} \geq 1.1\ f'_c$, for MassDOT approval.
c) If an AASHTO accredited laboratory is preparing the trial batch test specimens, MassDOT Acceptance presence is not required. If the Fabricator is preparing the trial batch test specimens, MassDOT Acceptance presence is required during trial batch test specimen preparation.
d) Alkali Silica Reaction (ASR) testing shall meet the requirements of M4.02.00. Independent laboratories performing ASR testing shall be listed on the MassDOT Quality Construction Materials List (QCML).
e) Calcium nitrite shall be removed from mix designs containing the admixture and replaced by an equivalent quantity of water when preparing Chloride Ion Penetration resistance trial batch test specimens.
f) The Wenner probe tip spacing “a” shall be 1.5.

2. Reinforcement and Prestressing Strands

The size and grade of steel reinforcement and prestressing strands shall be as indicated on the plans. All reinforcing steel shall be epoxy coated, Grade 60. All prestressing strands shall be uncoated.

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3. Transverse Ties

The transverse ties shall be low-relaxation strands meeting the requirements of AASHTO M 203. The size and grade shall be as indicated on the plans. The ties shall be supplied with a seamless polypropylene sheath which has corrosion inhibitor grease between the strand and sheath. The location of all transverse ties, shall be as shown on the plans.

4. Threaded Inserts

Threaded inserts are permissible in Prestressed Concrete Beams for installing formwork, utility supports, or deck drains. Threaded inserts shall be hot dip galvanized or made of stainless steel and shall not come in contact with the reinforcing steel. The number of threaded inserts installed for the Contractor's convenience shall be kept to a minimum.

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 Prestressed Concrete Beam 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 any precast concrete bridge decks 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.

The Contractor shall submit scaled shop drawings to the Engineer of Record for review and approval. An approval stamp shall appear on every shop drawing sheet. Wet-stamping or wet-signing is not required, provided that the stamp and reviewer name are legible. 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:

a) Number and type of Prestressed Concrete Beams including overall length, width and height.
b) Skew angle.
c) Location and spacing of strands, draped strands and their geometry, and/or location and spacing of strands to be debonded including the length of each strand's debondment.

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d) Location, size and geometry of all steel reinforcement, and mechanical reinforcing bar splicers if called for on the plans.
e) Location and details of all inserts, anchors, and any other items required to be cast into the Prestressed Concrete Beams (whether detailed on the plans by the Engineer of Record or provided for the Contractor's convenience). Prestressed Concrete Beams shall not be fired or drilled into for attachment purposes. All hardware shall be galvanized except as noted.
f) 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).
g) The minimum compressive strength required prior to release of prestressing and prior to handling the Prestressed Concrete Beam.

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 Prestressed Concrete Beams shall be fabricated in accordance with the latest edition of PCI MNL-116 as modified herein.

C. PLACEMENT, FINISHING AND CURING PLAN

At least 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. 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

ITEM 995.01 (Continued)

D. DUNNAGE PLAN SHOP DRAWINGS

At least 30 days prior to the start of fabrication, the Contractor shall submit proposed Dunnage Plan Shop Drawings to the Engineer of Record for review and approval. This shall be an independent submittal, separate from the fabrication shop drawings. The Dunnage Plan Shop Drawings shall include the following:

a) Proposed layout of the Prestressed Concrete Beams for storage in yard and during shipping
b) Support and blocking point locations
c) Support and blocking materials

E. REINFORCEMENT

The reinforcing bars shall be installed in accordance with Section 901.62 of the Standard 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.

F. PLACING AND TENSIONING STRANDS

Placing and tensioning strands shall be in accordance with PCI MNL-116. The location of all prestressing strands shall be as indicated on the plans.

G. 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.

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H. FORMS

Concrete shall be cast in rigidly constructed forms, which will maintain the Prestressed Concrete Beams within specified tolerances to the shapes, lines and dimensions shown on the approved 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.

Where applicable, the material used for forming voids in concrete deck beams shall be sufficiently strong and resistant to water to support the wet concrete, which is to be packed around the void forms, without collapsing. The void forms shall be securely anchored so that no movement will occur during placing and consolidation of the concrete. Void drains shall be installed at the locations shown on the plans and Fabricator shall ensure that the drains are in contact with the void form. After the beams have been cast and removed from the forms, the Fabricator shall check that the drains are still in contact with the void form by inserting a rigid probe into the drain for a distance greater than the thickness of the concrete at the void drain.

I. 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. concrete

J. 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.

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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.

K. 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.

L. FINISHING OF CONCRETE

The top of the prestressed concrete beams shall be given a rake finish with a ¼" amplitude applied transversely across the beam to the limits shown on the plans.

M. EXPOSED SURFACES OF PRESTRESSED CONCRETE BEAMS

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.

N. EXPOSED SURFACES OF SHEAR KEYS AND CLOSURE POURE SHEAR KEYS

If the beams have shear keys cast in the sides of the beams, the surfaces of the shear keys shall be abrasive blasted prior to shipment. 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 similar to that of 60 grit sand paper.

O. 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.

ITEM 995.01 (Continued)

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.

P. 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).

Q. 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 Prestressed Concrete Beams, 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

ITEM 995.01 (Continued)

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.

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.

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(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.

(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*).

ITEM 995.01 (Continued)

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 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 ft^2/gal., with the first being allowed to become tacky before the second is applied.

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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.

6. 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 initial delay 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

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7. 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.

8. 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

9. 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.

R. RELEASE

The Fabricator shall not release strands or handle the Prestressed Concrete Beam until Quality Control compressive strength cylinders attain a minimum compressive strength of 80% Design Strength (f'_c) or the specified detensioning compression strength as indicated on the approved shop drawings has been achieved. All exposed concrete surfaces shall continue to be cured in conformance with the *Final Curing Methods* sections until completion.

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S. HANDLING AND STORAGE OF PRESTRESSED CONCRETE BEAMS

Prestressed Concrete Beams 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) Prestressed Concrete Beams are protected from precipitation with polyethylene curing covers until 100% f'_c is attained
b) Prestressed Concrete Beams maintain a minimum concrete temperature of 40°F until 100% f'_c is attained

Prestressed Concrete Beams damaged during handling and storage will be repaired or replaced at Engineer's direction at no cost to the Town. Prestressed Concrete Beams 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. Prestressed Concrete Beams shall be supported on the ground by means of continuous blocking, in accordance with the approved dunnage plan.

Prestressed Concrete Beams 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 Prestressed Concrete Beams. Blocking shall be provided at all locations of tie-down straps. Prestressed Concrete Beams 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.

T. 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 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 Prestressed Concrete Beams, 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 ¼-inch deep, except when classified as Category 4
b) Cracks less than or equal to 0.006 inches wide
c) Cracks less than or equal to 0.125 inches wide on surfaces that will receive a concrete overlay or spray-applied membrane waterproofing.

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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 or spray-applied membrane waterproofing
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 or spray-applied membrane waterproofing
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 Engineer 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:

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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) Compressive strength testing that does not meet the specified Design Strength, f'_c

U. SHIPPING

Prior to shipment, the Fabricator shall perform the following actions and provide documentation to the Engineer:

a) Prestressed Concrete Beams 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 Prestressed Concrete Beam'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 approved Corrective Actions submitted on the Non-Conformance Reports (NCR), shall be verified to have been completed by the Quality Control Manager.
f) All NCRs shall be signed off by the Quality Control Manager.

ITEM 995.01 (Continued)

V. DELIVERY

Upon Delivery, the following documentation shall be provided to the designee:

a) QC Compressive Strength Test Report Forms attaining Design Strength, f'c for the Prestressed Concrete Beam'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 the Prestressed Concrete Beams upon receipt at the site. Prestressed Concrete Beams damaged during delivery shall be repaired or replaced at Engineer's direction at no cost to the Town or Engineer.

CONSTRUCTION METHODS – FIELD CONSTRUCTION

A. GENERAL

All of the Contractor's field personnel involved in the erection and assembly of the Prestressed Concrete Beams shall have knowledge of and follow the approved Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly.

Prior to installation, the following documentation shall be reviewed and confirmed by the designee:

a) QC Compressive Strength Test Report Forms attaining Design Strength, f'_c for the Prestressed Concrete Beam'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 Resident Engineer has accepted all Prestressed Concrete Beams prior to installation.

B. ERECTION PROCEDURE AND QUALITY CONTROL PLAN FOR PRESTRESSED CONCRETE BEAM ASSEMBLY

Prior to the erection, the Contractor shall submit an Erection Procedure and a Quality Control Plan for Prestressed Concrete Beam Assembly for approval by the Engineer. This submittal shall include computations and drawings for the transport, hoisting, erection and handling of the Prestressed Concrete Beams. The Erection Procedure and Quality Control Plan for Prestressed Concrete Beam Assembly 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 and Quality Control Plan for Prestressed Concrete Beam Assembly shall, at a minimum, include the following:

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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) Steel reinforcing details, and location and details of lifting devices
b) Minimum concrete compressive strength for handling the Prestressed Concrete Beams.
c) Concrete stresses stresses during handling, transport, and erection.
d) Crane capacities, pick radii, sling geometry, and lifting hardware.
e) Verification that the equipment can handle all pick loads and weights with the required factor of safety.
f) Evaluation of construction sequence and evaluation of any geometric conflicts in the lifting of the Prestressed Concrete Beams and setting them on the abutments and piers.
g) Design of crane supports including verification of subgrade for support.
h) Location and design of all temporary bracing that will be required during erection.

2. Quality Control Plan for Prestressed Concrete Beam Assembly

The Quality Control Plan for Prestressed Concrete Beam Assembly is a document prepared and submitted by the Contractor prior to the start of work which requires the Contractor to identify and detail the sequence of construction in accordance with the project schedule and which clearly identifies all stages of field construction. The assembly procedures for the Prestressed Concrete Beams shall be submitted on full size 24”x36” sheets. This document will be treated as a Construction Procedure and will be reviewed by both the Designer and the District Construction Office.

At a minimum, the Quality Control Plan for Prestressed Concrete Beam Assembly shall include the following:

a) Listing of the equipment, materials, and personnel including their assigned responsibilities that will be used to erect and assemble the Prestressed Concrete Beams on site.
b) Documentation of all preparatory work necessary for moving personnel, equipment, supplies, and incidentals to the project site before beginning work.
c) Detailed schedule showing the sequence of operations that the Contractor will follow to complete the field construction from setting working points and working lines to the casting of closure pours and the curing of the closure pour concrete, as described below and as called for on the plans.
d) For NEDBT and NEXT D beams, Contractor’s means for ensuring that the Prestressed Concrete Beam shall align to the roadway profile and cross slope and means for adjusting the final deck slab elevation.

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e) Timeline and descriptions of Quality Control activities to be followed throughout the field construction operations including methods and procedures for controlling tolerance limits both horizontally and vertically.

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. Town Representative reserves the right to perform additional independent survey. If discrepancies are found, the Contractor may be required to verify previous survey data.

D. ADJACENT PRESTRESSED CONCRETE DECK BEAMS

1. Beam Layout and Erection

Prestressed concrete beams shall be installed to the line and grade shown on the plans in accordance with the Contractor's approved Erection Procedure and Assembly Plan. The location of the beams on the abutments shall be laid out according to the nominal width of the beams as shown on the plans. Each beam shall be erected such that after erection, the beam shall lie entirely within the horizontal lines defined by its nominal width for its entire length and shall not infringe on the space allocated for any adjacent beam. The Contractor may adjust the width of the shear key between beams.

Immediately prior to erecting the beams, the keyway surfaces shall be cleaned at the job site of all dust, dirt, and carbonation using a high-pressure water blast.

After all beams are erected, the actual overall width of the beams as laid out shall not deviate from the nominal dimension shown on the framing plan beyond a tolerance of +0 inches and -1 inches.

After the beam layout has been accepted by the Engineer, the Contractor shall cut the lifting devices off below the top of the beam.

2. Transverse Tie Tensioning

Unless shown otherwise on the plans, the transverse ties shall be tensioned to 5,000 pounds before the keyways are filled. After the keyways are filled with mortar (M4.04.0) and the mortar has cured, the ties shall be tensioned as specified on the plans. No traffic or heavy equipment shall be allowed on the bridge until all transverse ties have been properly tensioned and the deck has been cast and cured.

3. Mortaring of Keyways

The precast concrete keyways that will receive mortar shall be free of materials such as paint, oil, curing compound, bond breaker, dirt etc. that will inhibit bonding. The precast concrete keyways shall be hydro-blasted with equipment that can remove asphaltic material, oils, dirt, rubber, curing compounds, paint carbonation, laitance, and other potentially detrimental materials, which may interfere with the bonding of the mortar and precast concrete.

Exposed reinforcing steel in the precast beam 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.

ITEM 995.01 (Continued)

Mortar (M4.04.0) shall be placed in strict accordance with the manufacturer's recommendations and instructions.

The keyways shall be filled flush to the top of the beams and any vertical misalignment between beams shall be feathered out on a slope of 1 to 12. Curing shall be performed in strict accordance with the manufacturer's recommendations. The keyways shall not be filled in cold weather when either the ambient temperature or the prestressed concrete beam's temperature is below the mortar manufacturer's recommendation. No localized heating of either the prestressed concrete beams or of the air surrounding the keyway will be permitted in an attempt to reach application temperatures.

If the keyways are not filled within five days after the beams are erected, the Contractor shall cover and protect the keyways from weather and debris until they are filled.

4. Concrete Deck Slab Placement

Prior to casting the concrete deck slab, the top of the beam shall be clean and free of all laitance or bond inhibiting agents. The concrete deck slab shall be placed after the transverse ties have been fully tensioned. Deck concrete shall be placed against the beam concrete without the use of any bonding agents.

After the formwork has been removed, all threaded inserts that have been cast into the beams for support of the formwork shall be plugged after use with a grout of the same color as that of the precast cement concrete.

5. Backwalls and Curtain Walls

The backwalls and the curtain walls at the abutment bridge seats shall be cast only after the beam layout has been accepted. Closed cell foam shall be attached to the bridge beams to the limits and thickness as shown on the plans and the backwall / curtain wall concrete shall be placed directly against it. The sidewalk and safety curb may be cast after the curtain walls have been cast.

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 for Bridge Structure No. N-18-003. 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 Engineer 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 No. N-18-003. 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)

Sub-Item	Description	Quantity	Unit	Unit Price	Total
482.31	Sawing & Sealing Joints in Asphalt Pavement at Bridges	60	FT	_____	_____
904.3	5000 PSI 3/4 IN., 685 HP Cement Concrete	90	CY	_____	_____
904.31	Precast Highway Guardrail Transitions	4	EA	_____	_____
910.	Steel Reinforcement for Structures	5500	LB	_____	_____
910.1	Steel Reinforcement for Structures – Epoxy Coated	16500	LB	_____	_____
930.307	Prestressed Concrete Deck Beams (S48-18)	459	FT	_____	_____
931.210	Precast Abutment Footing Unit	6	EA	_____	_____
931.211	Precast Abutment Stem Unit	6	EA	_____	_____
931.212	Precast Abutment Backwall Unit	6	EA	_____	_____
931.220	Precast Wingwall Footing Unit	4	EA	_____	_____
931.221	Precast Wingwall Stem Unit	8	EA	_____	_____
960.	Structural Steel	3300	LB	_____	_____
965.	Membrane Waterproofing for Bridge Decks	2000	SF	_____	_____
970.	Damp-Proofing	2100	SF	_____	_____
975.1	Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)	175	FT	_____	_____

Total Cost of Item 995.01 $_____

APPENDIX A

PREVAILING WAGE RATES

APPENDIX B

PROJECT PLANS

PLANS OF CHESTNUT STREET OVER IPSWICH RIVER IN THE TOWN OF NORTH READING, MIDDLESEX COUNTY

PREPARED BY TEC, INC.
DATED 10/22/2024
41 SHEETS

APPENDIX C

GEOTECHNICAL REPORT,

HYDRAULIC REPORT,

AND

WETLAND REPORT

APPENDIX D

ENVIRONMENTAL PERMITS:

401 WATER QUALITY CERTIFICATION

404 USACE PRE-CONSTRUCTION NOTIFICATION

ARTICLE 97

CHAPTER 91

ENVIRONMENTAL NOTIFICATION FORM

NOTICE OF INTENT

ORDER OF CONDITIONS

PROJECT PLANS WERE PROVIDED AS A PART OF THIS SUBMISSION.

PLEASE SEE APPENDIX B FOR PLANS.