



**STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION**



**2800 BERLIN TURNPIKE, P.O. BOX 317546  
NEWINGTON, CONNECTICUT 06131-7546**

**Phone: 860-594-3128**

September 22, 2015

Subject: Project No. 135-326  
Replacement of MNRR Bridge over Atlantic Street-Phase 1 I-95 NB Exit 8 Ramp Bridge.

NOTICE TO CONTRACTORS:

This is to notify all concerned and especially the prospective bidders that the bid opening for the subject project is still scheduled for September 30, 2015 at 2:00 P.M. in the Conference Room of the Department of Transportation Administration Building, 2800 Berlin Turnpike, Newington, Connecticut.

Addendum No. 2 is attached and can also be obtained on the Statewide Contracting Portal at [http://www.biznet.ct.gov/scp\\_search/BidResults.aspx?groupid=64](http://www.biznet.ct.gov/scp_search/BidResults.aspx?groupid=64)

This addendum is necessary to add new special provisions, revise special provisions, delete special provisions, add new contract items, revise contract items, delete contract items, add new plan sheets, revise plan sheets and delete plan sheets.

Bid Proposal Forms (0135-0326.EBS file and amendment file 0104-0164.00# if applicable) are available for those bidders that have received approval from the Department to bid on the subject project.

**Pre-Bid Questions and Answers:** Questions pertaining to DOT advertised construction projects must be presented through the CTDOT Pre-Bid Q and A Website. The Department cannot guarantee that all questions will be answered prior to the bid date. **PLEASE NOTE - at 12:01 am, the day before the bid, the subject project(s) being bid will be removed from the Q and A Website, Projects Advertised Section, at which time questions can no longer be submitted through the Q and A Website. At this time, the Q and A for those projects will be considered final, unless otherwise stated and/or the bid is postponed to a future date and time to allow for further questions and answers to be posted.**

*Harold J. Emond*

For: Gregory D. Straka  
Contracts Manager  
Division of Contracts Administration

**SEPTEMBER 22, 2015**  
**REPLACEMENT OF MNRR BRIDGE OVER ATLANTIC STREET – PHASE 1**  
**I-95 NB EXIT 8 RAMP BRIDGE**

**STATE PROJECT NO. 135-326**  
**TOWN OF STAMFORD**

**ADDENDUM NO. 2**

This Addendum addresses the following questions and answers contained on the “CT DOT QUESTIONS AND ANSWERS WEBSITE FOR ADVERTISED CONSTRUCTION PROJECTS”:

Question and Answer Nos. 2, 3, 4, 6, 8, 9, 10, 11, 15, 17, 19, 20, 21, 23, 25, and 26.

**SPECIAL PROVISIONS**  
**NEW SPECIAL PROVISIONS**

The following Special Provisions are hereby added to the Contract:

- **NOTICE TO CONTRACTOR – PROCUREMENT OF MATERIALS**
- **ITEM NO. 0603851A – STRUCTURAL STEEL (LOW ALLOY)**

**REVISED SPECIAL PROVISION**

The following Special Provision is hereby deleted in its entirety and replaced with the attached like-named Special Provision:

- **SECTION 1.03 – AWARD AND EXECUTION OF CONTRACT**
- **ITEM NO. 0101176A - DISPOSAL OF PCB WASTE**
- **ITEM NO. 0506070A – GROUND ANCHORS**
- **ITEM NO. 0506071A – PERFORMANCE TEST FOR GROUND ANCHORS**
- **ITEM NO. 0506073A – PROOF TEST FOR GROUND ANCHORS**
- **ITEM NO. 0651595A – JACKING 42 INCH PIPE**
- **ITEM NO. 0974005A – REMOVAL OF EXISTING RETAINING WALL (SITE NO. 1)**
- **ITEM NO. 1401984A – 18” PVC PIPE (SANITARY SEWER)**
- **ITEM NO. 1403001A - MANHOLE (SANITARY SEWER)**
- **ITEM NO. 1403002A – MANHOLE OVER 10’ DEEP (SANITARY SEWER)**
- **ITEM NO. 1403501A – RESET MANHOLE (SANITARY SEWER)**
- **ITEM NO. 1405075A – TELEVISION PIPELINE INSPECTION (SANITARY SEWER)**

- ITEM 1507000A – PROTECTION AND SUPPORT OF EXISTING UTILITIES

**DELETED SPECIAL PROVISIONS**

The following Special Provisions are hereby deleted in their entirety:

- ITEM NO. 0506072A – EXTENDED CREEP TEST FOR GROUND ANCHORS
- ITEM NO. 0653002A – CLEAN DRAINAGE SYSTEM

**CONTRACT ITEMS**

**NEW CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
0202120	ROCK EXCAVATION (NO EXPLOSIVES)	C.Y.	525
0603851A	STRUCTURAL STEEL (LOW ALLOY)	CWT	2,299
0653001	CLEAN EXISTING CATCH BASIN	EA	5
0653010	CLEAN EXISTING MANHOLE	EA	4
0653100	CLEAN EXISTING CULVERT – 12” TO 42” DIAMETER	L.F.	1,300
0653101	CLEAN EXISTING CULVERT – GREATER THAN 42” DIAMETER	L.F.	215

**REVISED CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
0603801	STRUCTURAL STEEL	2,602 CWT	303 CWT
0714050	TEMPORARY EARTH RETAINING SYSTEM	14,626 SF	18,033 SF
0944000	FURNISHING AND PLACING TOPSOIL	285 SY	1,175 SY
0950005	TURF ESTABLISHMENT	285 SY	1,175 SY

**DELETED CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
0653002A	CLEAN DRAINAGE SYSTEM	L.S.	0

**PLANS**

**NEW PLANS**

The following Plan Sheets are hereby added to the Contract:

03.024-1.A2

**REVISED PLANS**

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:  
03.010.A2, 03.041.A2, 04.012.A2, 04.021.A2, 04.022.A2, 04.023.A2, 04.024.A2,  
04.067.A2, 07.001.A2, 07.002.A2, 07.010.A2, 07.013.A2, 08.005.A2, 09.006.A2,  
10.005.A2, and 10.007.A2

**DELETED PLANS**

The following Plan Sheets are hereby deleted in their entirety:  
03.024

The Detailed Estimate Sheets do not reflect these changes.

The Bid Proposal Form has been revised to reflect these changes.

There will be no change in the number of calendar days due to this Addendum.

The foregoing is hereby made a part of the contract.

## **NOTICE TO CONTRACTOR - PROCUREMENT OF MATERIALS**

Upon award, the Contractor shall proceed with shop drawings, working drawings, procurement of materials, and all other submittals required to complete the work in accordance with the contract documents.

**ITEM # 0603851A – STRUCTURAL STEEL (LOW ALLOY)**

Work under this item shall conform to the requirements of Section 6.03 amended as follows:

**Article 6.03.01 - Description:** is supplemented as follows:

This special provision applies to the structural steel used in retaining wall construction. Where the term “structural steel” is used within the contract plans for the construction of retaining walls, said steel shall be paid for under the item “Structural Steel (Low Alloy).”

**Article 6.03.03 – Construction Methods:** In Subarticle 4 “Field Erection” - part (e) “Welded Connections,” following the last paragraph of the article, add the following:

Galvanized surfaces shall be prepared for welding based on the recommendations of the American Galvanizers Association. These recommendations are available online at: <http://www.galvanizeit.org/design-and-fabrication/fabrication-considerations>

**Article 6.03.05 – Basis of Payment:** Delete in its entirety and replace with the following:

The structural steel, incorporated in the completed and accepted structure, will be paid for at the Contract unit price per hundredweight for "Structural Steel (Low Alloy)." Payment shall be for structural steel, complete in place, which price shall include quality control, furnishing, fabricating, transporting, storing, erecting, welding, surface preparation and all materials including fastener assemblies, equipment, tools and labor incidental thereto.

No direct payment will be made for preparing galvanized surfaces for welding. No direct payment will be made for field touch-up of galvanized surfaces that may be required for any reason including, but not limited to, field or shop preparation for welding. No direct payment will be made for non-destructive testing as may be required.

Pay Item	Pay Unit
Structural Steel (Low Alloy)	CWT

## **SECTION 1.03 - AWARD AND EXECUTION OF CONTRACT**

**Article 1.03.07 – Insurance** - is supplemented as follows:

Add the following four paragraphs after the first sentence in the second paragraph:

"The Contractor is warned that he will not be allowed on the railroad property by the Railroad Company if there are outstanding charges remaining against the contractor for Railroad Services rendered on prior projects. No request for an extension of time will be considered as a result of any delay to the Contractor's operations caused by the Contractor's indebtedness to the railroad. It is agreed that providing of any conductors, flagmen, or other employees shall not relieve the contractor from liability or payment for any damages caused by his operations.

If any insurance specified within this Article shall be provided on a claims-made basis, then in addition to coverage requirements, such policy shall provide that:

- 1) The policy retroactive date must coincide with or precede the Contractor's start of work (including subsequent policies purchased as renewals or replacements),
- 2) The Contractor will make every effort to maintain similar insurance for at least two years following project completion,
- 3) If insurance is terminated for any reason, the Contractor agrees to purchase an extended reporting provision of at least two years to report claims arising from Work performed in connection with this Contract, and,
- 4) The policy must allow for reporting of circumstances or incidents that might give rise to future claims.

"The Contractor shall assume any and all deductibles in the described insurance policies contained herein. The Contractor's insurers shall have no right of recovery or subrogation against the State or the Railroad and the described insurance shall be primary coverage."

For coverage provided as per Article 1.03.07, Subarticle 5 and 6 as amended herein, the State shall be named as additional insured."

Add the following to Subarticle 5- Railroad Protective Liability Insurance.

"In addition, the contractor is required to file certificates of insurance with Metro-North Commuter Railroad at least 30 days prior to commencing any work within the Railroad right-of-way. Certificates are to be sent to: Ms. Melva Villa, Risk Analyst, Metro-North Railroad Risk and Insurance Management Department, 2 Broadway, 21<sup>st</sup> floor, New York, NY, 10004."

In Subarticle 1 - Worker's Compensation Insurance, after ". . . in accordance with the requirements of State law", add the following: ". . . , or with limits of liability of not less than \$1,000,000 for each accident or illness, whichever is greater."

Add the following to Subarticle 2 – Commercial General Liability Insurance:

"Products, completed operations, independent Contractors, and contractual liability coverages are to be included and all railroad exclusions are to be deleted. The named as an additional insured with respect to operations to be performed shall be as noted in Subarticle 14."

Add the following to Subarticle 3 - Automobile Liability Insurance:

"A policy is issued to and covering the Contractor's tools and equipment, including automotive equipment used by the Contractor in the work which is the subject of this contract. Coverage shall be on all-risk basis. The State of Connecticut is to be named as an additional insured as respects its interest in the covered property, and the insurance shall include an insurer's waiver of subrogation in favor of each Party insured thereunder."

Replace Subarticle 4 - Owner's and Contractor's Protective Liability Insurance for and in the Name of The State with the following:

Delete 2,000,000 and replace with 3,000,000 in the second line under Minimum Annual Aggregate Amount (\$) in the table for Contract Amount 20 Million – 50 Million.

Subarticle 5 - Railroad Protective Liability Insurance, add the following:

After "**Railroad Protective Liability and Property Damage Liability Insurance:**" insert "The Contractor shall carry this insurance with respect to the Project operations it performs, and also those performed by its subcontractors, on ISO/RIMA Form, for and on behalf of (in the name of) those appearing in Subarticle 22. Those entities under Subarticle 22 shall be listed and named as additional insured on all policies taken for this project."

Add the following to the end of the Subarticle: "This policy shall be endorsed to the effect that for the purposes of this insurance, the employees of the Railroad Company, as listed below, shall be considered the same as regular employees of the Contractor: a) Any watchman, flagman, and similar employee who is employed by the Railroad and is specifically assigned or furnished by the Railroad for work in connection with the project, or, b) Any employee of the Railroad while operating the work trains or other equipment assigned to the project by the Railroad and while engaged in the performance of work directly involved in the Contract."

Revise Subarticle 16 – Termination or Change of Insurance as follows:

In the first sentence, after "...notify the Department...", add "and the Railroad...".

Add Subarticle 19 after Subarticle 18, as follows:

**"19. Contractual Liability Insurance:** The Contractor shall provide Insurance to indemnify the State against all claims as described in Article 1.07.10."

Add Subarticle 20 after Subarticle 19, as follows:

**"20. Structural Injury and Builders Risk:** For vertical (building) construction work only, the Contractor shall furnish evidence of insurance to the Department with respect to the operations the Contractor performs, and also those performed by its subcontractors, it carries on its own behalf Structural Injury Insurance providing for a total limit of \$1,500,000 for all damages arising out of bodily injuries to or death of all persons in any one accident or occurrence, and, subject to that limit per accident, a total (or aggregate) limit of \$3,000,000 for all damages

arising out of injury to or destruction of property in any one accident or occurrence. In addition to structural injury coverage for property damages caused by covered perils, the Contractor must carry builder's risk (fire extended coverage) insurance, at a level not less than Fifty Percent (50%) of the Total Bid Amount for this project. Coverage shall be All Risk and on a Completed Value basis, including labor and materials in place, on site, in storage off-site, or in transit. Those entities appearing in Subarticle 14 and the Construction Contractors shall be named as insured with respects to their interests in the property."

Add Subarticle 21 after Subarticle 20, as follows:

**“21. Proof of Insurance:** Upon receipt of written request, the contractor shall furnish to the Railroad, a signed copy of the policy for Contractor’s Commercial General Liability Insurance, Protective Liability Insurance and the Railroad Protective Liability Insurance. If any work is subcontracted, the Contractor shall furnish a signed copy of the policy for Contractor’s Public Liability Insurance for each subcontractor requested.”

Add Subarticle 22 after Subarticle 21, as follows:

**“22. Additional Insured:** Where required by the previous articles, the names of the “Additional Insured” shall be as indicated below:

Metro-North Commuter Railroad  
Metropolitan Transportation Authority of New York (MTA)  
Connecticut Department of Transportation (ConnDOT), Its Agents and Assigns  
CSX Corporation  
National Railroad Passenger Corporation (AMTRAK)  
Providence and Worcester Railroad Company  
Consolidated Railroad Corporation (CONRAIL)

Note: For projects with limits of construction that cross the Connecticut/New York State Line into New York, “American Premier Underwriters” shall also be shown as an additional insured.”



**Metro-North Railroad**

# **STOP!**

***STOP THE DELAY AND FAST TRACK THE INSURANCE REVIEW PROCESS BY FOLLOWING THESE INSTRUCTIONS CAREFULLY:***

- 1. FORWARD THIS SECTION TO YOUR INSURANCE BROKER FOR REVIEW AND HANDLING OF THE REQUIRED INSURANCE.**
- 2. THE COMPLETED INSURANCE SUBMISSION SHOULD INCLUDE:**

A. A METRO-NORTH RAILROAD CERTIFICATE OF INSURANCE, SIGNED AND NOTARIZED WITH ENTRY PERMIT NUMBER AND WORK LOCATION DISPLAYED. (SEE ATTACHED FORM)

B. ADDITIONAL INSURED ENDORSEMENT (CG 20 26 07 04) OR EQUIVALENT MUST BE ATTACHED. INDEMNIFIED PARTIES WILL VARY BASED UPON LOCATION. (REFER TO ATTACHED TABLE OF ADDITIONAL/NAMED INSUREDS).

C. RAILROAD PROTECTIVE LIABILITY (RRPL) MUST BE PRESENTED ON A BINDER NOT A CERTIFICATE AND MUST INCLUDE THE FOLLOWING INFORMATION:

- 1) NAMED INSUREDS: INDEMNIFIED PARTIES WILL VARY BASED UPON LOCATION. (REFER TO ATTACHED TABLE OF ADDITIONAL/NAMED INSUREDS).
- 2) PROJECT DESCRIPTION AND LOCATION
- 3) CONTRACTOR NAME AND ADDRESS

- 3. RETURN INSURANCE WITH EXECUTED AGREEMENT TO:**

**James Horn c/o Metro North Railroad  
420 Lexington Avenue, 12<sup>th</sup> Floor  
New York NY 10017**



**BASIC INSURANCE GUIDELINES FOR  
METRO NORTH RAILROAD (MNRR)  
ENTRY PERMITS**

Policies must be written by Carriers rated A-/VII or better to be acceptable to MNRR  
Read your agreement for specific insurance requirements.

In order to expedite the approval process, we recommend that you forward the insurance section from your agreement to your insurance representative for review and compliance of the coverages required. MTA Risk & Insurance Management must approve insurance prior to commencement of work.

**1. Metro North Agency Form must be used to provide evidence of insurance. The Certificate Must Include:**

- Agreement or Entry Permit Number;
- Any deductible, self-insured retention, sub-limit or aggregate limit;
- Insured's telephone number, contact person and e-mail address;
- Notarized signature of an Authorized Representative of the Insurance Carrier or Producer.
- The appropriate checked (✓) boxes for the Additional Insureds as applicable.

**2. Minimum Coverage: Refer to Your Agreement for Specific Insurance Requirements:**

**A. Workers' Compensation:**

- NY State Insurance Fund form is acceptable;
- If a company is domiciled in a state other than New York, coverage must be extended to include New York State;
- If your company is exempt from Workers' Compensation, supporting documentation from NYS or your company's accountant and or attorney is acceptable.

**B. General Liability:**

- Contractor's policies (and its subcontractor's policies, if applicable) shall apply on a primary and not on an excess or contributing basis with any policies which may be available to the MNRR and must be exhausted before implicating any MNRR policy available. Any Umbrella/Excess Policy used to meet minimum contract requirements must follow form of the underlying policy and be extended to "drop down" to become primary in the event the primary policy is exhausted.

**Provide a physical copy of the Additional Insured Endorsement (I.S.O. Form CG 20 26 07 04 version or equivalent. Endorsement (s) must include policy number(s))**

- - Additional Insureds for your work location are listed in the table below.

**C. Business Automobile Liability**

- Required if your vehicle enters Metro North property. The policy shall be extended to include employees of any insured acting in the scope of their employment.

**D. Railroad Protective Liability (RRPL) An Original Policy is required.** A detailed Insurance Binder (ACORD or Manuscript) will be accepted pending issuance of the Original Policy, which must be provided within 30 days of the Binder Approval. Named Insureds for your work location are listed in the table below

**Do Not Submit Evidence of RRPL on a Certificate of Insurance.**

**Binder must be provided for the RRPL to be replaced by a complete policy within  
30 days:**

**The Binder Must Include:**

- Agreement or Entry Permit Number;
- Contractor Name and Address with contact information;
- List of Named Insureds (refer to table of Named Insureds);
- Description and Location of Project;
- Signature of an Authorized Representative of the Insurance Carrier or Producer.

**ALL COMPLETED INSURANCE DOCUMENTS DESCRIBED ABOVE MUST BE  
FORWARDED TO:**

**James Horn c/o MNR  
420 Lexington Avenue, 12<sup>th</sup> Floor  
New York, NY 10017  
212 499 4504**

Except that as otherwise provided in this Article and/or the Specifications, the Permittee and/or their Contractor shall procure, at its sole cost and expense, and shall maintain in force at all times during the term of this Agreement, through the FINAL COMPLETION of contract, policies of insurance as herein below set forth, written by companies with an A.M. Best Company rating of A-/"VII" or better, and approved by the Metro-North Railroad/MTA and shall deliver evidence of such policies. These policies must: (i) be written in accordance with the requirements of the paragraphs below, as applicable; (ii) be endorsed in form acceptable to include a provision that the policy will not be canceled, materially changed, or not renewed, unless at least thirty (30) days prior written notice to the Metro-North Railroad/MTA c/o MTA Risk and Insurance Management Department - Standards, Enforcement & Claims Unit, 2 Broadway - 21<sup>st</sup> floor, New York, NY 10004 and (iii) state or be endorsed to provide that the coverage afforded under the Permittee and/or their Contractor's policies shall apply on a primary and not on an excess or contributing basis with any policies which may be available to the Metro-North Railroad/MTA, and also that the Permittee and/or their Contractor's policies, primary and excess, must be exhausted before implicating any Metro-North Railroad/MTA policy available, (iv) In addition, the Permittee's and/or their Contractor's policies shall state or be endorsed to provide that, if a subcontractor's policy contains any provision that may adversely affect whether the Permittee's and/or their Contractor's policies are primary and must be exhausted before implicating any Metro-North Railroad/MTA policy available, the Permittee's and/or their Contractor's and subcontractor's policies shall nevertheless be primary and must be exhausted before implicating any Metro-North Railroad/MTA policy available. At least two (2) weeks prior to the expiration of the policies, the Permittee and/or their Contractor shall endeavor to provide evidence of renewal or replacement policies of insurance, with terms and limits no less favorable than the expiring policies. Except as otherwise indicated in the detailed coverage paragraphs below, self insured retentions and policy deductibles shall not exceed \$100,000, unless such increased deductible or retention is approved by Metro-North Railroad/MTA. The Permittee and/or their Contractor shall be responsible for all claim expense and loss payments within the deductible or self insured retention on the same basis as would be the case if commercial insurance was available for the loss. The insurance monetary limits required herein may be met through the combined use of the insured's primary and umbrella/excess policies.

**A. Workers' Compensation Insurance** (including Employer's Liability Insurance with limits of not less than \$2,000,000, which limit may be met by a combination of primary and excess insurance) meeting the statutory limits of the laws of the state in which the work is to be performed.

**B. Commercial General Liability Insurance** (I.S.O. 2001 Form or equivalent approved by Metro-North Railroad) in the Permittee's and/or their Contractor's name with limits of liability in the amount of at least \$3,000,000 each occurrence/\$3,000,000 General Aggregate Limit (other than products-completed operations)/\$3,000,000 Products/Completed Operations Aggregate Limit on a combined single limit basis for injuries to persons (including death) and damage to property. The limits may be provided in the form of a primary policy or combination of primary and umbrella/excess policy. When the minimum contract amounts can only be met when applying the umbrella/excess policy, the umbrella/excess policy must follow form of the underlying policy and be extended to "drop down" to become primary in the event primary limits are reduced or aggregate limits are exhausted. Such insurance shall be primary and

noncontributory to any other valid and collectible insurance and must be exhausted before implicating any Metro-North Railroad/MTA policy available.

Such policy should be written on an occurrence form, and shall include:

- Contractual coverage for liability assumed by the Permittee and/or their Contractor under this agreement;
- Personal and Advertising Injury Coverage;
- Products-Completed Operations;
- Independent Contractors Coverage;
- "XCU" coverage (Explosion, Collapse, and Underground Hazards) where necessary;
- Contractual Liability Exclusion, applicable to construction or demolition operations to be performed within 50 feet of railroad tracks, must be voided, where necessary;
- Coverage for claims for bodily injury asserted by an employee of an additional insured and any Employer Liability Exclusion which may otherwise operate to exclude such coverage shall be voided in this respect; and
- Additional Insured Endorsement (I.S.O. Form CG 20 26 07 04 version or equivalent approved by the Metro-North Railroad) listing:
  - See Attached Additional Insured/Named Insured Table for the required

Additional Insureds at Entry Permit/Work location.

**C. Business Automobile Liability Insurance** - (I.S.O. Form CA 00 01 10 01 or equivalent approved by the Railroad). If vehicle enters Agency's property or is used as part of service provided, in the Permittee's and/or their Contractor's name with limits of liability in the amount of \$2,000,000 each accident for claims for bodily injuries (including death) to persons and for damage to property arising out of the ownership, maintenance or use of any owned, hired or non-owned motor vehicle. The policy shall be extended to include employees of any insured acting in the scope of their employment.

- If the project involves transporting and/or disposing of any hazardous material or waste off of the jobsite, the Permittee and/or their Contractor or any subcontractor performing such work must add the MCS-90 to the automobile policy. The CA9948 endorsement is also required if transporting to a site outside of NYS. **(Additional pollution liability insurances maybe required, which are identified in below paragraphs.**
- The policy limits of liability must be increased to at least \$5,000,000 each occurrence pursuant to federal, state or local laws, rules and regulations, and
- Copies of the MCS-90 and CA9948 endorsements, if applicable, shall be provided for review as part of the insurance submission.

**D. Railroad Protective Liability Insurance** (ISO-RIMA or equivalent form approved by the Metro-North Railroad), covering the work to be performed at the designated job site and affording protection for damages arising out of bodily injury or death, physical damage to or destruction of property, including damage to the Insured's own property and conforming to the following:

- The following are the "Named Insureds" for this coverage:

See Attached Additional Insured/Named Insured Chart for the required Named Insureds at Entry Permit/Work location.

- The limit of liability shall be at least \$2,000,000 each occurrence, subject to a \$6,000,000 annual aggregate;
- Policy must be endorsed to provide coverage for claims arising from injury to employees covered by Federal Employer's Liability Act (FELA).
- Policy Endorsement CG 28 31 - Pollution Exclusion Amendment is required to be endorsed onto the policy when environmental-related work and/or exposures exist.
- Indicate the Name of the Permittee and/or their Contractor to perform the work, the name of the Metro-North Railroad for whom the work is being performed and the Contract description and number.
- Evidence of Railroad Protective Liability Insurance, must be provided in the form of the Original Policy. A detailed Insurance Binder (ACORD or Manuscript Form) will be accepted pending issuance of the Original Policy, which must be provided within 30 days of the Binder Approval.

**Environmental Coverages will be required ONLY when environmental exposures are part of the work.**

**E. Contractor's Pollution Liability** - In the case of a contract involving environmentally regulated substances or hazardous material exposure(s), the Permittee and/or their Contractor shall provide Contractor's Pollution Liability Insurance with respect to the work and activities of the Permittee and/or their Contractor or its Subcontractors, including but not limited to handling, transporting or disposing of any hazardous substances and/or environmentally regulated materials and any sudden and/or non-sudden pollution or impairment of the environment, including clean-up costs and defense. This insurance shall have limits of liability specifically written for this contract in the amount of at least \$5,000,000. The Permittee and/or their Contractor shall comply with all federal, state, and/or local laws, rules and regulations and shall obtain any additional coverages required by federal, state, or local government agencies. The Contractor's Pollution Liability Insurance shall be in effect from the time the MetroNorth Railroad permits the work relating to the Hazardous Substances or other environmentally regulated substances and materials to begin through the completion of the work.

i. This insurance shall name the following entities as additional insured's: Metro-North Railroad and the Metropolitan Transportation Authority (MTA) including its subsidiaries and affiliates.

- ii. This insurance may be supplied by the Subcontractor performing the Work, if the Permittee and/or their Contractor is not performing any of the relevant Work and providing all applicable additional insureds are named.
- iii. The Permittee and/or their Contractor or its Sub-contractor performing the Work shall obtain all permits, licenses and other forms or documentation which are required and forward them to the Project Engineer. The insurance shall be submitted to MTA Risk and Insurance Management Department pursuant to requirements referenced in the Insurance Article.
- iv. In the event that the Permittee and/or their Contractor or its Subcontractors transports from the Site hazardous substances or any other environmentally regulated substance that requires a governmentally regulated manifest, the **MCS-90 Endorsements** shall be attached to the auto liability policy (the CA9948 is also required, if hauling outside of NYS). Both shall be furnished on a primary basis with limits of liability of at least \$5,000,000 per occurrence providing coverage for bodily injury or property damage including liability for environmental restoration resulting from negligence in the operation, maintenance or use of any motor vehicle involved in the transportation of hazardous substances or any other environmentally regulated substance as required pursuant to any federal, state or local laws, rules and regulations. **A copy of each endorsement, if applicable, shall be submitted for review as part of the insurance submission showing the \$5M limits.**
- v. Any additional insurance policies necessary to obtain required permits or otherwise comply with applicable law, ordinances or regulations regarding the performance of the work should be provided to the Metro-North Railroad.

F. **Pollution Legal Liability (Non-Owned Disposal Site Coverage)** - If the project activities include the disposal of waste or other hazardous substance from the work site, the Permittee and/or their Contractor shall maintain or cause to be maintained the following insurance:

- i. The Permittee and/or their Contractor shall provide a certificate of insurance to Metro North Railroad listing the disposal facility as an insured location or
  - Alternatively, the Permittee and/or their Contractor may designate the disposal site, and provide a certificate of insurance from the disposal facility to the Metro-North Railroad.
- ii. The Metro-North Railroad and Metropolitan Transportation Authority are to be named as additional insureds on these policies with limits of liability of at least \$5,000,000 per occurrence
- iii. If coverage is not provided under a stand alone policy, but is included in the general liability policy, a Non-Owned Disposal Site endorsement must be referenced on the insurance certificate and a copy thereof submitted with the insurance.

The Permittee and/or their Contractor shall furnish evidence of all policies before any work is started to the Metro-North Railroad:

**C/o MTA Risk & Insurance Management  
Standards Enforcement & Claims Unit.**

**2 Broadway - 21<sup>st</sup> Floor**  
**New York, NY 10004**

Certificates of Insurance may be supplied as evidence of such aforementioned policies required by this Article, except the Railroad Protective Liability Policy, designated as Policy D). **The Railroad Protective Liability Insurance Policy** must be provided in the form of the **Original Policy**. A detailed Insurance Binder may be provided, **ACORD** or **Manuscript Form, pending issuance of the Original Policy. The Original Policy must be submitted to MTA RIM within 30 days of the Binder Approval.** However, the Metro-North Railroad reserves the right to request copies of such policies herein described above. If requested by the Metro-North Railroad, the Permittee and/or their Contractor shall deliver to the Metro-North Railroad, within forty-five (45) days of the request, a copy of such policies, certified by the insurance carrier as being true and complete.

If a Certificate of Insurance is submitted, it must: (1) be provided on the Metro-North Railroad Certificate of Insurance Form or MTA Certificate of Insurance Form for Joint Agency Agreements; (2) be signed by an authorized representative of the insurance carrier or producer and notarized; (3) disclose any deductible, sublimit, self-insured retention, aggregate limit or any exclusions to the policy that materially change the coverage; (4) indicate the Additional Insureds and Named Insureds as required herein. The Permittee and/or their Contractor must provide a physical copy of the Additional Insured Endorsement (I.S.O. Form CG 20 26 07 04 version or equivalent, as applicable and the endorsement(s) must include policy number(s); (5) reference the Contract by number on the face of the certificate; and (6) expressly reference the inclusion of all required endorsements.

Nothing herein contained shall be deemed to limit the Permittee and/or their Contractor liability to the limits of liability, or coverage of the Policies above their renewals, or replacement.

If, at any time during the period of this Agreement, insurance as required is not in effect, or proof thereof is not provided to the Metro-North Railroad, the Metro-North Railroad shall have the options to: (i) direct the Permittee and/or their Contractor to suspend work or operation with no additional cost or extension of time due on account thereof; or (ii) treat such failure as an Event of Default.

## ADDITIONAL INSURED/NAMED INSURED TABLE

LOCATION/STATION	CONNECTICUT – NEW HAVEN LINE AND BRANCHES
<u><b>NEW HAVEN LINE</b></u> New Haven-State Street New Haven Milford Stratford Bridgeport Fairfield Southport Green's Farms Westport East Norwalk South Norwalk Rowayton Darien Norton Heights Stamford Old Greenwich Riverside Cos Cob Greenwich	Metro-North Railroad (MNRR), Metropolitan Transportation Authority (MTA)*, State of Connecticut and CT Department of Transportation (CDOT), National Railroad Passenger Corporation (AMTRAK), CSX Transportation, Inc. & New York Central Lines, LLC, Providence & Worcester Railroad Company (P&W) Housatonic Railway.
<u><b>New Canaan Branch</b></u> New Canaan Talmadge Hill Springdale Glenbrook	Metro-North Railroad (MNRR), Metropolitan Transportation Authority (MTA)*, State of Connecticut and CT Department of Transportation (CDOT) Providence & Worcester Railroad Company (P&W)
<u><b>Danbury Branch</b></u> Danbury Bethel Redding Branchville Cannondale Wilton Merritt 7	Metro-North Railroad (MNRR), Metropolitan Transportation Authority (MTA)*, State of Connecticut and CT Department of Transportation (CDOT) Providence & Worcester Railroad Company (P&W)
<u><b>Waterbury Branch</b></u> Waterbury Naugatuck Beaufalls Seymour Ansonia Derby Shelton	Metro-North Railroad (MNRR), Metropolitan Transportation Authority (MTA)*, State of Connecticut and CT Department of Transportation (CDOT), Providence & Worcester Railroad Company (P&W)

\*Metropolitan Transportation Authority means the Metropolitan Transportation Authority including its subsidiaries and affiliates.

## Station List With Line

Ansonia	Waterbury
Beacon Falls	Waterbury
Branchville	Danbury
Bridgeport	New Haven
Cannondale	Danbury
Cos Cob	New Haven
Danbury Bethel	Danbury
Darien	New Haven
Derby Shelton	Waterbury
East Norwalk	New Haven
Fairfield	New Haven
Glenbrook	New Canaan
Green's Farms	New Haven
Greenwich	New Haven
Merritt 7	Danbury
Milford	New Haven
Naugatuck	Waterbury
New Canaan	New Canaan
New Haven	New Haven
New Haven-State Street	New Haven
Norton Heights	New Haven
Old Greenwich	New Haven
Redding	Danbury
Riverside	New Haven
Rowayton	New Haven
Seymour	Waterbury
South Norwalk	New Haven
Southport	New Haven
Springdale	New Canaan
Stamford	New Haven
Stratford	New Haven
Talmadge Hill	New Canaan
Waterbury	Waterbury
Westport	New Haven
Wilton	Danbury

- Capital Contract
- Operating Contract
- Entry Permit or Film



**Metro-North Railroad  
CERTIFICATE OF INSURANCE**

AGREEMENT or CONTRACT #:		AGREEMENT or CONTRACT NAME/DESCRIPTION:	
INSURANCE PRODUCER:		CERTIFICATE ISSUANCE DATE:	DATE RECEIVED BY MTA RIM:
ADDRESS:		MTA REFERENCE #:	
PHONE #:			
INSURED:		CO LTR	COMPANIES AFFORDING COVERAGE
ADDRESS:		A	
PHONE #:		B	
		C	
		D	
CERTIFICATE HOLDER: Metro-North Railroad/MTA Attention: Risk & Insurance Management		E	
ADDRESS: 2 Broadway 21 <sup>st</sup> Floor New York, NY 10004		F	
PHONE#: (646) 252-1430		G	

**COVERAGES (See Notes 1 and 2)**

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	EFFECTIVE DATE	EXPIRATION DATE	LIMITS	
	<b>GENERAL LIABILITY</b> <input type="checkbox"/> Comprehensive Form <input type="checkbox"/> Underground Expl. & Collapse Hazard <input type="checkbox"/> Products/Completed Operations <input type="checkbox"/> Contractual Liability <input type="checkbox"/> Independent Contractors <input type="checkbox"/> Fifty Foot Exclusion Voided <input type="checkbox"/> Personal & Advertising Injury <input type="checkbox"/> SIR/Deductible \$ _____				BI & PD COMBINED OCCURRENCE	\$
					GENERAL AGGREGATE	\$
					PRODUCTS/COMPLETED OPERATIONS AGGREGATE	\$
					OTHER	\$
	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> Any Auto <input type="checkbox"/> Owned Autos <input type="checkbox"/> Hired Autos <input type="checkbox"/> Non-Owned Autos				BODILY INJURY (Per Occurrence)	\$
					PROPERTY DAMAGE (Per Occurrence)	\$
					BODILY INJURY/PROPERTY DAMAGE COMBINED SINGLE LIMIT (Each Accident)	\$
	<b>GARAGE LIABILITY</b> <input type="checkbox"/> Any Auto				AUTO ONLY EACH ACCIDENT	\$
					OTHER THAN AUTO ONLY	EA ACC \$
						AGG \$
	<b>EXCESS LIABILITY</b> <input type="checkbox"/> Umbrella Form <input type="checkbox"/> Other Than Umbrella Form <input type="checkbox"/> SIR/Deductible \$ _____				EACH OCCURRENCE	\$
					AGGREGATE	\$
	<b>WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY</b> <input type="checkbox"/> USLH <input type="checkbox"/> Jones Act <input type="checkbox"/> "All States" Coverage				<input type="checkbox"/> STATUTORY LIMITS	
					EMPLOYER'S LIABILITY	\$
	<b>BUILDER'S RISK</b>				CONTRACT VALUE OF \$	
	<b>PROFESSIONAL LIABILITY</b> <input type="checkbox"/> Includes Pollution Liability <input type="checkbox"/> Deductible \$ _____					\$
	OTHER: _____					\$
	OTHER: _____					\$
	OTHER: _____					\$

**RAILROAD PROTECTIVE LIABILITY INSURANCE IS NOT ACCEPTED ON CERTIFICATE OF INSURANCE FORMS:  
PROVIDE DETAILED BINDER AND/OR POLICY**

LIABILITY COVERAGES:

ADDITIONAL INSURED (See Note 3) Check all that apply [X]
Coverage: Commercial Liability, Garage Liability, Excess/Umbrella Liability
Contractor's Pollution Liability, Pollution Legal Liability, etc.

For all MNR

- Metropolitan Transportation Authority, including its subsidiaries and affiliates.
Connecticut Department of Transportation (CDOT)
The State of Connecticut
Midtown Trackage Ventures LLC
Midtown TDR Ventures LLC
National Railroad Passenger Corp. (Amtrak)
NJ Transit Rail Operations Inc.
New Jersey Transit Corporation
CSX Transportation Inc. & New York Central Lines LLC
Delaware & Hudson Railway Company, Inc
Norfolk Southern Railway Company & Pennsylvania Lines LLC
Housatonic Railroad Company
Providence & Worcester Railroad Company
Danbury Terminal Railroad Co.
Maybrook Railroad Company
Other: \_\_\_\_\_

PROPERTY COVERAGES:

(See Note 3) Check all that apply [X]

- NAMED INSURED
Coverage: Property, etc.
ADDITIONAL NAMED INSURED/LOSS PAYEES
Builder's Risk, etc.
LOSS PAYEES
Coverage: Crime Insurance, Valuable Papers
Metro-North Commuter Railroad Company
Metropolitan Transportation Authority, including its subsidiaries and affiliates.
Connecticut Department of Transportation (CDOT)
The State of Connecticut
Midtown Trackage Ventures LLC
Midtown TDR Ventures LLC
National Railroad Passenger Corp. (Amtrak)
NJ Transit Rail Operations Inc.
New Jersey Transit Corporation
CSX Transportation Inc. & New York Central Lines LLC
Delaware & Hudson Railway Company, Inc
Norfolk Southern Railway Company & Pennsylvania Lines LLC
Housatonic Railroad Company
Providence & Worcester Railroad Company
Danbury Terminal Railroad Co.
Maybrook Railroad Company
Other: \_\_\_\_\_

NOTE 1: The subscribing insurance company(s), authorized to do business in the State of New York, certifies that insurance of the kinds and types and for limits of liability herein stated, covering the Agreement/Contract herein designated, has been procured by and furnished on behalf of the Insured and is in full force and effect for the period listed on the front of this Certificate of Insurance. In addition, the subscribing insurance company(s) certifies that the insurance limits for General Liability Insurance are not amended by deductible clauses of any nature except as has been disclosed to and approved by the Metro-North; and that coverage is afforded for the Insured's obligations under that provision of the contract/agreement providing for indemnification of the Indemnified Parties, including the Metro-North, named therein. When applicable, any exclusion applying to construction or demolition operations on or within fifty (50) feet of a railroad (stations, yards, tracks, etc.) has been voided; and any employer liability exclusion which may otherwise operate to exclude claims for bodily injury asserted by an employee of an additional insured shall be voided.
NOTE 2: The subscribing company(s) agrees that no policy referred to herein shall be changed or canceled until thirty (30) days written notice has been sent to the following address: Metro-North Railroad/MTA c/o MTA Risk and Insurance Management Department, 2 Broadway, 21st Floor New York, NY 10004.
NOTE 3: All references to Named Insureds and Additional Insureds include those entities' directors, officers, employees, partners, agents, subsidiaries and affiliates.
NOTE 4: This certificate is issued to the Certificate Holder in consideration of the Agreement/Contract entered into with the named insured. It is understood and agreed that the certificate holder relies on the certificate as basis for continuing such Agreement/Contract with the name insured.

AUTHORIZED INSURER/PRODUCER \_\_\_\_\_

BY \_\_\_\_\_
(signature of authorized Insurer/Producer)

TITLE \_\_\_\_\_

STATE OF )
COUNTY OF ) s.s.

On this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, before me personally came \_\_\_\_\_, to me known, who being duly sworn, did depose and say that he/she resides in \_\_\_\_\_, that he/she is the \_\_\_\_\_ of the corporation and described in and which executed the foregoing Certificate of Insurance, that he/she is fully authorized to execute the foregoing Certificate of Insurance.

(Notary Public)

CERTIFICATES OF INSURANCE MUST BE COMPLETED BY AUTHORIZED INSURANCE REPRESENTATIVES ONLY.

- Capital Contract
- Operating Contract
- Entry Permit or Film



**Metro-North Railroad  
CERTIFICATE OF INSURANCE**

AGREEMENT or CONTRACT #:		AGREEMENT or CONTRACT NAME/DESCRIPTION:	
INSURANCE PRODUCER:		CERTIFICATE ISSUANCE DATE:	DATE RECEIVED BY MTA RIM:
ADDRESS:			MTA REFERENCE #:
PHONE #:			
INSURED: ADDRESS: PHONE #:	CO LTR	COMPANIES AFFORDING COVERAGE	
	A		
	B		
	C		
	D		
	E		
	F		
CERTIFICATE HOLDER: Metro-North Railroad/MTA Attention: Risk & Insurance Management		G	
ADDRESS: 2 Broadway 21 <sup>st</sup> Floor New York, NY 10004			
PHONE#: (646) 252-1430			

**COVERAGES (See Notes 1 and 2)**

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	EFFECTIVE DATE	EXPIRATION DATE	LIMITS	
	<b>GENERAL LIABILITY</b> <input type="checkbox"/> Comprehensive Form <input type="checkbox"/> Underground Expl. & Collapse Hazard <input type="checkbox"/> Products/Completed Operations <input type="checkbox"/> Contractual Liability <input type="checkbox"/> Independent Contractors <input type="checkbox"/> Fifty Foot Exclusion Voided <input type="checkbox"/> Personal & Advertising Injury <input type="checkbox"/> SIR/Deductible \$ _____				BI & PD COMBINED OCCURRENCE	\$
					GENERAL AGGREGATE	\$
					PRODUCTS/COMPLETED OPERATIONS AGGREGATE	\$
					OTHER	\$
	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> Any Auto <input type="checkbox"/> Owned Autos <input type="checkbox"/> Hired Autos <input type="checkbox"/> Non-Owned Autos				BODILY INJURY (Per Occurrence)	\$
					PROPERTY DAMAGE (Per Occurrence)	\$
					BODILY INJURY/PROPERTY DAMAGE COMBINED SINGLE LIMIT (Each Accident)	\$
	<b>GARAGE LIABILITY</b> <input type="checkbox"/> Any Auto				AUTO ONLY EACH ACCIDENT	\$
					OTHER THAN AUTO ONLY	EA ACC \$
						AGG \$
	<b>EXCESS LIABILITY</b> <input type="checkbox"/> Umbrella Form <input type="checkbox"/> Other Than Umbrella Form <input type="checkbox"/> SIR/Deductible \$ _____				EACH OCCURRENCE	\$
					AGGREGATE	\$
	<b>WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY</b> <input type="checkbox"/> USLH <input type="checkbox"/> Jones Act <input type="checkbox"/> "All States" Coverage				<input type="checkbox"/> STATUTORY LIMITS	
					EMPLOYER'S LIABILITY	\$
	<b>BUILDER'S RISK</b>				CONTRACT VALUE OF \$	
	<b>PROFESSIONAL LIABILITY</b> <input type="checkbox"/> Includes Pollution Liability <input type="checkbox"/> Deductible \$ _____					\$
	OTHER: _____					\$
	OTHER: _____					\$
	OTHER: _____					\$

RAILROAD PROTECTIVE LIABILITY INSURANCE IS NOT ACCEPTED ON CERTIFICATE OF INSURANCE FORMS:  
PROVIDE DETAILED BINDER AND/OR POLICY

LIABILITY COVERAGES:

ADDITIONAL INSUREDS (See Note 3) Check all that apply [X]
Coverage: Commercial Liability, Garage Liability, Excess/Umbrella Liability
Contractor's Pollution Liability, Pollution Legal Liability, etc.

For all MNR

- Metropolitan Transportation Authority, including its subsidiaries and affiliates.
Connecticut Department of Transportation (CDOT)
The State of Connecticut
Midtown Trackage Ventures LLC
Midtown TDR Ventures LLC
National Railroad Passenger Corp. (Amtrak)
NJ Transit Rail Operations Inc.
New Jersey Transit Corporation
CSX Transportation Inc. & New York Central Lines LLC
Delaware & Hudson Railway Company, Inc
Norfolk Southern Railway Company & Pennsylvania Lines LLC
Housatonic Railroad Company
Providence & Worcester Railroad Company
Danbury Terminal Railroad Co.
Maybrook Railroad Company
Other: \_\_\_\_\_

PROPERTY COVERAGES:

(See Note 3) Check all that apply [X]

- NAMED INSUREDS
Coverage: Property, etc.
ADDITIONAL NAMED INSUREDS/LOSS PAYEES
Builder's Risk, etc.
LOSS PAYEES
Coverage: Crime Insurance, Valuable Papers
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Metropolitan Transportation Authority, including its subsidiaries and affiliates.
Connecticut Department of Transportation (CDOT)
The State of Connecticut
Midtown Trackage Ventures LLC
Midtown TDR Ventures LLC
National Railroad Passenger Corp. (Amtrak)
NJ Transit Rail Operations Inc.
New Jersey Transit Corporation
CSX Transportation Inc. & New York Central Lines LLC
Delaware & Hudson Railway Company, Inc
Norfolk Southern Railway Company & Pennsylvania Lines LLC
Housatonic Railroad Company
Providence & Worcester Railroad Company
Danbury Terminal Railroad Co.
Maybrook Railroad Company
Other: \_\_\_\_\_

- NOTE 1: The subscribing insurance company(s), authorized to do business in the State of New York, certifies that insurance of the kinds and types and for limits of liability herein stated, covering the Agreement/Contract herein designated, has been procured by and furnished on behalf of the Insured and is in full force and effect for the period listed on the front of this Certificate of Insurance.
NOTE 2: The subscribing company(s) agrees that no policy referred to herein shall be changed or canceled until thirty (30) days written notice has been sent to the following address: Metro-North Railroad/MTA c/o MTA Risk and Insurance Management Department, 2 Broadway, 21st Floor New York, NY 10004.
NOTE 3: All references to Named Insureds and Additional Insureds include those entities' directors, officers, employees, partners, agents, subsidiaries and affiliates.
NOTE 4: This certificate is issued to the Certificate Holder in consideration of the Agreement/Contract entered into with the named insured. It is understood and agreed that the certificate holder relies on the certificate as basis for continuing such Agreement/Contract with the name insured.

AUTHORIZED INSURER/PRODUCER \_\_\_\_\_
BY \_\_\_\_\_
(signature of authorized Insurer/Producer)
TITLE \_\_\_\_\_

STATE OF )
COUNTY OF ) s.s.

On this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, before me personally came \_\_\_\_\_, to me known, who being duly sworn, did depose and say that he/she resides in \_\_\_\_\_ that he/she is the \_\_\_\_\_ of the corporation and described in and which executed the foregoing Certificate of Insurance, that he/she is fully authorized to execute the foregoing Certificate of Insurance.

(Notary Public)

CERTIFICATES OF INSURANCE MUST BE COMPLETED BY AUTHORIZED INSURANCE REPRESENTATIVES ONLY.

**GENERAL PROCEDURE FOR ACCESS TO RAILROAD PROPERTY**

CT

All outside parties who need to perform construction or maintenance on or adjacent to Metro-North Railroad property must comply with the following:

- 1) **Permit Application:** Parties requiring an entry permit shall submit a written request to the Chief Maintenance of Way Officer defining the location, scope of work and duration of activities on or adjacent to Railroad facilities. Address the letter to:

Assistant Vice President-Chief Engineer  
Metro-North Railroad  
420 Lexington Avenue, 12<sup>th</sup> Floor  
New York, NY 10017

- 2) **Insurance:** Furnish proof of insurance in a form acceptable to and approved by the Director of MTA Risk and Insurance Management no less than 20 working days prior to the intended start of work (see Section C of this specification) to:

MTA/Metro-North Railroad  
Attn: Risk & Insurance Management  
Standards, Enforcement and Claims Unit  
2 Broadway, 21<sup>st</sup> Floor  
New York, NY 10004  
Tel: (646) 252-1430

Applicant shall obtain confirmation of receipt and approval of the insurance certificate from the Director of MTA Risk and Insurance Management.

- 3) **Payment:** Upon review of the scope of work provided with the permit application, Metro-North will prepare an estimate of the cost of providing Railroad Protective Personnel and all other expenses related to the project. Supply payment, in full, of Metro-North's estimated cost of Railroad Force Account Services no less than 20 working days prior to the intended start of work. Obtain confirmation of receipt by the Chief Maintenance of Way Officer. Since the payment is based on an estimated cost, unexpended funds if any, will be subject to reimbursement. On the contrary, should the actual work exceed the estimated cost, an additional payment shall be submitted to continue Railroad Force Account Services.
- 4) **Technical Submittals:** Supply copies of construction shop drawings, calculations and supporting documentation to:

Mr. David B. Willard, P.E.  
Assistant Director, Structural Engineering  
Metro-North Railroad Capital Engineering  
Bridgeport, Connecticut Office  
525 Water Street, 3rd Floor  
Bridgeport, CT 06601  
Tel: (203) 337-3606 / Fax: (203) 337-3609

Ms. Julie Thomas  
Connecticut Department of transportation  
Property Management  
50 Union Ave., 4<sup>th</sup> Floor West  
New Haven, CT 06519  
Tel: 203-497-3383  
Fax: 203-789-6956

Upon receipt of the submittals, allow 15 working days from date of receipt for Metro-North's review of the submittals prior to requesting a conference to schedule that activity. Once the above requirements have been satisfied, contact the Assistant Director, Structural Engineer no less than 15 working days prior to the start of work to schedule a pre-construction conference at (203) 337-3606. When all is in order, the Bridgeport Office Department will schedule Railroad coordination and support services. (See Sections A and B of "Construction Management 1 & C Specifications")- No work will commence until the applicant receives permission from the designated Railroad Representative at the site to proceed with the work.

(Rev. J/2/10) [Jim-CT]

**CONSTRUCTION SPECIFICATION -1 & C SECTION A**  
**METRO-NORTH RAILROAD COMPANY**  
**CONTRACTOR REQUIREMENTS FOR WORK AFFECTING THE RAILROAD**

The contractor shall be governed by the State of Connecticut Department of Transportation Standard Specification for Roads, Bridges and Incidental Construction, Form 814 (or latest edition), with the following additions:

1. AH matters requiring Railroad Company approval or coordination of construction methods shall be directed to: **Metro-North Railroad Company, Connecticut Bridges Program Office, 525 Water Street, Bridgeport, Connecticut 06601.**
2. The contractor shall obtain design and construction approval of construction methods from the railroad. He shall submit detailed plans appurtenant data and calculations for any operation on or adjacent to the Railroad property prior to the start of work. Metro-North will evaluate the effect of this work on the operating Railroad. The plan shall locate and identify all utilities, above and below ground at the work site. He shall make necessary plan revisions, schedule changes, additions, deletions, etc. at his own expense. The contractor shall remove at his own expense any pipe, wire, or structural facility installed without Metro-North approval or which deviates from the Plan approved by Metro-North.

Under the direction of a Railroad representative (engineer, inspector) the contractor shall - at no cost to the Railroad - perform pre and post construction surveys of tracks and structures to establish existing horizontal and vertical clearances. The elevations shall reference an established survey benchmark which will remain undisturbed throughout the construction. It may be necessary for the contractor to monitor movements of tracks structures on a more frequent basis - monthly, weekly or daily as determined by the Railroad representative. Copies of the field notes must be delivered to the Railroad on a regular basis.

Under the direction of a Railroad representative (engineer, inspector) the contractor shall - at no cost to the Railroad - take pre and post construction photographs of the entire work site and track area, two sets of which will be delivered to the Railroad. The photographs shall be gloss prints 8 inches by 10 inches in size. They shall also be labeled on their reverse sides. The label shall include project title, Project Identification Number (PIN), Bridge Identification Number (BIN) or contract number, name of contractor, date and direction photograph was taken. Each photograph shall also be numbered for identification.

3. Sheeting shall be required on all excavations where the side of the excavation is intercepted by the Railroad live load influence line. The live load influence line is defined as a line originating at the bottom outside edge of tie and extending downward at a slope of 1 (vertical) on 1 Vi (horizontal). Such excavations must be designed to withstand, in addition to all static loads such as structural dead load, soil pressure and hydrostatic pressure, a Railroad live load of Cooper E-80 or other loading magnitude as may be directed by the Railroad.

Moreover, sheeting alongside active track systems shall maintain lateral support. Lateral support shall consist of a compacted stone ballast shoulder level with the top of tie for at least one (1) foot from the end of tie supported by a slope no steeper than one (1) vertical to two (2) horizontal. Timber sheeting left in place shall be treated with wood preservative in accordance with the American Wood Preservers Association Standards for timber in contact with soil.

CONSTRUCTION SPECIFICATION -i & C SECTION A

4. Protective scaffolding shall be necessary where, at the sole discretion of the Railroad, such scaffolding is necessary to protect the Railroad or the general public from possible falling debris, paint or other materials; to protect personnel working above the right-of-way or to provide a platform for personnel, materials and or equipment. A protective scaffold intended to contain finely broken concrete decking shall be designed for a live load of 200 pounds per square foot applied uniformly over the entire structure, and a 2 kip concentrated load placed anywhere on the structure. The two loads are not to be applied simultaneously for design purposes. Design of the scaffold intended for any other purpose shall be submitted to Metro-North for approval. The design shall contain details of any construction activities supported or protected by the scaffold. Loads or rigging which exceed the capacity of the scaffold shall be subject to the conditions of Section B "Rigging." All materials for protective scaffolding must be fire retardant. The contractor must supply the Railroad with certification from the manufacturer or supplier that lumber meets or exceeds the ASTM E-84 fire retardant specification for exterior application 30-minute duration. Plans and calculations for sheeting and scaffolding must be submitted to the Railroad for approval prior to construction. Further, plans and calculations must be stamped by a Professional Engineer licensed in the state in which the project is located.
  
5. The contractor shall safeguard the tracks, rolling stock and other equipment and plant of the Railroad from being damaged in any manner and will be held financially responsible for same. He shall not perform any operations which might foul the Railroad until he has complied with the Railroad requirements.
  
6. An operating track will be considered fouled when, in the sole opinion of the Railroad, demolition, blasting or construction activity on or adjacent to a main track or controlled siding may interfere with the safe movement of trains at normal speed. A crane, derrick or a similar piece of equipment located on Railroad right-of-way or on adjacent property shall be considered as fouling the track when the position in which it is working is such that without regard to the manner in which it is intended to carry out the operation, failure or malfunction could cause damage or obstruction within the operating area. Similarly, Railroad utilities (power, communications and signal lines) will be considered fouled when, in the sole opinion of the Railroad, the contractor's operation could interfere with these utility lines.
  
7. The contractor shall give sufficient advance notice so that the Railroad may arrange to supply special supervisory and protective forces.

Section 12 "Protective Personnel" defines the advance notice requirements for operations requiring protective services. The Railroad will provide protective forces to the extent possible considering operational and maintenance priorities. The Railroad makes no guarantee that protection personnel will be available to meet the contractor's preferred schedule. Further, no such work may actually commence until the assigned Railroad representative affirmatively advises the contractor that the necessary protective forces are stationed and that he may proceed.

CONSTRUCTION SPECIFICATION -1 & C SECTION A

8. The contractor will not store materials or equipment upon Railroad right-of-way without first obtaining written permission of the Railroad. The contractor shall secure construction materials and equipment which could be used by vandals to obstruct Railroad operation in a vandal-proof enclosure. The contractor shall protect the work site with fences, barricades, barriers, watchmen or other means necessary to bar access to operating areas via the work site.
9. The contractor must furnish an English-speaking supervisor at each job location who is capable of communicating (including translating if necessary) instructions from the flagman or other Metro-North representative to the contractor's personnel on the job. Such supervisor must remain on the site at all times while work is being performed or any contractor employees are on or about the Railroad right-of-way.
10. The contractor shall comply with any and all Federal, State and Local laws, regulations and rules governing environmentally controlled substances and construction practices. De-watering operations shall comply with applicable regulatory controls and shall be subject to Metro-North review and approval. The contractor shall comply with Federal and State regulations for containment, storage and disposal of hazardous/industrial wastes. He shall comply with Metro-North Procedure 50-601, Item "O," Environmental Controls. The contractor shall indemnify and hold harmless the Railroad from any loss, liability or expense on account of claims which result from the handling, transportation, disposal or abatement of asbestos, asbestos containing material or asbestos contaminated materials, lead paint materials and other environmentally regulated substances and material in the possession of contractor or his subcontractors where said claim, is not the result of negligence of an Indemnified Party.
11. The Metro-North Safety Department offers an orientation class for all contractor personnel who have reason to enter Railroad property. The contractor can obtain training material from the Safety Department.

The contractor shall comply with the requirements of all applicable Federal, State, Local and Railroad jurisdictions to provide a suitable work environment for workmen and for the general public. He shall prepare and submit a comprehensive "Safety Plan" which will:

1. Designate a company representative(s) who will prepare and implement a program of compliance.
2. Supply personal safety equipment for all workmen employed by the contractor or his subcontractors and enforce use of this equipment by contractor personnel.
3. Train all employees and subcontractor employees with emphasis upon unusual conditions found in the Railroad environment.

## CONSTRUCTION SPECIFICATION -1 & C SECTION A

### 12. Protective Personnel

Metro-North will furnish flagmen, inspectors, maintenance personnel and similar labor (protective personnel) as required by Metro-North to protect the operation of train traffic during the contractor's construction activities. The contractor must obey the instructions from Metro-North flagmen or other representatives on the job site promptly. Failure to follow instructions from Railroad personnel on the site will lead to withdrawal of Metro-North's Entry Permit, thus closing the job site to the contractor and its employees. The Railroad will at its sole discretion, determine the need for and the availability of protective, support personnel. The contractor must notify the assigned Railroad inspector no less than 14 calendar days in advance of undertaking an approval construction activity which may require protective personnel. If the contractor notifies Metro-North less than 14 days in advance, the Railroad may be unable to supply protective personnel and/or the Railroad may incur additional costs in accordance with existing collective bargaining agreements in order to fulfill a request. The cost of protective personnel and any additional penalty costs incurred by the railroad due to late notification shall be borne by the contractor or agency responsible to reimburse Railroad costs. Requests to cancel construction activities and protective personnel must be received and acknowledged by the assigned Railroad inspector no less than 96 hours prior to the start of the scheduled construction activity. Any costs incurred by Metro-North due to late cancellation notice shall be borne by the contractor or agency responsible to reimburse Railroad costs.

13. The Railroad will, at its sole discretion, remove tracks from service and de-activate high voltage traction power facilities to permit certain construction activities which can only be performed at times when the Railroad can schedule this track use. In general, the Railroad can de-activate single tracks at night between the hours of 2:30 AM and 5:00 AM. Construction activities which require de-activating all tracks of a main line system must be performed on weekend nights at times specified by the Railroad. Requests for additional "track use" will be evaluated subject to operating and maintenance priorities. Requests to de-activate track(s) and/or high voltage power systems must be received and acknowledged by the assigned Railroad inspector no less than 14 days prior to the scheduled activity. Metro-North will only consider requests for "track time" to facilitate construction activities that have been approved by the Construction Management Department.
14. Highway-rail mounted equipment and "work trains" are generally prohibited from use by non-Railroad agencies on Metro-North mainlines tracks.

CONSTRUCTION SPECIFICATION -1 & C SECTION A

15. The contractor shall adhere to Metro-North security practices. He shall identify all contractor/subcontractor personnel who have reason to enter a designated security area of Railroad property. He shall supply a listing of the names of all personnel who have reason to enter Railroad property. The list shall be updated whenever there is a change in personnel. He shall supply each workman with company insignia which shall be worn on outer garments whenever workmen are on Railroad property. Contractor personnel failing to wear identifying insignia shall be removed from the property.
16. An Entry Permit shall be necessary before non-Railroad personnel enter Railroad property. The project owner shall contact the office of the Chief Engineer of Maintenance to initiate the process at:

Metro-North Railroad  
Engineering Department  
420 Lexington Avenue  
12<sup>th</sup> Floor  
New York, New York 10017

17. A Force Account Agreement shall be necessary between Metro-North and the project owner to provide for reimbursement of Railroad protective costs incidental to the construction project. The project owner shall contact the:

Metro-North Railroad  
Connecticut Bridges Program Office  
525 Water Street  
Bridgeport, Connecticut 06601

The project owner shall deposit with Metro-North payment of the full amount of the estimated cost of Railroad services prior to entering the property.

CONSTRUCTION SPECIFICATION -1 & C SECTION B

Requirement for Erection, Demolition and Other Rigging  
Operations Over or Adjacent to Railroad Right-of-Way

The contractor must furnish the following information to obtain written approval prior to the start of any rigging operation over or adjacent to the Railroad right-of-way:

1. Plan view showing locations of cranes, boom length and rigging operating radii, with delivery or disposal vehicle weight and locations shown.
2. Crane rating sheets showing cranes to be adequate for 150% of the lift. Crane and boom nomenclature shall be indicated. Include manufactures' recommended data for special applications such as barge mounted equipment.
3. Plans and computations showing weight of pick. Include weight of rigging equipment.
4. Location plan showing obstructions, indicating that the proposed swing is possible, A profile of overhead utility lines or obstructions demonstrating that the rigging operation is possible. Computations and plans demonstrating that foundations for equipment and temporary structures are adequate and protect subsurface utilities and structures.
5. Plans and calculations showing locations and structural adequacy of mats, barges, planking or special decking as may be required by the Railroad.
6. Written statement from crane owner giving date of last crane condition and safety inspection and the results of said inspection.
7. Data sheet listing number, type, size, arrangement and capacity of slings, spreader bars or other connecting equipment. Copies of catalog or information sheets of specialized equipment.
8. A complete procedure, indicating the order of lifts and repositioning or rehitching of the cranes and partial pre-cutting of structural members.
9. Temporary support of any components or intermediate stages including bolting data shall be shown.
10. A time schedule of each stage or lift, as well as a schedule for the entire lifting procedure.
11. All plans and calculations submitted to the Railroad as required above shall be stamped by a Professional Engineer licensed in the state where the work is performed.

In general, unless otherwise directed by the Railroad, operations directly over or adjacent to the operating right-of-way which foul the operating area, or which in the event of a failure could fall across the operating area will be performed between approximately 2:30 AM and 5:00 AM. Operations involving a track and power outage across all tracks may be performed only on weekends -at times specified by the Railroad.

The contractor shall locate and mark the exact crane location in the field at least two working days prior to the intended operation. He shall verify the radii and clearances for critical picks, and he shall confirm the stability of the foundation for crane outriggers and supports. Any deviation from this plan must be approved, in writing, by the Metro-North Engineer prior to the date that the work will be scheduled.

## **ITEM NO. 0101176A - DISPOSAL OF PCB WASTE**

### **Description:**

Work under this item shall consist of the loading, transportation and final off-site disposal of polychlorinated biphenyl-contaminated material (PCB Waste), excluding dewatering fluids, that may be generated from various excavations within the PCB Areas of Environmental Concern (PCB AOECs). PCBs in concentrations at or above 1 part per million (ppm) have been documented within the PCB AOECs. In the event that PCBs are detected in concentrations at or above 1 ppm during the disposal characterization under Item 0202315A, "Disposal of Controlled Materials," the transportation and disposal of PCB Waste shall be conducted under this Item. The PCB Waste shall be loaded into lined dump trailers or lined roll-off trailers from the existing temporary waste stockpile area (WSA), transported to, and disposed of at a permitted disposal facility listed herein.

The Contractor must use one or more of the following Department-approved disposal facilities for the disposal of PCB Waste:

Waste Management Model City Facility 1550 Balmer Road Model City, NY 14107 Attn: Patricia Stauffer Phone: (800) 843-3604 Fax: (716) 754-0211	Environmental Quality Company Wayne Disposal Facility 49350 North I-94 Service Drive Belleville, MI 48111 Attn: Debbie Oleskienko Phone: (800) 592-5489 Fax: (800) 592-5329
Clean Harbors of Braintree, Inc. 1 Hill Avenue Braintree, MA 02184 Attn: John Mattson Phone: (781) 380-7100 Fax: (781) 380-7193	Cycle Chem.(AKA General Chemical Corp., CC/GC) 217 South First Street Elizabeth, NJ 07206 Attn: Gordon Mayfield Phone: (908) 354-0210 Fax: (908) 355-0562

### **Construction Methods:**

#### **A. Submittals**

The Contractor shall submit in writing, within seven (7) days after discovery of PCB concentrations at or above 1 ppm:

1. A letter listing the names of the disposal facilities (from the list above) which the Contractor will use to receive PCB Waste from this Project;

03/16/09

2. A copy of the attached "Disposal Facility Material Acceptance Certification" form from each facility, which shall be signed by an authorized representative of each disposal facility; and
3. A copy of the facility acceptance criteria and facility sampling frequency requirements from each facility.

No facility may be substituted for the one(s) designated in the Contractor's submittal without the Engineer's prior approval. If the material cannot be accepted by any of the Contractor's designated facilities, the Department will supply the Contractor with the name(s) of other acceptable facilities.

**Disposal Facility Materials Acceptance Certification**

Project Number: 0135-0326

Project Location: Reconstruction of Metro-North Railroad Bridge over Atlantic Street, Stamford, CT

Facility Name \_\_\_\_\_ Telephone \_\_\_\_\_

Facility Address \_\_\_\_\_ Fax \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

The Contractor has supplied the analytical data contained in the report concerning the site investigation performed by the Designer. I have personally reviewed this data and intend to accept the following:

PCB Waste as described in Item 0101176A, "Disposal of PCB Waste" for the subject Project at a cost of \$ \_\_\_\_\_ per Ton for disposal and an additional \$ \_\_\_\_\_ per Ton for transportation from the Project to the facility (if applicable).

This intent to accept the material will be subject to and dependent upon the facility's subsequent evaluation of waste characterization determination documentation to be provided to the Contractor by the Engineer.

Authorized Facility Representative \_\_\_\_\_ / \_\_\_\_\_  
Printed/Typed Name Title  
\_\_\_\_\_  
Signature Date

Note: The facility shall attach the acceptance criteria and facility sampling frequency requirements to this document.

**DO NOT ALTER FORM IN ANY WAY. FORM MUST BE COMPLETED IN ENTIRETY.**

## B. Material Disposal

The Contractor shall obtain and complete all paperwork necessary to arrange for material disposal (such as disposal facility waste profile sheets). It is solely the Contractor's responsibility to coordinate the disposal of PCB Waste with its selected disposal facility(s). Upon receipt of the final approval from the facility, the Contractor shall arrange for the loading, transport and disposal of the PCB Waste in accordance with all federal and state regulations. **No claim will be considered based on the failure of the Contractor's selected disposal facility(s) to meet the Contractor's production rate or for the Contractor's failure to select sufficient facilities to meet its production rate.**

Disposal characterization sampling of the Controlled Materials will be conducted under Item 0202315A, "Disposal of Controlled Materials." If PCBs are detected at concentrations at or above 1 ppm, the materials will be disposed of as PCB Waste. If additional characterization data for the PCB Waste is required by the disposal facility, the Engineer will sample materials at a frequency established by the selected disposal facilities. The Contractor shall designate to the Engineer which facility it intends to use prior to samples being taken. The Contractor is hereby notified that laboratory turnaround time is expected to be fifteen (15) working days. Turnaround time is the period of time beginning when the Contractor notifies the Engineer which facility it intends to use and that the bin is full and ready for sampling and ending with the Contractor's receipt of the laboratory analytical results. Any change of intended disposal facility may prompt the need to resample and will therefore restart the time required for laboratory turnaround. The laboratory will furnish such results to the Engineer. Upon receipt, the Engineer will make available to the Contractor the results of the final waste characterization determinations. **No delay claim will be considered based upon the Contractor's failure to accommodate the laboratory turnaround time as identified above.**

All manifests or bills of lading to accompany the transportation of the PCB Waste shall be prepared by the Contractor and signed by an authorized Department representative, as Generator, for each truck load of material that leaves the site. The Contractor shall forward the appropriate original copies of all manifests or bills of lading to the Engineer the same day the material leaves the Project.

A load-specific certificate of disposal, signed by the authorized agent representing the disposal facility, shall be obtained by the Contractor and promptly delivered to the Engineer for each load.

### C. Material Transportation

In addition to all pertinent federal, state and local laws or regulatory agency polices, the Contractor shall adhere to the following precautions during the transport of PCB Waste off-site:

1. Prior to leaving the site, PCB Waste is to be loaded into lined containers and covered sufficiently to preclude the loss of material during transport and is to remain covered until the arrival at the selected disposal facility.
2. All vehicles departing the site are to be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume, and contents of materials carried.
3. No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed to accept the type and quantity of waste.

### D. Equipment Decontamination

All equipment shall be provided to the work site free of gross contamination. The Engineer may prohibit from the site any equipment that in his opinion has not been thoroughly decontaminated prior to arrival. Any decontamination of the Contractor's equipment prior to arrival at the site shall be at the expense of the Contractor. The Contractor is prohibited from decontaminating equipment on the Project that has not been thoroughly decontaminated prior to arrival.

The Contractor shall furnish labor, materials, tools and equipment for decontamination of all equipment and supplies that are used to handle PCB Waste. Decontamination shall be conducted at an area designated by the Engineer and shall be required prior to equipment and supplies leaving the Project, between stages of the work, and between work in different AOECs.

Decontamination of equipment shall be done using double wash/rinse procedures. All surfaces that have contacted PCB Wastes shall be scrubbed with a detergent/water solution and then rinsed clean with potable water. The Contractor shall repeat the process with a detergent/water solution wash and clean water rinse. Decontamination shall be conducted in the decontamination pad in order to collect the detergent/water wash and rinse water. The decontamination water shall then be containerized, and sampled for disposal, in accordance with federal and state regulations. Once the double wash/rinse decontamination procedure is complete, equipment may leave the Project or be used in other areas of the site.

The Contractor shall be responsible for the collection and disposal of any liquid wastes that may be generated by its decontamination activities in accordance with applicable regulations.

**Method of Measurement:**

The work of “DISPOSAL OF PCB WASTE” will be measured for payment as the actual net weight in tons of material delivered to the disposal facility. Such determinations shall be made by measuring each hauling vehicle on the certified permanent scales at the disposal facility. Total weight will be the summation of weight bills issued by the facility specific to this Project.

Equipment decontamination, the collection of residuals, and the collection and disposal of liquids generated during equipment decontamination activities will not be measured separately for payment.

**Basis of Payment:**

This work will be paid for at the Contract unit price, which shall include the loading of PCB Waste into lined dump trailers and transportation from the existing temporary WSA to the disposal facility; the fees paid to the facility for disposal; the preparation of all related paperwork; and all equipment, materials, tools, and labor incidental to this work. **This unit price will be applicable to all of the Contractor-selected disposal facilities and will not change for the duration of the Project.**

This price shall also include equipment decontamination; the collection of solid residuals generated during decontamination and placement of such material into the lined dump trailer; and the collection and disposal of liquids generated during equipment decontamination activities.

Pay Item	Pay Unit
Disposal of PCB Waste	Ton

**ITEM #0506070A – GROUND ANCHORS**

**ITEM #0506071A – PERFORMANCE TEST FOR GROUND ANCHORS**

**ITEM #0506073A – PROOF TEST FOR GROUND ANCHORS**

**DESCRIPTION:**

The work shall consist of installing permanent ground anchors as specified herein and as shown on the plans. The Contractor shall furnish all labor, materials, supervision and equipment required to complete the work. The contractor shall select the foundation anchor type, drilling method, grouting method, grouting pressures, and subject to the minimum values in the contract documents, determine the bond length, and anchor diameter. The Contractor shall also be responsible for surveying, designing, installing, quality control, and testing ground anchors that will develop the load-carrying capacity indicated on the Contract Drawings in accordance with this Specification.

Subsurface conditions are provided on the boring logs contained in the plan sheets.

The Contractor shall also be responsible for containment, hauling and legal disposal of all-drilling fluids and excavated materials, in accordance with this Specification, Section 1.10 of the Form 816 and all applicable local codes and regulations.

The use of down-hole hammers will not be permitted unless the Engineer provides written authorization.

**QUALIFICATIONS AND SUBMITTALS:**

**1-Qualifications:** The Contractor performing the work described in this Specification shall have installed permanent ground anchors for a minimum of 3 years.

The Contractor shall assign an engineer, licensed in the State of Connecticut, to supervise the work. The Contractor's engineer will have at least 3 years of experience in the design and construction of permanent anchored structures. The Contractor may not use consultants or manufacturer's representatives in order to meet the requirements of this section.

Drill operators shall also have a minimum of 3 years experience installing permanent ground anchors with the Contractor's organization.

The Engineer shall suspend the work if the Contractor substitutes personnel without prior written approval. If work is suspended due to the unauthorized substitution of personnel, the Contractor shall be fully liable for additional costs resulting from the suspension of work and no adjustment in contract time resulting from the suspension of work will be allowed.

**2-Design Criteria:** Unless shown on the plans or otherwise directed in writing by the Engineer, the Contractor shall select the type of tendon to be used. The maximum tendon loading can not exceed the following percentages of the specified minimum tensile strength (SMTS):

Tendon Design Load.....	60 percent of the SMTS of the prestressing steel
Lock-off Load.....	70 percent of the SMTS of the prestressing steel
Test Load .....	80 percent of the SMTS of the prestressing steel

The Contractor shall be responsible for determining the bond length necessary to develop the design load indicated on the Contract Drawings or in accordance with this Specification. However, minimum bond length shall be 15 feet for strand and bar tendons in either soil or weathered bedrock or 10 feet for strand or bar tendons in bedrock.

The free stressing length (unbonded length) shall be not less than 15 feet for bar tendons or strand tendons regardless of soil or rock or as shown on the plans whichever is greater.

Strand and bar tendons shall not extend beyond the right-of-way limit shown on the contract drawings.

**3-Submittals:** The Contractor shall submit with the Working Drawings, their qualifications including resumes of the Contractors personnel (drill operator(s), and Contractors engineer). For each project, include (1) name of client contract, address, and telephone number; (2) location of project; (3) contract value; (4) relevant anchor work and (5) scheduled completion date and actual completion date for the work.

Working Drawings and supporting documentation for the design and construction of the ground anchors shall be submitted to the Engineer for review in accordance with Article 1.05.02-2. The Working Drawing submission shall include:

- A) Proposed start date and detailed construction sequence with the proposed drilling methods and equipment including drill hole diameter proposed to achieve the specified pullout resistance values. Information on space requirements and excavation methods (if required) to access each anchor location will also be provided.
- B) Ground anchor schedule giving: anchor number; design load; type and size of tendon; minimum total anchor length; minimum bond length; minimum tendon bond length; and minimum unbonded length.
- C) A scale drawing of the ground anchor tendon and the corrosion protection system including spacers; centralizers; unbonded length corrosion protection system; bond length corrosion protection system; anchorage and trumpet; and anchorage corrosion protection system.
- D) Plan view showing location of anchor and location of property line and/or limits of permanent easement.

- E) Certified Test Reports and Materials Certification for the following materials, if used: prestressing steel (strand or bar); portland cement; prestressing hardware; bearing plates; and corrosion protection system.
- F) Quality Control details including anchor drilling, anchor installation with lifting methods and grout placement.
- G) Grout Mix Design including compressive stress strength test results (AASHTO T106/ASTM C109) supplied by a qualified independent testing lab verifying the specified minimum 7 day and 28 day grout compressive strengths.
- H) Identification number and certified calibration report for each test jack, load cell primary pressure gauge and reference pressure gauge to be used. Jack and pressure gauge shall be calibrated as a unit. Calibration records shall include the date tested, device identification number, and the results shall be certified to an accuracy of 2 percent or less traceable to the National Bureau of Standards by a qualified independent testing laboratory within 90 days prior to submittal. The Engineer may request additional calibration(s) at any time during construction if there is evidence of improper handling of equipment or improper readings. No compensation will be provided for additional calibrations.

**MATERIALS:**

**1-Grout:**

Cement shall be Portland Cement Type I, II, III (ASTM C150)

Fine Aggregate meeting Section M.03.01-2

Potable water

The grout mixture shall have a minimum 28-day compressive strength of at least 3000 psi measured in accordance with ASTM C 109 at the time of stressing and 60 percent of design strength at 7 days. Bleed shall be less than 2 percent. Admixtures will be used in strict accordance with the manufacturers' recommendations, subject to the approval of the Engineer. Accelerators, and expansive admixtures, will not be permitted.

Non-shrink, non-staining grout meeting Section M.03.01 may be used for filling sealed encapsulations, trumpets, and anchorage covers.

**2-Steel Elements:**

- A) Prestressing Steel: Ground anchor tendons shall be fabricated from single or multiple elements of one of the following prestressing steels:
  - ASTM A 722 Steel Bars
  - ASTM A 416 (uncoated seven-wire strand)
  - ASTM A 886 (indented seven-wire strand)
  - ASTM A 882 (epoxy coated, seven-wire strand)

- B) Prestressing Steel Couplers: Prestressing steel bar couplers shall be capable of developing 100 percent of the minimum specified ultimate tensile strength of the prestressing steel bar. Steel strands used for a soil or rock anchor shall be continuous with no splices.
- C) Anchorage devices: shall be capable of developing 95 percent of the specified minimum ultimate tensile strength (SMTS) of the prestressing steel tendon.
- D) Bearing plate: ASTM A 709 Grade 36 or ASTM A536
- E) Trumpet: ASTM A 53 for pipe, ASTM A 500 for tubing. Minimum wall thickness of 0.25 inches.
- F) Anchorage Covers: ASTM A 709 Grade 36 or ASTM A53 for pipe, ASTM A536 for ductile iron, or ASTM 500 for tubing.
- G) Wedges: new steel elements be designed to preclude premature failure of the prestressing steel due to notch or pinching effects under static and dynamic strength meeting requirements of Section 3.1.6 (1) and Section 3.1.8 (1) and 3.1.8 (2) of the Guide Specification contained in the PTI "Post Tensioning Manual". Wedges for epoxy coated strand shall be designed to be capable of biting through the epoxy coating and into the strand. Removal of the epoxy coating from the strand to allow the use of standard wedges is permitted. Anchor nuts and other threadable hardware for epoxy coated bars shall be designed to thread over the epoxy coated bar and still comply with the requirements for carrying capacity.

### **3-Miscellaneous Anchor Elements:**

- A) Bondbreaker: The bondbreaker shall be fabricated from a smooth plastic tube or pipe having the following properties:
  - 1. resistant to grout, or corrosion inhibiting compound;
  - 2. resistant to aging and by ultra-violet light;
  - 3. nondetrimental to the tendon;
  - 4. capable of withstanding handling and installation methods;
  - 5. enable the tendon to elongate during testing and stressing; and
  - 6. allow the tendon to remain unbonded after lock-off.
- B) Centralizers and Spacers: Centralizers and spacers shall be fabricated from plastic, steel or other material that is nondetrimental to the prestressing steel. Wood shall not be used. A combination centralizer-spacer may be used.

### **4-Corrosion Protection Elements:**

- A) Tendon Bond Length Protection for Grout Protected Tendons:

A grout-filled, corrugated plastic encapsulation or a grout-filled, deformed steel tube shall be used. The prestressing steel can be grouted inside the encapsulation prior to inserting the tendon into the drill hole or after the tendon has been placed.

Tendon Bond Length Encapsulations: The tendon bond length to be encapsulated to provide additional corrosion protection, the encapsulation shall be fabricated from one of the following:

1. High density corrugated polyethylene tubing conforming to the requirements of AASHTO M 252 and having a minimum wall thickness of 1/16 inch except pregrouted tendons, which may have a minimum wall thickness 3/64 inch.
2. Deformed steel tubing or pipes conforming to ASTM A 52 or A 500 with a minimum wall thickness of 3/16 inch.
3. Corrugated, polyvinyl chloride tubes manufactured from rigid PVC compounds conforming to ASTM D 1784, Class 13464-B.
4. Fusion-bonded epoxy conforming to the requirements of AASHTO M 284.

B) Unbonded Length Protection:

1. Bar Tendons

A smooth bond breaker shall provide corrosion protection of the unbonded length over a grout filled bar sheath. The corrosion inhibiting compound shall completely coat the tendon element.

2. Strand Tendons

Corrosion protection of the unbonded length shall encapsulate tendons composed of individual grease filled extruded strand sheaths with a common smooth sheath; or individual grease filled strand sheaths with a grout filled smooth sheath. The corrosion inhibiting compound shall completely coat the tendon elements, fill the void between them and the sheath, and fill the interstices between the wires of 7-wire strands. Provisions shall be made to retain the compound within the sheath.

Sheath: A sheath shall be used as part of the corrosion protection system for the unbonded length portion of the tendon. The sheath shall be fabricated from one of the following:

1. A polyethylene tube (minimum 1/16 in wall thickness) pulled or pushed over the prestressing steel. The polyethylene shall be Type II, III or IV as defined by ASTM D 1248.
2. A hot-melt extruded polypropylene tube (minimum 1/16 in wall thickness). The polypropylene shall be cell classification B55542-11 as defined by ASTM D 4101.
3. A hot-melt extruded polyethylene tube (minimum 1/16 in wall thickness). The polyethylene shall be high density Type III as defined by ASTM D 1248.
4. Steel tubing (minimum 3/16 in wall thickness) conforming to ASTM A 500.
5. Steel pipe (minimum 3/16 in wall thickness) conforming to ASTM A 53.
6. Schedule 40 plastic pipe or tube of PVC conforming to ASTM D 1784 Class 13464-B.

Where corrugated pipe is used as a sheath a separate bondbreaker or common smooth sheath shall be provided in the unbonded length to allow the prestressing steel to freely elongate during stressing and to remain unbonded to the surrounding grout after lock-off.

C) Unbonded Length/Bond Length Transition:

The transition between the corrosion protection for the bonded and unbonded length shall be designed and fabricated to ensure continuous protection from corrosive attack.

The corrosion protective sheath surrounding the unbonded length of the tendon shall be long enough to extend into the trumpet, but shall not come into contact with the stressing anchorage during testing. Any excessive protection length shall be trimmed off.

D) Anchorage Protection:

The corrosion inhibiting compound placed in either the free length or the trumpet area shall be an organic compound (i.e., grease or wax) with appropriate polar moisture displacing, corrosion inhibiting additives and self-healing properties. The compound shall permanently stay viscous and be chemically stable and nonreactive with the tendon, sheathing material, and the anchor grout.

1. Anchorages shall be encased in a minimum 2 inch thick concrete or grout-filled cover, or be completely covered in a corrosion inhibiting compound.
2. Centralizers and spacers (multi-element tendon) shall be provided at maximum intervals of 10 feet with the deepest centralizer located within two foot of the end of the anchor and the upper centralizer for the bond zone located no more than 5 feet from the top of the tendon bond length. Centralizers shall be able to support the tendon in the drill hole and position the tendon so a minimum of 1 inch of grout cover is provided and shall permit grout to freely flow around the tendon and up the drill hole. Spacers shall be used to separate elements of a multi-element tendon and shall permit grout to freely flow around the tendon and up the drill hole.
3. The trumpet shall be sealed to the bearing plate and shall overlap the unbonded length corrosion protection by at least 4 inch. The trumpet shall be long enough to accommodate movements of the structure and the tendon during testing and stressing without damaging the encapsulation, regardless of type of tendon.
4. The trumpet shall be completely filled with grout, except restressable anchorages must use corrosion inhibiting compounds. Compounds may be placed any time during construction. Compound-filled trumpets shall have a permanent seal between the trumpet and the unbonded length corrosion protection. Grout must be placed after the ground anchor has been tested and stressed to the lock-off load. Trumpets filled with grout shall have either a temporary seal between the trumpet and the unbonded length corrosion protection or the trumpet shall fit tightly over the unbonded length corrosion protection for a minimum of 4 inch.

E) Coupler Protection:

The coupler and any adjacent exposed bar sections shall be covered with a corrosion-proof compound of wax-impregnated cloth tape. The coupler area shall be covered by a smooth plastic tube complying with the requirements set forth in this Specification, overlapping the adjacent sheathed tendon by at least 1 inch. The two joints shall be sealed each by a coated heat shrink sleeve of at least 6-inch length, or approved equal. The corrosion-proof compound shall completely fill the space inside the cover tube.

Heat shrinkable sleeves shall be fabricated from crosslinked polyolefin tube coated with an adhesive sealant. Prior to shrinking, the tube shall have a nominal wall thickness of 0.02 inches. The adhesive sealant shall have a nominal thickness of 0.02 inches.

Strand couplers are not permitted.

A minimum of 1 inch of grout cover over the encapsulation shall be provided.

**Construction Methods:**

**1-Records**

The Contractor shall compile the following report on an accepted form, for each anchor that is installed:

- A) **As-built drawings** showing the location, elevations, and orientation of each ground anchor, anchor type, anchor capacity, tendon type, total anchor length, bond length, unbonded length, and tendon bond length.
- B) **Drilling and grouting conditions** containing date of drilling and grouting, diameter of drill hole, drilling method, depth of stratum penetration, quantity of water entering the hole during grouting, groundwater elevation, grouting pressures and quantity injected.
- C) **Testing requirements and results**, anchor test results and graphs, extended creep tests, and lock-off loads. Testing equipment shall include dial gauges, dial gauge support, jack and pressure gauge, electronic load cell, and a reaction frame.

The Contractor shall provide the Engineer with a copy of this report immediately after each anchor is tested and/or locked-off.

**2-Tendon Storage and Handling:**

Tendons shall be handled and stored in such a manner as to avoid damage or corrosion. Heavy corrosion or pitting, damage to the prestressing steel, the corrosion protection, and/or the epoxy coating shall be cause for rejection by the Engineer. Grounding of welding leads to the prestressing steel is forbidden. Prestressing steel exposed to excessive heat (i.e., more than 400° F) shall be rejected.

Lifting of pre-grouted tendons shall be to manufacturers' recommendations and not cause excessive bending, which can debond the prestressing steel from the surrounding grout.

### **3-Drilling:**

The Contractor shall be responsible for selecting drilling equipment and methods suitable to establish a stable hole of adequate dimensions, within the tolerances specified. Down-hole hammers are not permitted unless the Engineer provides **written** authorization.

Holes for anchors shall be drilled at the location [ $\pm 3$  inches], orientation [ $\pm 3^\circ$  inclination and/or lateral direction] and to the length as shown on the Contract Drawings, the approved Working Drawings or as directed by the Engineer. The Contractor is to select the diameter of the hole required to develop the specified pullout resistance. The drill bit or casing crown shall not be more than 1/8 inch smaller than the specified hole diameter. If caving ground is encountered the Contractor is to adjust his drill method, including drilling fluid, use of drilling casing, etc..

### **4-Tendon Insertion:**

The tendon shall be inserted into the drill hole at a rate that does not damage the sheathing, coating, and grout tubes; and shall not be driven or forced. When the tendon cannot be completely inserted, the Contractor shall remove the tendon from the drill hole and clean and/or redrill the hole to permit insertion. Strand tendons shall be straightened by hand during installation. The bottom end of the tendon may be fitted with a cap or bullnose to aid its insertion into the hole, casing, or sheathing.

### **5-Grouting:**

The grouting equipment shall produce a uniformly mixed grout free of lumps and undispersed cement, and be capable of continuously agitating the grout. A positive displacement grout pump shall be used. The pump shall be equipped with a pressure gauge capable of measuring pressures of at least 145 Psi or twice the actual grout pressures used whichever is greater. The grouting equipment shall be sized to enable three times the theoretical grout volume to be placed in one continuous operation.

The grout shall be injected from the lowest point of the drill hole. The grout can be placed before or after insertion of the tendon. The quantity of the grout and the grout pressures shall be recorded. The grout pressures and grout takes shall be controlled to prevent excessive heave or fracturing. Grout will be placed by means of a tremie pipe from the bottom of the pile upward to avoid segregation. The grout will be placed immediately after the drill hole is cleaned to the satisfaction of the Engineer, and the steel reinforcing with centering devices is installed.

The grout at the top of the drill hole shall not contact the back of the structure or the bottom of the trumpet.

If the ground anchor is installed in a fine-grained soil using drill holes larger than 6" in diameter, then the grout above the top of the bond length shall be placed after the ground anchor has been tested and stressed. The Engineer will allow the Contractor to grout the entire drill hole at the same time if the Contractor can demonstrate that his particular ground anchor system does not derive a significant portion of its load-carrying capacity from the soil above the bond length portion of the ground anchor.

If grout protected tendons are used for ground anchors anchored in rock, then pressure grouting techniques shall be utilized. Pressure grouting requires that the drill hole be sealed and that the grout be injected until a minimum 50 Psi grout pressure (measured at the top of the drill hole) can be maintained on the grout for at least five (5) minutes.

The grout tube may remain in the hole on completion of grouting if the tube is filled with grout.

After grouting, the tendon shall not be loaded for a minimum of 3 days and the grout has achieved a minimum of 60% of the ultimate design strength.

### **5-Anchorage Installation:**

The anchor bearing plate and the anchor head or nut shall be installed perpendicular [ $\pm 3^\circ$ ] to the tendon, centered on the bearing plate, without bending or kinking of the prestressing steel elements. Wedge holes and wedges shall be clean.

The stressing tail shall be cleaned and protected from damage until final testing and lock-off. After the anchor has been accepted by the Engineer, the stress tail shall be cut to its final length according to the tendon manufacture's recommendations.

The corrosion protection surrounding the unbonded length of the tendon shall extend up beyond the bottom seal of the trumpet or 4 inch into the trumpet if no trumpet seal is provided. The corrosion protection surrounding the unbonded length of the tendon shall not contact the bearing plate or the anchor head during testing and stressing.

### **STRESSING, LOAD TESTING AND ACCEPTANCE:**

**1 – General:** Each ground anchor shall be tested. No load greater than ten (10) percent of the design load can be applied to the ground anchor prior to testing. The maximum test load shall be no less than 1.50 times the Service Design Load (SDL) for ground anchors designed to meet the requirements of the AREMA Manual for Railway Engineering, nor 1.00 times the Factored Design Load (FDL) for ground anchors designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications. Loads shall not exceed 60 percent of the guaranteed ultimate tensile strength. The test load shall be simultaneously applied to the entire tendon. Stressing of single elements of multi-element tendons shall not be permitted.

**2 – Stressing Equipment:** The testing equipment shall consist of:

A dial gauge or vernier scale capable of measuring to the nearest 0.001 inch shall be used to measure the ground anchor movement. The movement-measuring device shall have a minimum travel equal to twice the theoretical elastic elongation of the total anchor length at the maximum test load and it shall have adequate travel so the ground anchor movement can be measured without resetting the device at an interim point.

A hydraulic jack and pump shall be used to apply the test load. The jack and a calibrated primary pressure gauge shall measure the applied load. Testing cannot commence until the Engineer has approved the calibration. The primary pressure gauge shall be graduated in 100 Psi increments or less. Stressing equipment shall be capable of stressing the whole tendon in one

stroke to the specified Test Load and the equipment shall be capable of stressing the tendon to the maximum specified Test Load within 75 percent of the rated capacity. The pump shall be capable of applying each load increment in less than 60 seconds.

The equipment shall permit the tendon to be stressed in increments so that the load in the tendon can be raised or lowered in accordance with the test specifications and allow the anchor to be lift-off tested to confirm the lock-off load.

A calibrated reference pressure gauge shall also be kept at the site to periodically check the production (i.e., primary pressure) gauge. The reference gauge shall be calibrated with the test jack and primary pressure gauge. The reference pressure gauge shall be stored indoors and not subjected to rough treatment.

The Contractor shall provide an electrical resistance load cell and readout to be used when performing an extended creep test.

The stressing equipment shall be placed over the ground anchor tendon in such a manner that the jack, bearing plates, load cells and stressing anchorage are axially aligned with the tendon and the tendon is centered within the equipment.

### **3 – Load Testing Setup:**

- A) Dial gauges shall bear on the pulling head of the jack and their stems shall be coaxial with the tendon direction. The gauges shall be supported on an independent, fixed frame, which will not move as a result of stressing or other construction activities during the operation.
- B) Prior to setting the dial gauges, an Alignment Load (AL) of no more than 5 % of design load shall be placed on the tendon.
- C) Regripping of strands, which would cause overlapping wedge bites, or wedge bites on the tendon below the anchor head, shall be avoided.
- D) Stressing and testing of multiple element tendons with single element jacks is not permitted.
- E) Stressing shall not begin before the grout has reached adequate strength.

### **4 – Performance Tests:**

- A) The number of ground anchors as shown on the plans or as directed by the Engineer shall be Performance Tested in accordance with the procedures described below. The Engineer shall select the ground anchors to be performance tested. The remaining ground anchors shall be tested in accordance with the proof test procedures (see Part 5).
- B) The performance test shall be made by incrementally loading and unloading the ground anchor in accordance with the schedule provided. The load shall be raised from one increment to another immediately after recording the ground anchor movement. The ground anchor movement shall be measured and recorded to the nearest 0.001 inch with respect to an

independent fixed point at the alignment load and at each increment of load. The load shall be monitored with the primary pressure gauge. The reference pressure gauge shall be placed in series with the primary pressure gauge during each performance test. If the load determined by the reference pressure gauge and the load determined by the primary pressure gauge differ by more than ten (10) percent, the jack, the primary pressure gauge and the reference pressure gauge shall be recalibrated at no expense to the State. At load increments other than the maximum test load, the load shall be held just long enough to obtain the movement reading.

- C) The maximum test load in a performance test shall be held for ten (10) minutes.

### PERFORMANCE TEST SCHEDULE

Step	Load
1	AL
2	0.25SDL or 0.20FDL
3	AL
4	0.25SDL or 0.20FDL
5	0.50SDL or 0.40FDL
6	AL
7	0.25SDL or 0.20FDL
8	0.50SDL or 0.40FDL
9	0.75SDL or 0.60FDL
10	AL
11	0.25SDL or 0.20FDL
12	0.50SDL or 0.40FDL
13	0.75SDL or 0.60FDL
14	1.00SDL or 0.75FDL
15	AL
16	0.25SDL or 0.20FDL
17	0.50SDL or 0.40FDL
18	0.75SDL or 0.60FDL
19	1.00SDL or 0.75 FDL
20	1.20SDL or 0.90FDL
21	AL
22	0.25SDL or 0.20FDL
23	0.50SDL or 0.40FDL
24	0.75SDL or 0.60FDL
25	1.00SDL or 0.75FDL
26	1.20SDL or 0.90FDL
27	1.33SDL or 1.00FDL
28	HOLD FOR 10 MINUTES
29	AL
30	Adjust to lock-off load

D) The jack shall be adjusted as necessary in order to maintain a constant load. The load-hold period shall start as soon as the maximum test load is applied and the ground anchor movement, with respect to a fixed reference, shall be measured and recorded at 1 minute, 2, 3, 4, 5, 6 and 10 minutes. If the ground anchor movement between one (1) and ten (10) minutes exceeds 0.04 inch, the maximum test load shall be held for an additional 50 minutes. If the load-hold is extended, the ground anchor movement shall be recorded at 15 minutes, 20, 30, 40, 50 and 60 minutes.

**5 - Proof Tests:**

The proof test shall be performed by incrementally loading the ground anchor in accordance with the following schedule. The load shall be raised from one increment to another immediately after recording the ground anchor movement. The ground anchor movement shall be measured and recorded to the nearest 0.001 inch with respect to an independent fixed reference point at the alignment load and at each increment of load. The load shall be monitored with the primary pressure gauge. At load increments other than the maximum test load, the load shall be held just load enough to obtain the movement reading.

**PROOF TEST SCHEDULE**

Step	Load
1	AL
2	0.25SDL or 0.20FDL
3	0.50SDL or 0.40FDL
4	0.75SDL or 0.60FDL
5	1.00SDL or 0.75FDL
6	1.20SDL or 0.90FDL
7	1.33SDL or 1.00FDL
8	Reduce to lock-off load
9	AL (optional)
10	Adjust to lock-off load

The maximum test load in a proof test shall be held for ten (10) minutes. The jack shall be adjusted as necessary in order to maintain a constant load. The load-hold period shall start as soon as the maximum test load is applied and the ground anchor movement with respect to a fixed reference shall be measured and recorded at 1 minute, 2, 3, 4, 5, 6 and 10 minutes. If the ground anchor movement between one (1) and ten (10) minutes exceeds 0.04 inch, the maximum test load shall be held for and additional 50 minutes. If the load hold is extended, the ground anchor movements shall be recorded at 15 minutes, 20, 30, 40, 50 and 60 minutes.

**6 – Extended Creep Tests:**

A) Extended creep tests are not anticipated to be required. Should creep-susceptible soils be identified during construction, the item “Extended Creep Test for Ground Anchors” shall be added to the contract, and testing shall be conducted as follows. The Engineer shall select the ground anchors to be performance tested. The stressing equipment shall be capable of

measuring and maintaining the hydraulic pressure within 50 psi. A load cell shall be used to monitor small changes in load during constant load-hold periods.

- B) The extended creep test shall be made by incrementally loading and unloading the ground anchor in accordance with the performance test schedule in Part 4. At the end of each loading cycle, the load shall be held constant for the observation period indicated in the extended creep test schedule below. The times for reading and recording the ground anchor movement during each observation period shall be 1 minute, 2, 3, 4, 5, 6, 10, 15, 20, 25, 30, 45, 60, 75, 90, 100, 120, 150, 180, 210, 240, 270 and 300 minutes as appropriate for the load increment. Each load-hold period shall start as soon as the test load is applied. In a creep test, the primary pressure gauge and reference pressure gauge will be used to measure the applied load and the load cell will be used to monitor small changes in load during constant load-hold periods. The jack shall be adjusted as necessary in order to maintain a constant load.
- C) The Contractor shall plot the ground anchor movement and the residual movement measured in an extended creep test. The Contractor shall also plot the creep movement for each load hold as a function of the logarithm of time.

**EXTENDED CREEP TEST SCHEDULE**

Load	Observation Period (min.)
AL	
0.25SDL or 0.20FDL	10
0.50SDL or 0.40FDL	30
0.75SDL or 0.60FDL	30
1.00SDL or 0.75FDL	45
1.20SDL or 0.90FDL	60
1.33SDL or 1.00FDL	300

**7 – Ground Anchor Acceptance Criteria:**

- A) A performance- tested or proof- tested ground anchor with a 10 minute load-hold shall be acceptable if the: (1) ground anchor resists the maximum test load with less than 0.04 inch of movement between 1 minute and 10 minutes; and (2) total elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.
- B) A performance- tested or proof- tested ground anchor with a 60 minute load-hold shall be acceptable if the: (1) ground anchor resists the maximum test load with a creep rate that does not exceed 0.08 inch in the last log cycle of time; and (2) total elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.
- C) A ground anchor subjected to extended creep testing is acceptable if the: (1) ground anchor resists the maximum test load with a creep rate that does not exceed 0.08 inch in the last log cycle of time; and (2) total elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.

- D) The initial lift-off reading shall be within plus or minus five (5) percent of the designed lock-off Load. If this criterion is not met, then the tendon load shall be adjusted accordingly and the initial lift-off reading repeated.

**8 - Procedures for Anchors Failing Acceptance Criteria:**

- A) Anchors that do not satisfy the minimum apparent free length criteria shall be either rejected and replaced at no additional cost to the State or locked off at not more than 50 percent of the maximum acceptable load attained.
- B) Regroutable anchors which satisfy the minimum apparent free length criteria but which fail the extended creep test at the test load may be post-grouted and subjected to an enhanced creep criterion. This enhanced criterion requires a creep movement of not more than 0.04 inch between 1 minute and 60 minutes at test load. Anchors which satisfy the enhanced creep criterion shall be locked off at the design lock-off load. Anchors which cannot be post-grouted or regroutable anchors that do not satisfy the enhanced creep criterion shall either be rejected or locked off at 50% of the maximum acceptable test load attained.
- C) In the event that an anchor fails, the contractor shall immediately modify the design and/or construction procedures. These modifications may include, but are not limited to, modifying the installation methods, reducing the anchor design load by increasing the number of anchors, increasing the anchor length, or changing the anchor type. Any modification of design or construction procedures, or increase in the number of anchors shall be at no cost to the State. A description of any proposed modifications must be submitted to the Engineer in writing. Proposed modifications shall not be implemented until the Contractor receives written approval from the Engineer.

**9- Anchor Lock-Off:**

- A) After testing has been completed, the load in the tendon shall be such that after seating losses (i.e., wedge seating), the specified lock-off load has been applied to the anchor tendon. If no lock-off load is provided on the plans the lock-off load is to be between 75 and 100 percent of the Service Design Load for ground anchors designed to meet the requirements of the AREMA Manual for Railway Engineering, or between 55 and 75 percent of the Factored Design Load for ground anchors designed to meet the requirements of the AASHTO LRFD Bridge Design Specifications.
- B) The wedges shall be seated at a minimum load of 50% ultimate load for tendon (Fpu). If the lock-off load is less than 50% Fpu, shims shall be used under the wedge plate and the wedges seated at 50% Fpu. The shims shall then be removed to reduce the load in the tendon to the desired lock-off load.

**10- Anchor Lift-Off Test:**

After transferring the load to the anchorage, and prior to removing the jack, a lift-off test shall be conducted to confirm the magnitude of the load in the anchor tendon. This load is determined by reapplying load to the tendon to lift off the wedge plate (or anchor nut) without unseating the

wedges (or turning the anchor nut). This moment represents zero time for any long time monitoring.

**Method of Measurement:** The quantity of ground anchors to be paid for will be the number of ground anchors installed and accepted. Should the Contractor elect to use an alternate number of ground anchors, the number of ground anchors to be paid for will not exceed that shown in the Contract Documents. The quantity of performance and extended creep tests to be paid for a maximum of once each per anchor location and this/these test(s) will only be the paid if the ground anchor is accepted.

**Basis of Payment:** The quantity of ground anchors as determined above will be paid for at the contract price per unit of measurement for the particular pay item listed below and shown in the bid schedule, which price and payment will be full compensation for the cost of furnishing all labor, equipment and material required to complete the work described in this section.

Payment will be made under:

Pay Item	Pay Unit
Ground Anchors	Each
Performance Test for Ground Anchors	Each
Proof Test for Ground Anchors	Each

## **ITEM #0651595A– JACKING 42 INCH PIPE**

### **Description:**

Work under this item will consist of furnishing and installing three (3) 42 inch steel pipes by jacking and boring at the locations shown on the drawings and in conformity with these Special Provisions. The pipe material shall be **Steel**. Jacking of the three (3) pipes shall be performed from one (1) jacking pit as shown on the plans to the length indicated. Once the required length is reached jacking will be stopped and the jacking shields will be left in place to become part of the jacked pipe. Any proposed changes to the plan as shown or to this special provision shall be submitted to the Engineer for approval. Work under this item shall also include the design and construction of the jacking pit which shall include the temporary earth retaining system to support the pit and reaction wall. The work shall also include all earth excavation required for the jacking pit and pipe jacking operation, removal of the temporary earth retaining system for the pit, removal and backfilling of the pit area to match the surrounding grades, grouting the void space outside of the jacked pipes, installing utility ducts (supplied by utility) and grouting the pipes.

The work shall comply with Item #0202629A – Settlement Monitoring Program and all requirements of the Railroad.

Rock Excavation from the pipe jacking operation shall be measured and paid for separately under the item “Rock Excavation (No explosives)”. All surplus material shall be disposed of at the designated Waste Stockpile Area (WSA).

Jacking is expected to be in areas of rock so the machinery utilized will be equipped to bore through rock.

All work shall be performed in accordance with all local, state and federal safety and permit requirements and the provisions of the **Metro-North Railroad Pipeline Occupancy Specifications**. In the event there is any conflicting information between the MNR requirements and this specification, the MNR requirements shall apply.

The Contractor shall be solely responsible for all damages resulting from ground movement associated with pipe jacking operations. Ground movement shall be monitored in accordance with Item 0202629A – Settlement Monitoring Program.

The LRFD design code shall be used for this work.

### **Materials:**

Pipe: Pipe thickness shall be designed by Contractor to accommodate all forces associated with the installation procedure. The thickness shall be based on static and dynamic loads from railroad traffic loading and anticipated jacking forces for selected pipe and driven pipe lengths.

Pipe lengths shall be determined and specified by the Contractor and shall conform to the requirements of Article M.08.01 of the Standard Specifications, amended as follows: Steel pipe

shall be Permalok Steel Pipe and conform to the requirements of ASTM A-36, ASTM A515, grade 60 or ASTM A572, grade 42.

Steel used in the manufacture of Permalok connections shall conform to ASTM A-36 as a minimum and be machinable. The pipe shall be 42" OD. Details of joint formation shall follow the recommendations of the manufacturers of the joint material and of the pipe.

Permalok steel pipe shall be manufactured by the rolled and welded cylinder method utilizing the DSAW process in sections of not less than 8 feet long, except as needed to achieve the final finished length of pipe.

Permalok connectors shall be full penetration butt-welded square to the ends of pipe sections, or profiled directly on the finished sections, at the option of the manufacturer.

#### Dimensional Tolerances

Roundness – The pipe diameter as measured along any single plane shall not vary more than 1% from the specified diameter.

Circumference – The outside circumference shall not vary more than 1% ± from the nominal circumference based on the specified diameter, or 3/4" ± maximum.

Wall Thickness – The actual wall thickness of the steel pipe sections shall not vary more than 5% under the nominal wall thickness specified.

Straightness – The maximum straightness deviation in any 10 foot length shall be 1/8". The maximum straightness deviation in fabricated sections up to 40 feet shall be 3/8".

Contact Grout: The Contractor shall submit the grout mix proposed to completely fill the voids outside the pipe. Grout shall consist of one part Portland cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. All grout mixtures shall contain 2 percent of bentonite by weight of the cement. Sand to be used shall be of such fineness that 100 percent will pass a Standard No. 8 sieve and at least 45 percent, by weight, will pass a Standard No. 40 sieve.

Bentonite shall be a commercial-processed powdered bentonite, Wyoming type, such as Imacogel, Black Hills, or equal. All grout mix proportions shall be subject to review and acceptance by the Engineer.

#### **Construction Methods:**

##### SUBMITTALS

Prior to the start of this work, the Contractor shall submit his Work Plan, Working Drawings, Calculations, and Contingency Plan in accordance with Article 1.05.02 of the Standard Specifications, Form 816. All work plans, working drawings, and calculations shall be signed and stamped by an Engineer licensed in the State of Connecticut.

### Work Plan and Working Drawings:

A. Pipe Jacking: A detailed, description of the pipe-jacking equipment and procedures to be employed, including:

- Methods for steering and for monitoring line and grade.
- Manufacturer's literature describing details of the proposed jacking system.
- Description of method and capabilities for controlling ground conditions at the tunnel heading and for controlling ground loss.
- Estimation of the maximum jacking force required to complete the pipe installation.
- Dimensions, strength, joint details and manufacturer's details of the pipe to be used.
- Details for cushioning the pipe joints during jacking.
- Drawings, and details for the pipe jacking shield or tunnel machine, including details of cutterhead, jacking propulsion system, safety systems, face support capabilities, and steering jack provisions for making line and grade corrections.
- Details for supporting the face during tunneling and while tunneling operations are interrupted.
- Manufacturer's product information, cutterhead design details, working arrangement drawings, specifications, and operating procedures.
- Drawings and details showing excavation and mucking systems.
- The machine manufacturer shall provide a written guarantee that the machine is capable of withstanding the anticipated loads and ground conditions. If the
- Contractor provides a shield that they have designed and built, and then a Professional Engineer registered in the State of Connecticut shall review the design and certify that it is capable of withstanding the anticipated loads and ground conditions.
- Arrangement and position of main jacks, thrust ring, jacking controls, and pressure gages.
- Thrust block and jacking frame design and details, including reaction transfer calculations.
- Details of pipe lubrication system and description of pipe lubricants to be used during pipe jacking, including manufacturer's literature.
- Details of water control plan including temporary dewatering provisions, details for the control, treatment, and disposal of groundwater and construction water in compliance with local, state, and federal requirements.
- Shop drawings of pipe material, joints, contact grout fittings and plugs, cushion materials, and fabrication tolerances.

### B. Jacking Pits

- Design and geometry of jacking pit excavation and support system, including details such as launching seals. The Contractor shall have sole responsibility for sizing the pit excavations, except where maximum sizing limits are noted on the Drawings. The size of the pit shall be adequate to construct all structures indicated and allow room for jacking pipe, equipment, and operations. The jacking pit walls shall be located as shown on the Drawings. The excavation support walls located closest to the highway

shall be designed such that they do not move laterally more than one (1) inch during construction. The Contractor shall locate the jacking and receiving pits at the locations required to construct the pipeline between the stations indicated on the Drawings.

- Drawings indicating arrangement of supports and construction sequence for proposed support system(s). Show the elevation of struts, braces, or other supports as related to the depth of the excavation. Indicate sizes, shapes, and material specifications for all support elements, including lagging, if used.
- Design of jacking walls for the pipe culvert shall be designed for all loads including highway surcharge loads where applicable.

### C. Contact Grouting

- Work Plan indicating contact grouting details, specifications of equipment, grouting procedures, sequences and injection pressures, monitoring and recording equipment, pressure gauge calibration data, methods of controlling grout pressure, method of transporting grouting equipment and materials within the pipe.
- Details of grout mixes including proportions, admixtures, manufacturer's literature, and laboratory test data verifying the strength of the proposed contact grout.
- Grouting Spoil Disposal Plan describing contact grouting spoil handling and disposal procedures. No grouting spoils of any kind shall be allowed to enter the drainage system.
- Removal and disposal is the responsibility of the Contractor and shall be performed using Best Management Practices and in accordance with applicable local, state, and federal regulations.

## Calculations

### A. Pipe Jacking

- Design calculations demonstrating that the pipe is capable of sustaining the maximum stresses to be imposed during jacking. The calculations shall consider maximum ground loads, live loads, jacking forces, eccentric forces due to steering and other loads that may be reasonably anticipated. Loads shall be shown and described. A minimum factor of safety of 3.0 shall be used.
- Calculations demonstrating that the materials behind the thrust block will sustain the maximum planned forces developed by the main jacks.
- When computer calculations are included with design calculations, the following documentation shall be furnished as a minimum:
  1. A synopsis of the computer program (s) stating briefly required input, method of solution, approximations used, second order analysis incorporated, specifications or codes used, cases considered, output generated, extent of previous usage or certification of program(s) and program(s) author.
  2. Identification by number, indexing and cross referencing of all calculation sheets, including supplemental "long-hand" calculation sheets.

3. Fully identified, dimensioned, and annotated diagram of each member of structure being considered.
4. Clear identification and printing of all input and output values, including intermediate values if such values are necessary for orderly review.
5. Identification of the processing unit, input/output devices, storage requirements, etc., if such supplemental information is significant and necessary for evaluation of the submittal.

## B. Jacking Pits

- Design calculations demonstrating that the pit excavation support systems and working slabs are able to withstand earth pressures, hydrostatic pressures, bottom heave, equipment load, live loads, and other surcharge loads. Acceptable excavation support methods include the use of steel plates with steel rib supports, sheet piling and bracing, soldier piles and lagging, or other methods approved by the Engineer. Predrilled holes may be required to provide sufficient toe embedment for the lateral support system.
- Design calculations demonstrating that each member or support element can support the maximum loads that can occur during construction with appropriate safety factors.
- Design calculations demonstrating that the support system minimizes horizontal and vertical movements to protect adjacent structures/utilities from damage. Design support system to maintain the stability of the excavation against sliding or bottom heave. Employ wales, struts, and beams for bracing and lateral support as required for the excavation faces supported by soldier piles and lagging, liner plate, or sheeting systems. Provide struts with intermediate vertical and horizontal supports as required to prevent buckling. Provide timber lagging, precast concrete lagging, liner plates, or steel plates as required to retain soil between supports.
- Design of a suitable groundwater control system for each pit excavation that extends below the groundwater level. System shall control groundwater inflows, drain the excavation, prevent piping or loss of ground, and maintain stability of excavations.
- Design of a working slab for each pit bottom to provide stable support for construction operations and to resist hydrostatic uplift.
- Design of break out framing and suitable launching seals, ground improvement and/or ground treatment provisions (if required as dictated by actual field conditions encountered), to maintain excavation support and to prevent groundwater inflow or loss of ground when breaking out or into pit excavations. Breakout plans shall indicate support installed and ground stabilization or treatment measures implemented to maintain excavation support and stability when breaking out of jacking pit and when holing through into receiving pit. Provide details of launching seals and ground improvement provisions to control groundwater inflows and minimize loss of ground when breaking into or out of pit excavations.

## Schedule

A schedule for pipe jacking identifying all major construction activities as independent items shall be provided by the Contractor. The schedule shall include as a minimum the following activities: mobilization, groundwater control at jacking and receiving pits; pit excavation and sequence of installation for temporary excavation support; jacking equipment setup; pipe

installation for each drive; site restoration and cleanup; and demobilization. The schedule shall also include the working hours for each activity, and a written description of the construction methods and equipment to be employed in completing each of the work activities shown on the schedule.

#### Reports and Records

Reports and records shall include:

- Survey notes, records, and shift reports indicating thrust force, rate of advance, and line and grade deviation.
- Monitoring data of horizontal deflections and vertical settlement of excavation supports.
- Other reports and records shall be submitted no later than 24 hours after the shift to which they apply.

The Contractor shall submit field notes and daily logs upon completion of the shift.

#### Contingency Plan

The Contractor shall submit a plan indicating what the Contractor will do if settlement or heave is measured or observed. The plan shall include methods and procedures for ground improvement, repairing the pavement structure of West Avenue, and procedures for contacting the Engineer, and other items. If required, ground improvement methods would require evaluation of subsurface conditions encountered during construction and approval by the Engineer.

### EQUIPMENT

#### Pipe Jacking Shield

The machine or shield used for pipe jacking shall be designed to sustain any ground loads which may be imposed upon it as well as any loads imposed by the thrust jacks, and steering mechanisms. The machine shall be capable of being controlled to the desired line and grade within the specified tolerances. The machine shall have a cutterhead or employ other excavation methods capable of excavating both natural soil and boulders, and improved ground material (if required to be in-place). Use of a roadhead or an electric excavator mounted inside of an open face shield is also acceptable. The machine shall also satisfy the following requirements:

- A. The machine shall be capable of advancing through the geologic conditions described in the subsurface data provided. The machine shall also be capable of excavating, handling, and removing improved ground (if required prior to pipe jacking) of whatever strength and consistency.
- B. The shield or tunneling machine shall be designed to minimize the loss of ground ahead of, and around the shield.
- C. The machine shall be steerable in both vertical and horizontal directions to maintain line and grade within the specified tolerances. Provide steering jacks as required to correct line and grade deviations during jacking. If a rotary-type cutterhead is used, the cutterhead shall have a reversible drive system so that it can rotate in either direction to minimize rotation or roll of the pipe during installation.

- D. The machine shall be equipped with suitable safety systems in accordance with applicable OSHA requirements for underground construction equipment.
- E. The tail of the machine shall have gaskets to prevent material from moving into the tunnel through the joint between the tail skin and the pipe.
- F. The jacking system shall be capable of continuously monitoring the jacking pressure, the rate of advancement, and the distance jacked. The jacking system shall develop a uniform distribution of jacking forces on the end of the pipe.

#### Contact Grouting

Equipment for mixing and injecting grout shall be adequate to satisfactorily mix and agitate the grout and force it into the grout holes, in a continuous flow at the desired pressure. Grout injection shall be performed with a progressing helical cavity type pump capable of continuously developing a uniform pressure of 98.6 kPa (14.5 psi) at the grout hole connection with minimum pulsation.

Two pressure gauges shall be provided, one at the grout pump and one at the collar of each hole being grouted. The accuracy of the gauges shall be checked at least weekly with an accurately calibrated "test gauge". The "test gauge" shall not be used for actual grouting. The "test gauge" shall be stored on site in the Contractor's office. An adequate supply of spare pressure gauges shall be available on site at all times.

Suitable stop valves shall be provided at the collar of each hole for use in maintaining pressure as required until the grout has set.

The grouting equipment shall be provided with a flow meter to determine the volume of grout injected. The meter shall be calibrated in gallons to the nearest one-tenth of a gallon.

The grouting equipment shall be maintained in satisfactory operating condition through the course of the work to ensure continuous and efficient performance during grouting operations.

Grout hoses shall have an inside diameter not less than 37 mm (1.5-inch) or greater than 62mm (2.5-inch) and shall be capable of withstanding the maximum water and grout pressures to be used.

### INSTALLATION

#### Pipe Jacking

The pipe shall be placed to the line and grade shown on the Drawings, using a jacking method. Jacking shall not begin until the following conditions have been met:

- A. Required submittals have been made and the Engineer has completed review of all submittals.
- B. Jacking pit excavation has been completed and supported in accordance with submitted Contractor design.

- C. Pre-job safety conference has been conducted in accordance with OSHA requirements. Arrange this conference and inform the Engineer of the time and place of the conference not less than three working days in advance.
- D. The Contractor's site safety representative shall prepare a code of safe practices and an emergency plan in accordance with OSHA requirements. Provide the Engineer with a copy of each prior to starting pipe jacking.

Pipe installation shall be completed in accordance with the approved submittals. The pipe shall be installed between the limits indicated on the Drawings to the specified line and grade, utilizing methods that include due regard for the safety of workers, adjacent structures, utilities, and the public. Any damage shall be immediately repaired to the satisfaction of the agency or utility having jurisdiction, at no additional cost to the Department.

Adequate control of the elevation and direction of the pipe shall be provided by means of a device that can alter the direction of the pipeline heading. This device shall adequately alter the direction of the leading section or shield when measurements made during the jacking operations show that the pipe or shield is drifting off the required line and/or grade.

If the Contractor's jacking method requires advance soil stabilization to prevent loss of material and prevent settlement or displacement of embankment, then the Contractor shall stabilize the soils. Grout shall be cement, chemical or other special injection material selected to accomplish the necessary stabilization at no additional cost.

The materials to be used and the method of injection shall be prepared by a Registered Professional Soils Engineer, or by an experienced and qualified company specializing in this work and submitted for approval to the Engineer before the start of work. Proof of experience and competency shall accompany the submission.

At any interruption of the jacking operation, the heading shall be completely bulkheaded to the satisfaction of the Engineer.

Each pipe section shall be jacked as the excavation progresses in such a way that leaves no length unsupported unless approved otherwise by the Engineer. Pipes shall be jacked into place without damaging the pipe or the interior lining. In the event a section of pipe is damaged during the jacking operation, the pipe shall be jacked through to the receiving pit and removed. Other methods of repairing the damaged pipe may be used, subject to approval by the Engineer.

A lubrication system using bentonite and/or polymers shall be provided as necessary to minimize pipe friction.

The axial forces from the thrust jacks shall be distributed to the pipe uniformly through a ring of cushion material to prevent damage to the ends of the pipe. The cushioning material shall prevent contact between joint surfaces.

At a minimum, the thrust force, rate of advance, distance along the drive, deviation from line and grade, and steering jack adjustments shall be monitored and recorded within the first 300mm (12-inches) and within the last 300mm (12-inches) of each pipe segment installed.

The thrust block shall be properly designed and constructed to provide the required resistance to the forces developed by the main jacks. The thrust block shall be constructed normal to the pipe alignment and designed to support the maximum obtainable jacking pressure developed by the main jacking system.

Where boulders or other large obstructions are encountered which prevent the advancement of the pipe while it is being jacked, such obstructions shall be cut or otherwise broken off to the plane of the outer surface of the pipe. When such cutting or breaking off of the obstruction is not practicable, the obstruction may be completely removed by such methods as proposed by the Contractor and approved by the Engineer.

The Contractor shall not use water to aid in loosening the material, including large obstructions ahead of the pipe, to aid in removing material away from the front end of the pipe, nor for any other purpose in connection with the pipe installation.

The use of open trench method of excavation within the limits for jacking shown on the Drawings will not be permitted.

Where voids are unavoidably created outside the pipe during the advancement of the pipe or due to removal of material at the front of the pipe, such voids shall be immediately filled with damp and, damp sand-clay or other suitable material, rammed into place.

The jacking pit, receiving pit, and the pipe shall be kept relatively dry during the progress of the jacking work.

Adequate provisions shall be made to assure that no voids will be left outside the pipe during the jacking work or after the work has been completed. Immediately upon completion of the jacking operation the pipeline shall be contact grouted. The grout holes shall subsequently be cleaned and suitably plugged.

If settlement or heave is observed, pipe jacking shall stop, the face of pipe jacking shall be breasted, the Engineer shall be notified and a meeting held to review the Contractor's contingency plan (required by this Specification) and actions to be taken by the Contractor. The contingency plan shall then be implemented, with any necessary modifications required by the Engineer, at no additional cost to the State.

#### Control of Line and Grade

The Contractor shall use local benchmarks to furnish and maintain all reference lines and grades for the pipe installation. Use these lines and grades to establish the exact location of the pipe using a laser guidance system on the tunneling machine.

Submit to the Engineer copies of field notes used to establish all lines and grades and provide 24 hours advance notice to allow the Engineer to check laser set up prior to beginning pipe jacking.

The Contractor shall be fully responsible for the accuracy of the work and any corrections, if required. Use an acceptable laser system to monitor line and grade continuously during pipe jacking operations. Laser supports shall be independent of working slab, jacking frame and thrust block to avoid movement of the laser during jacking. Stop pipe jacking operations and reset laser immediately if movement of laser occurs during the Work. Monitor line and grade continuously during pipe jacking operations and record deviation with respect to design line and grade at least once per 2 meters and submit records to the Construction Manager as requested. Control line and grade of the pipe to within the following specified tolerances:

- Design line: 100 mm (4 inches)
- Design grade: 50 mm (2 inches)

When the excavation is off line or grade, make the necessary corrections, and return to the plan alignment at a rate of not more than 1:300.

If the pipe installation exceeds the specified tolerances, the Contractor shall correct the installation. All corrective work shall be performed at no additional cost to the State, and is subject to the approval of the Engineer.

Once per shift, the line and grade shall be checked by the Contractor's surveyor.

Provide the Engineer with equipment to check the line and grade, as requested. Said checking shall not substitute for the Contractor's own line and grade control responsibilities.

#### Temporary Excavation Support at Jacking Pits

Jacking and receiving pits shall be located according to the Contractor's design submittal unless otherwise approved by the Engineer. Location of the excavation supports shall be within 100mm (4 inches) of those shown on the submitted working drawings.

Install excavation support in accordance with submittals that have been reviewed and accepted by the Engineer. The Contractor shall not proceed with excavation to the next level until bracing has been installed and tightly blocked or shimmed to provide proper support of the excavation. If, in the opinion of the Engineer, support deflections indicate that the support system requires modification to prevent excessive movements, the Contractor shall submit a redesign and revised Working Drawings and calculations to the Engineer at no additional cost to the Department.

Perform all excavation regardless of the type or nature or conditions of the material encountered at no additional cost to the State. Method of excavation used is optional. Use hand methods for excavation that cannot be accomplished with mechanical excavation equipment without endangering existing or new structures or other facilities.

The temporary excavation support walls located closest to the highway shall not move laterally more than 25mm. Surface control points established at the top of each jacking and receiving pit wall located closest to the highway shall be used to monitor lateral movement of temporary excavation support walls. Monitoring of these surface control points shall be made daily or as directed by the Engineer.

### Contact Grouting

Contact grouting shall commence following completion of pipe jacking. Contact grout shall be used to fill any voids outside the pipe. An attempt shall be made to hook up and pump grout at every port coupling unless variance is granted by the Engineer.

All material should be free of lumps when put into the mixer and grout mix shall be constantly agitated. Grout shall flow unimpeded and shall completely fill voids. Grout not injected after 90 minutes of mixing shall be discarded.

The locations of contact grout holes in the pipe are specified herein.

The grouting process shall be operated and controlled so that the grout will be delivered uniformly and steadily.

Grouting shall generally progress sequentially in an upgrade direction from one grout hole to the next grout hole in the sequence indicated in the approved submittals.

Inject grout through grout fittings to completely fill all voids outside the pipe. Grout pressure shall be controlled to avoid damage to the pipe. Remove plugs and clean out adjacent grout ports and install a valve to check for communication. Leave valves open and inject grout until communication is observed, then close valves until grout has set.

The sustained grouting pressure shall not exceed 14 psi at the grout hole collar connection unless approved otherwise by the Engineer.

All grouting operations are to be performed in the presence of the Engineer. Notify the Engineer at least 24 hours in advance of starting contact grouting operations.

No drilling or grouting spoils, runoff, or sediment of any kind shall be allowed to enter the drainage system. The Contractor shall provide for adequate disposal of all waste and wastewater from pipe grouting work and remove and properly dispose of all waste grout resulting from grouting operations in accordance with sediment and erosion control requirements shown on the Drawings and contained in the project permit, and with any applicable local, state, Railroad, and federal regulations. Grout spills shall be minimized and all cleanup of grout and waste materials shall be performed immediately to avoid damage to the pipe. The content of grout lines shall not be discharged into the tunnel. Removal and disposal shall be performed according to the approved grouting spoil disposal plan using Best Management Practices.

Recirculate grout mixes when any new mix is batched or after adding water, fluidifier, or sand to mix. Recirculate mix for at least two minutes prior to pumping grout into grout holes.

### Utility Conduits

Utility conduits shall be supplied by each utility and consist of no less than twelve (12), 4 to 6 inch diameter conduits for each of the three 42 inch steel casing pipes. The conduits shall be bundled (with spacers supplied by the utilities) and slid into the 42 inch casing. The ends shall be connected with a "U" Type connection to make a complete loop between all the conduits in each

casing. Prior to filling the void between the conduits and inside of the casing, the conduits shall be filled with water to dissipate the heat developed during the grouting operation and curing. A shield shall be provided at the ends of the ducts so the ends are exposed and not encased in the grout.

### **Method of Measurement**

- 1) Jacking 42 Inch Steel Pipe, being paid on a lump sum basis, will not be measured for payment. Limits of the pipe jacking shall be as shown on the drawings unless otherwise approved by the Engineer. The jacking pit, earth excavation for the pit, pipe jacking, removal of soil ahead of and around the jacked pipe, contact grouting, installation and removal of temporary earth retaining systems, construction, monitoring for lateral movement of jacking pit walls, soil stabilization, removal of jacking pits, dewatering, and backfilling, installing utility conduits and grouting shall be incidental to pipe jacking. Implementation of a contingency plan due to settlement or heave of railroad, shoulders or embankments as a result of the jacking operations will not be measured for payment, but will be incidental to pipe jacking.
- 2) The work of removal of the sacrificial jacking shields, if desired by the contractor, is included in the lump sum item and will be incidental to pipe jacking, which work shall include all traffic maintenance, cutting and restoration of pavement, restoration of disturbed areas, excavation and backfill and labor and materials incidental thereto.
- 3) Earth Excavation removed from the jacking operation and jacking pit construction is considered incidental to the work and part of the Item Jacking 42 Inch Steel Pipe. All material not to re-used shall be taken to the designated WSA.
- 4) Rock removed from the jacking operation shall be measured separately in accordance with the item "Rock Excavation (No explosives)".

### **Basis of Payment**

This work will be paid for at the contract lump sum unit price of "Jacking 42 Inch Steel Pipe", complete in place, which price shall include: the design, construction and removal of jacking pits, including earth excavation to construct the pits and perform the jacking operation; pipe jacking, furnishing pipe materials; dewatering; backfilling; submittals; final contact grouting; jacking shields left in place; monitoring of pit walls for lateral movement; soil stabilization; installing utility conduits and grouting and all materials, equipment, tools and labor incidental thereto. The contract lump sum price shall also include leaving the jacking shields in place and the cost of developing and implementing a contingency plan due to settlement or heave of the railroad, shoulders and embankments including any maintenance and protection of traffic required to address settlement. Payments will be made according to a schedule of value submitted by the Contractor and approved by the Engineer. Payment for the installation of the jacking pit shall not exceed 35% of the contract lump sum price.

The work of removal of the sacrificial jacking shields, if desired by the contractor, is included in the lump sum item for Jacking 42 Inch Steel Pipe, which work shall include all traffic

maintenance, cutting and restoration of pavement, restoration of disturbed areas, excavation and backfill and labor and materials incidental thereto.

Rock removed from the jacking operation and rock removed to perform the work shall be paid for separately in accordance with the item “Rock Excavation (No explosives)”.

<u>Pay Item</u>	<u>Unit</u>
Jacking 42 Inch Pipe	LS

**ITEM #0974005A – REMOVAL OF EXISTING RETAINING WALL (SITE NO. 1)**

Work under this item shall conform to the requirements of Section 9.74 amended as follows:

**Description:**

Work under this item shall include the removal and satisfactory disposal of the retaining wall constructed of modular units including fill inside, outside and on top of the units to the limits shown on the Contract Drawings.

**Construction Methods:**

The existing double wall retaining wall shall be removed to the lines shown on the plans or as ordered by the Engineer, due precaution being taken to avoid injury to new construction, public utility installation or abutting property. Temporary earth retaining system or earth retaining system left in place required for temporary support of roadway embankment for the removal of the existing wall shall be constructed in accordance with Item #0714050A, “Temporary Earth Retaining System”.

**Method of Measurement:**

The work under this item will not be measured for direct payment, but will be included in the Contract Lump Sum price.

**Basis of Payment:**

This work will be paid for at the Contract Lump Sum price for “Removal of Existing Retaining Wall (Site No. 1)”, which price shall include all equipment, tools, temporary earth retaining system or earth retaining system left in place, and labor incidental to the removal of the material and the disposal thereof as shown on the Contract Drawings.

Pay Item	Pay Unit
Removal of Existing Retaining Wall (Site No. 1)	LS

**ITEM NO. 1401984A – 18” PVC PIPE (SANITARY SEWER)**

**ITEM NO. 1403001A - MANHOLE (SANITARY SEWER)**

**ITEM NO. 1403002A – MANHOLE OVER 10’ DEEP (SANITARY SEWER)**

**ITEM NO. 1403501A – RESET MANHOLE (SANITARY SEWER)**

**ITEM NO. 1405075A – TELEVISION PIPELINE INSPECTION  
(SANITARY SEWER)**

**Description:** This Section includes all pipe, labor, equipment, appliances and materials required for the complete construction of a sanitary sewer at the locations and to the lines and grades indicated and/or as directed, including all pipe, pipe fittings and accessories, connections to other piping and structures, structures, trench excavation, shoring, bracing, dewatering, testing of pipelines and material tests, bypass pumping, jointing and jointing materials, installation, bedding materials, services of manufacturer's representatives and all other related and appurtenant work, complete in place and accepted, in accordance with the drawings and specifications, and as directed by the Owner.

Submittals: Submit the following

Product Data: For pipe, precast structures, frames and covers, and miscellaneous system products.

Shop Drawings: For excavation support and protection system; include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

The Contractor shall furnish to the Owner notarized test reports from the pipe and gasket manufacturers including methods of tests by an approved independent testing laboratory to show compliance of all materials furnished under this section of the specifications with all specification requirements. A copy of each test report is to be attached to the shipping list of each shipment itemizing by size; class and wall type, serial number and date of manufacture. All required testing of pipe materials furnished under this section of the specifications shall be provided by the Contractor at no additional expense to the Owner.

Field quality-control test reports.

The Contractor shall furnish, at no additional expense to the Owner, the services of pipe manufacturer's representatives for such lengths of time as may be necessary to properly instruct the Contractor's personnel in the proper handling, installation and jointing of the piping in accordance with the printed recommendations of the manufacturer of the pipe.

Guarantee: The Contractor shall furnish to the Owner a written guarantee signed by the manufacturer of the pipe, pipe fittings and gaskets which he proposes to furnish, which shall warrant and guarantee that the pipe, fittings and gaskets shall not fail or be injured as a result of conveying sewage, industrial wastes or groundwater. The form of guarantee shall in all respects be satisfactory to the Owner.

**Project Conditions:** Maintain flow of wastewater around section of pipes designated for replacement throughout duration of the Work.

**Materials:**

Polyvinyl Chloride (PVC) Sewer Pipe and Fittings:

Pipe shall be Poly-Vinyl Chloride Plastic Pipe with integral wall bell and spigot joints sealed with a rubber ring. Pipes and fittings shall meet and/or exceed all of the requirements of ASTM Specification D-3034, SDR 35, for Sanitary Sewer Pipe and Fittings.

Flexible Sewer Coupling: Fernco or approved equal.

Precast Concrete Manholes

Manholes shall comply with Section 5.07.02 of Form 816..

Pipe Connectors:

For new structures, connectors shall meet ASTM C923, resilient, of size required, for each pipe connecting to manhole section. Approved products include Lock Joint Flexible Manhole Sleeve by Interpace Corporation; KOR-N-SEAL; or approved equal.

For existing structures, connectors shall meet ASTM C923, resilient, of size required, for each pipe connecting to manhole section. Approved products include Kwik-Seal; Press Boot by Press Seal; or approved equal.

Manhole Frames and Covers:

Provide frames and covers of gray cast-iron conforming to ASTM A 48, Grade 30, H-20 Load Rated conforming to the requirements of the City of Stamford.

Manufacturers: Campbell Foundry, Pattern No. 1027, round flange or equal.

Miscellaneous

Brick: ASTM C32, Grade MS except Grade SS for manhole shelves.

Mortar: Composed by volume, of one part Portland cement and two parts sand. Do not add lime to mortar.

Grout: Form 816, Section M.03.01-14.

Filter Fabric: Form 816, Section M.08.01-26.

Flexible Gel: Hydrocide 700 by Degussa Building Systems; Parsonpoxy FG by Parson Environmental Products, Inc.; or approved equal.

Flexible Annular Space Filler: Manufactured by KOR-N-SEAL, Interpace, or approved equal.

Protective Coatings shall be two-coat, approved asphalt coating; 15-mil minimum thickness, unless otherwise indicated; factory or field applied to concrete manhole exterior surfaces.

**Execution:**

Post-Construction CCTV Inspection

Perform CCTV inspection of the installed sewer lines and structures to identify any defects in the installed system. The contractor shall provide a video log and written report of the findings to include structure locations, pipe size, and reference to all laterals and location of any defects to be repaired. After repairs are made the Contractor shall provide a follow-up CCTV of the repaired section for no additional cost. No additional compensation will be made to provide repairs of defect pipe.

The television camera used for the inspection shall be one specifically designed for such inspection. Lighting for the camera shall be suitable to allow a clear picture of the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. Unsatisfactory reproductions will not be accepted.

The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewers condition. In no case will the camera be pulled at a speed greater than thirty feet per minute.

By-Pass Pumping

Protect against surcharging of sewer system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather wastewater flows. Do not allow wastewater to discharge to storm drainage systems surface, or surface or ground water bodies

Provide standby pump(s) for each pump size capable of pumping equivalent wastewater flows for emergency use. Coordinate with the Engineer for appropriate time of by-pass. Provide personnel on site at all times during bypass pumping operations. Provide power source to operate bypass pumps at no additional cost.

Repair damage to existing pipes and structures to the satisfaction of the Engineer.

Inclement Weather Forecasts: Take additional and appropriate measures to protect the Work and to prevent release of wastewater when weather reports forecast potential conditions that may increase flow exceeding bypass pump capacity.

Earthwork

Perform trench excavation and backfilling in accordance with Form 816 Section 2.05. Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.

### Installation, General

Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. The existing sewer pipe in South State Street shall be maintained until the new sewer pipe is installed and accepted at which time the new sewer can be used and existing pie abandoned.

Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Install and support pipes and fittings with bedding material. Do not use saddles, blocking or stones as pipe supports. In structures, cut pipe flush with face of inside wall. Fill joint with annular space filler. When work is not in progress, close open ends of pipe to prevent entry of groundwater, earth, or foreign materials.

Install bell end with cap or plug at end of lateral sewer pipes, fittings, and pipe stubs. Use plugs of same material as pipe. Mark terminal ends with 51- by 76-mm lumber end markers that extend from invert to final grade. Install markers plumb. Leave end of marker exposed. In areas where marker cannot be exposed, fasten a steel plate or reinforcement rod to end of marker. Arrange for inspection by Engineer prior to backfilling.

Backfill must be placed and compacted in six inch (6") layers and shall conform to compaction standards detail, as shown on the plans. In the event the contractor wishes to utilize a hydraulic vibratory compactor, (ie: Ho-Pac) the compaction will be performed in the following manner; First lift shall be a minimum of four feet above the pipe. All lifts thereafter shall be a maximum of three to four feet depending upon soil conditions and may be reduced if proctor densities as stated on the detail are not obtained. Prior to construction the contractor will indicate the method of compaction and type of equipment he intends to use for this work.

No cutting of the final pavement course will be allowed. All sanitary sewer work to be constructed prior to final paving.

### Pipe Joint Construction and Installation

PVC Sewer Pipe and Fittings: Join pipe and fittings with gaskets according to ASTM D 2321 and manufacturer's written instructions. If full entry of pipe joint is not achieved, remove pipe and replace with new unit and gasket. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions. Close terminal ends of pipe and fittings with PVC stoppers secured in place.

RCP Pipe and Fittings: Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."

### Manhole Installation

Install manholes, complete with appurtenances and accessories indicated. Set manhole base level on 8 inches minimum bedding material. Align manhole steps. Assemble manhole sections before connecting pipe to manhole. Point inside and outside joints with mortar. Close lifting holes with plastic plugs and mortar. Prior to assembly, clean joint surfaces of precast concrete

sections and butyl rubber joint sealant. Form continuous channels and benches with concrete, brick and mortar, between inlets and outlet. Install precast concrete manhole sections with gaskets according to ASTM C 891. Fill annular space between sewer pipe and manhole on inner side of flexible pipe to manhole joint with flexible annular space filler.

#### Manhole Frames and Covers

Set frame in full bed of mortar. Cover bottom flange of frame with a thick, smooth-surfaced ring of mortar that extends to outside edge of masonry. Slope mortar ring to shed water away from frame. Set tops of frames and covers flush with finished surface of manholes that occur in pavements and lawns. Set tops 51 mm above finished grade of turf, unless otherwise indicated. At unpaved locations (except for lawns), surround manhole frame and masonry with concrete anchor ring as indicated. Adjust frames with collars, masonry units or bricks. Maximum adjustment height shall be 12 inches. For adjustments greater than 12 inches, install riser section for structure.

#### Concrete Placement

Place cast-in-place concrete according to ACI 318 and ACI 350R.

#### Abandoned Piping and Manholes

**Abandoned Piping:** Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Close open ends of piping with at least 8 inches-thick, cast-in-place concrete bulkheads; or close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.

**Abandoned Manholes:** Excavate around manhole as required and use either procedure below:

1. Remove manhole and close open ends of remaining piping and backfill to grade.
2. Remove top of manhole down to at least 915 mm below final grade. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete. Backfill remaining excavation to grade.

#### Field Quality Control

**General.** Clear interior of newly installed piping and structures of dirt and superfluous material as work progresses. Place plug in end of incomplete piping at end of day and when work stops. Flush piping between manholes and other structures to remove collected debris.

**Inspection:** Inspect interior of gravity sewer piping and structures to determine whether line displacement or other damage has occurred. Inspect after completion of backfill and compaction.

1. Submit reports for each system inspection.
2. Defects requiring correction include the following:

- a. Alignment: Less than full diameter of inside of pipe is visible between structures.
- b. Deflection: Flexible piping with deflection that prevents passage of 5 percent deflection gage meeting ASTM D3034.
- c. Crushed, broken, cracked, or otherwise damaged piping.
- 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
- 4. Re-inspect and repeat procedure until results are satisfactory.

Testing. Test new structure and piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

- 1. Perform testing upon completion of structure-to-structure sewer system segments. Provide by-pass pumping and cleaning of piping segment. Inspect mainline pipe joints
- 2. Schedule tests and inspections with Engineer; provide at least one business day advance notice.
- 3. Submit separate reports for each test.
- 4. Perform tests as follows:

a. New System Test - PVC Gravity Sewer Low-Pressure Air Test:

1) Plastic Pipe: Perform air test according to ASTM F 1417, Time Pressure Drop Method, modified as follows.

a) Minimum Allowable Time for 1.0 PSIG

Pipe Dia Mm (Inch)	Minimum Time (minutes)	Length (ft) for Min Time	Time (sec) for Longer Length (L) (Ft.)
152 (6)	5:40	398	0.854L
203 (8)	7:34	298	1.52L
305 (12)	11:20	199	3.418L

b) Calculate time for longer test lengths only when test length exceeds the lengths shown in the above table.

If test section fails, recompute time to include lateral lengths not included in previous calculation. Use the following formula:

$$T = 0.085[(D_1^2 L_1 + D_2^2 L_2 \dots + D_n^2 L_n) / (D_1 L_1 + D_2 L_2 \dots + D_n L_n)] K / Q$$

Where

T = Shortest time allowed for air pressure to drop 1.0 psig, seconds

K = 0.000419 (D<sub>1</sub>L<sub>1</sub> + D<sub>2</sub>L<sub>2</sub> ... + D<sub>n</sub>L<sub>n</sub>), but not less than 1.0

$$Q = 0.0015 \text{ cfm/sf}$$

$D_1, D_2, \text{ etc.} =$  Nominal diameter of different size of pipe being tested

$L_1, L_2, \text{ etc.} =$  Respective lengths of different size pipes being tested

- c) Modify air test pressure when groundwater is above top of sewer line. Install 152 mm (6 inch) or 203 mm (8 inch) diameter well points adjacent to manhole installations. Measure groundwater elevation prior to testing. Add to air pressure the following:

$$P = H / 2.3$$

*Where*

P = Pound of additional pressure

H = Height of groundwater elevation above sewer line, in feet

- Do not exceed 9.0 psig for total air pressure.

- b Gravity Sewer System Replacement Air Test (Joint Testing): Perform the following test upon completion of structure-to-structure segments.

- 1) Perform air test according to National Association of Sewer Service Companies (NASSCO), "Recommended Specifications for Sewer Collection System Rehabilitation", Section 6 "Sewer Pipe Joint Testing."
- 2) Test Pressure: 0.0207 MPa (3 psi) higher than surrounding groundwater pressure. In the absence of groundwater pressure data, provide pressure equal to 0.0035 MPa (1/2 psi) per vertical foot of pipe depth, or 0.0207 MPa (3 psi), whichever is greater. Maximum Pressure: 0.0689 MPa (10psi.)
- 3) Provide CCTV system, joint testing device (packer), and test monitoring equipment. Locate test monitoring controls above grade and in a location to allow for simultaneous and continuous observation of a television monitor and test monitoring equipment by the Engineer.
- 4) Test individual joints as sewer line replacement proceeds. Position testing device to straddle pipe joint. Expand testing device end elements and create a continuous void between the testing device and the pipe joint. Pressurize the air void; maintain minimum test pressure for 15 seconds with a 0.0138 MPa (2 psi) maximum drop in pressure.
- 5) Immediately repair joints failing pressurized test according to NASSCO, Section 7, Sewer Pipe Joint Sealing. Retest in accordance with the above procedures.
- 6) Complete testing and required repairs before returning sewer line to active service.

- 7) Submit written test records indicating test pressure; location (footage) of each joint tested; a statement indicating the test results for each joint tested; and retesting information for repaired joints.

c. Manholes: Perform vacuum test according to ASTM C1244.

- 1) Test each manhole prior to backfilling.
- 2) Plug lift holes with a non-shrink grout.
- 3) Temporarily plug pipes entering manhole. Secure and brace pipes and plugs to prevent them from being drawn into the manhole during testing.
- 4) Place test head at inside top of cone section and inflate seal in accordance with manufacturer's recommendations.
- 5) Draw a vacuum of 254 mm (10 inches) of mercury. Shut off pump.
- 6) With valves closed, measure elapsed time for vacuum to drop from 254 mm (10 inches) to 230 mm (9 inches.) Manhole shall pass if time meets or exceeds values indicated in Table 1.

Table1 - Minimum Test Times

Manhole Diameter		
1219 mm (48 inches)	1524 mm (60 inches)	1830 mm (72 inches)
Time to Drop Vacuum from 10 Inches to 9 Inches		
60 seconds	75 seconds	90 seconds

5. Leaks and loss in test pressure constitute defects that must be repaired.
6. Replace leaking piping and structures using new materials, and repeat testing until leakage is within allowances specified.

**Method of Measurement:**

Sewer Pipe: Measured for payment by the linear foot of the various sizes and types of material measured in place along the invert of the piping, complete in place and accepted. In measuring the lengths of pipe for payment, deduct the lengths of manhole inverts, as measured between inside faces of manhole walls. No separate measurement will be made for trench excavation, marking tape; vertical drops, and fittings including bends, reducers, couplings, adaptors, wyes and tees. There will be no measurement for wyes and lateral pipe to connect existing laterals to remain in service or laterals to be abandoned and capped but this work and materials shall be included in the measurement for PVC Pipe (Sanitary Sewer) of the size specified.

Manholes: Measured for payment on a per each basis by the appropriate type, size, and depth.

Manhole Frames and Covers: Will not be measured separately but shall be included with the measurement for Manholes.

Television Pipeline Inspection: For pre-installation verification of extent of non-surveyed existing sewer line and laterals and post television inspection, this work shall not be measured but they will be paid on a lump sum basis.

Remove Manhole / Remove Pipe: Measured for payment by the Cubic Yard under the Item Trench Excavation.

**Basis of Payment:**

Sewer Pipe: Paid for at the Contract Unit Price per linear foot of the appropriate pipe diameter, and material, complete in place, including bypass pumping, trench excavating, temporary excavation support system, dewatering, bedding, backfilling, filter fabric, impervious backfill where directed, fittings (including bends, reducers, couplings, adaptors, wyes and tees), cleaning, testing, and all materials, labor, tools, and equipment incidental to the Work. No additional payment will be made for shoring, bracing, pumping, bailing or for material or equipment necessary for the satisfactory completion of the work. The work to connect existing laterals to remain in service and laterals to be abandoned and capped shall be included in the cost of PVC Pipe (Sanitary Sewer) of the size specified.

Manholes: Paid for at the Contract Unit Price per each, of the type and diameter specified, for manholes not having a depth over 10 feet, complete in place, which price shall include frames and covers, steps, excavation, backfill, inverts, and connection to sewer service main; and all materials, equipment, tools and labor incidental thereto. No additional payment will be made for shoring, bracing, pumping, bailing or for material or equipment necessary for the satisfactory completion of the work.

Manholes Over a Depth of 10 feet: Paid for at the Contract Unit Price per each, of the type and diameter specified, complete in place, which price shall include frames and covers, steps, excavation, backfill, inverts, and connection to sewer service main; and all materials, equipment, tools and labor incidental thereto. No additional payment will be made for shoring, bracing, pumping, bailing or for material or equipment necessary for the satisfactory completion of the work.

Manhole "coring" and connections to existing stubs or pipes shall not be paid as separate items but shall be included in the prices bid for other items of work.

Abandoned Manhole: Paid for at the Contract Unit Price per each, regardless of diameter or type, including excavation, cutting and plugging of existing pipe, backfilling; and including materials, labor, tools, and equipment incidental to the Work.

Remove Manhole / Remove Pipe: Paid for under the Item Trench Excavation

Television Pipeline Inspection (Sanitary Sewer): Paid post construction for at the Contract Lump Sum Price, regardless of diameter or type, including cleaning of existing line, camera inspection, assigning stationing of laterals, identifying lateral size and activity; reports, and including materials, labor, tools, and equipment incidental to the Work.

<u>Pay Item</u>	<u>Pay Unit</u>
18" PVC Pipe (Sanitary Sewer)	LF
Manhole (Sanitary Sewer)	Ea
Manhole Over 10' Deep (Sanitary Sewer)	Ea
Television Pipeline Inspection (Sanitary Sewer)	LS

## **ITEM 1507000A – PROTECTION AND SUPPORT OF EXISTING UTILITIES**

### **Description:**

Work under this item shall consist of designing, furnishing, placing and subsequently removing temporary supports and protection shields which will be necessary to protect and / or stabilize the existing utilities during the construction of the drainage, structures, roadway, traffic signal foundations and other work as shown on the plans. The affected utilities, as shown on the plans include, but are not limited to: SNET, dba Frontier Communications of Connecticut; Aquarian Water Company of Connecticut; Yankee Gas Services Company; Cablevision of Connecticut, LP; Northeast Utilities; Traffic Control lines owned by Connecticut DOT or City of Stamford; IMS lines owned by Connecticut DOT or City of Stamford; Sanitary Sewers owned by City of Stamford Water Pollution Control Authority, duct banks and fiber optics owned by Level 3 and drainage culverts owned by Connecticut DOT or the City of Stamford. The work shall be performed in accordance with these specifications.

The work pertaining to the temporary support of the drainage system, gas main, electrical lines and duct banks, communication lines and duct banks, water mains and sewer lines primarily involves the support and prevention of damages which are possible during the excavation and construction of the proposed work. The work shall also include the protection and support of overhead facilities and utility poles.

This work includes, but is not limited to, the support and / or protection of existing utilities in the following known areas of conflict:

- South State Street and Canal Street Intersection, new drainage pipe proposed to connect to existing drainage manhole (potential for conflicts with electric duct banks, gas mains and water main, all shown on the plan).
- South State Street, between Station 506+50 and 521+25 +/-, new sanitary and drainage facilities proposed in proximity to existing sanitary and drainage facilities that must be maintained during construction.
- Canal Street between Station 12+00 and 13+00 +/-, new drainage facility proposed that runs parallel and adjacent to the existing water main.
- South State Street and Atlantic Street intersection, new drainage and sanitary pipe proposed that crosses several existing utilities including Verizon & Frontier telecommunications facilities, electric duct bank, gas main and water main.

The Contractor shall support vertical trenches to avoid undermining or loss of lateral support for all utilities adjacent to parallel installations, crossings of utilities and utilities adjacent to the traffic signal mast arm foundations.

The Contractor is herein made aware that construction of the proposed work will require the installation of shoring or other lateral support work and will require pipe installation beneath or adjacent to active electrical conduit and duct banks, water main, gas mains, sanitary sewer and storm drains. The Contractor shall protect and provide for all utilities either buried or above ground to maintain service.

The Contractor is advised that no service interruption resulting from Contractor operations will be allowed, except as otherwise provided in the Special Provision "Prosecution and Progress." Extreme caution shall be exercised during all stages of construction in order to preserve the existing utilities. A Department representative shall be present at the installation of the temporary supports. Further attention shall be paid to "Section 1.07 – Legal Relations and Responsibilities," and the Notice to Contractor for "Protection of Existing Utilities".

The Contractor shall notify the Engineer prior to the start of his work and shall be responsible for all coordination with the Department and the utility companies. The Contractor shall allow the Engineer complete access to the work.

The Contractor is herein advised that it is his responsibility to verify locations, conditions and field dimensions of all existing features, as actual conditions may differ from information indicated on the plans or contained elsewhere in these specifications.

**Materials:**

The materials for this work shall be of satisfactory quality for the purpose intended and shall be submitted for review by the Engineer. The material shall be intended for use in structures and shall be sound and capable of safely carrying the specified loads.

**Construction Methods:**

The Contractor shall prepare working drawings and computations showing his proposed method of support and protection for each utility to be supported and protected. Preparation and submittal of working drawings and computations shall conform to the requirements of Article 1.05.02. The support shall safely carry all utility dead loads and any imposed loadings under all possible construction conditions. The utility protection shields shall safely carry any imposed loadings under all possible construction conditions. Said supports and protections shall be constructed in a manner that will not interfere with the proposed construction.

The Contractor shall use every effort to protect all utilities from damage of any nature which might result from carelessness or negligence in his operations. He shall be held solely and strictly responsible for any damage resulting from such carelessness and negligence.

A periodic inspection of the temporary utility support and protection shall be performed by the Contractor, as directed by the Engineer.

The Contractor shall and maintain the existing utilities until the proposed construction has been completed to a point where removal of the supports will not cause damage to the protected utility.

When the temporary support and protection systems are no longer required, they shall be removed from the site by the Contractor.

**Method of Measurement**

This work, being paid for on a lump sum basis, will not be measured for payment.

**Basis for Payment:**

The work will be paid for at the contract lump sum price for "Protection and Support of Existing Utilities" which price shall include designing and detailing all supports and protection shields, working drawing submittals, furnishing, installing, periodic inspection, removing supports and protection shields, coordinating work with the utility companies, furnishing and installing vertical trench supports and shoring and all materials, equipment, tools and labor incidental thereto.

Pay Item	Pay Unit
Protection and Support of Existing Utilities	Lump Sum