

**JUNE 1, 2017**  
**REPLACEMENT OF MNRR BRIDGE OVER ATLANTIC STREET – PHASE 2**  
**FEDERAL AID PROJECT NO. H121(002) & N/A**  
**STATE PROJECT NOS. 0135 – 0301 & 0301 – 0163**  
**CITY OF STAMFORD**

**ADDENDUM NO. 4**

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. 57, 71, 132, 171, 181, 184, 188, 240, 245, 247, 248, 249, 254 to 256, 261, 264, 272, 274 to 276, 288, 289, 292, 299, 300, 302, 303 and 305.

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

The following Special Provision is hereby added to the Contract:

- **ITEM NO. 0506550A – DOWNSPOUT SPLASH PAD**

**REVISED SPECIAL PROVISIONS**

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- **CONTRACT TIME AND LIQUIDATED DAMAGES**
- **NOTICE TO CONTRACTOR – ENVIRONMENTAL INVESTIGATIONS**
- **SECTION 1.08– PROSECUTION AND PROGRESS**
- 
- **ITEM NO. 0096065A – REMOVAL OF CATENARY**
- **ITEM NO. 0096066A – REMOVAL OF SIGNAL AND COMMUNICATION CABLES**
- **ITEM NO. 0096068A – REMOVAL CATENARY PORTAL STRUCTURE**
- **ITEM NO. 0096070A – REMOVAL OF CATENARY STRUCTURE FOUNDATION**
- **ITEM NO. 0096081A – REMOVAL OF FEEDER OR AERIAL GROUND WIRE**
- **ITEM NO. 0099010A – REMOVAL OF ABANDONED RAILROAD EQUIPMENT**

- ITEM NO. 0096084A – MOTOR OPERATED DISCONNECT SWITCH
- ITEM NO. 0101175A – PCB WASTE HANDLING
- ITEM NO. 0202528A – REMOVAL OF RAILROAD TRACKS
- ITEM NO. 0213904A– BALLAST MAT
  
- ITEM NO. 0503020A – RAILROAD TRACK WORK
- ITEM NO. 0503471A – TURNOUT INSTALLATION
- ITEM NO. 0503004A – LIFT AND LINE EXISTING TRACK
  
- ITEM NO. 0601980A – PRECAST CONCRETE PLATFORM – TYPE 1 (10’ WIDE)
- ITEM NO. 0714016A – LAGGING

**DELETED SPECIAL PROVISIONS**

The following Special Provisions are hereby deleted in their entirety:

- ITEM NO. 0096052A – AUXILIARY POWER TRANSFORMERS
- ITEM NO. 1507000A – PROTECTION AND SUPPORT OF EXISTING UTILITIES

**CONTRACT ITEMS**

**NEW CONTRACT ITEM**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
<u>0506550A</u>	<u>DOWNSPOUT SPLASH PAD</u>	<u>EA</u>	<u>64 EA</u>

**REVISED CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0096066A</u>	<u>REMOVAL OF SIGNAL AND COMMUNICATION CABLES</u>	<u>4,000 LF</u>	<u>1,200 LF</u>
<u>0096070A</u>	<u>REMOVAL OF CATERNARY STRUCTURE FOUNDATION</u>	<u>14 EA</u>	<u>12 EA</u>
<u>0096084A</u>	<u>MOTOR OPERATED DISCONNECT SWITCH</u>	<u>1 EA</u>	<u>2 EA</u>
<u>0101117A</u>	<u>CONTROLLED MATERIALS HANDLING</u>	<u>13,300 CY</u>	<u>16,820 CY</u>
<u>0101175A</u>	<u>PCB WASTE HANDLING</u>	<u>4,500CY</u>	<u>980 CY</u>
<u>0101176A</u>	<u>DISPOSAL OF PCB WASTE</u>	<u>6,750 TON</u>	<u>1,470 TON</u>
<u>0202315A</u>	<u>DISPOSAL OF CONTROLLED MATERIALS</u>	<u>20,138 TON</u>	<u>25,418 TON</u>
<u>0202528A</u>	<u>REMOVAL OF RAILROAD TRACKS</u>	<u>1,386 LF</u>	<u>2,404 LF</u>
<u>0503004A</u>	<u>LIFT AND LINE EXISTING TRACK</u>	<u>4055 LF</u>	<u>2,125 LF</u>
<u>0509001</u>	<u>WELDED STUDS</u>	<u>6,904 EA</u>	<u>6,664 EA</u>

<u>0601000</u>	<u>CLASS "A" CONCRETE</u>	<u>2,395 CY</u>	<u>2,372 CY</u>
<u>0601201</u>	<u>CLASS "F" CONCRETE</u>	<u>2,988 CY</u>	<u>3,003 CY</u>
<u>0602000</u>	<u>DEFORMED STEEL BARS</u>	<u>471,780 LB</u>	<u>475,430 LB</u>
<u>0603851A</u>	<u>STRUCTURAL STEEL (LOW</u> <u>ALLOY)</u>	<u>1,163 CWT</u>	<u>1,203 CWT</u>
<u>0702026A</u>	<u>MICROPILES</u>	<u>325 EA</u>	<u>327 EA</u>
<u>0728020A</u>	<u>STONE BALLAST</u>	<u>1,197 TON</u>	<u>3,508 TON</u>
<u>0822002</u>	<u>RELOCATED TEMPORARY</u> <u>PRECAST CONCRETE BARRIER</u> <u>CURB</u>	<u>370 LF</u>	<u>760 LF</u>
<u>0822010A</u>	<u>REMOVAL OF TEMPORARY</u> <u>PRECAST CONCRETE BARRIER</u> <u>CURB</u>	<u>2,846 LF</u>	<u>1,400 LF</u>

**DELETED CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL</u> <u>QUANTITY</u>	<u>REVISED</u> <u>QUANTITY</u>
<u>1801000</u>	<u>REPAIR OF IMPACT</u> <u>ATTENUATION SYSTEM TYE A,</u> <u>MODULE 200 LB</u>	<u>16 EA</u>	<u>0 EA</u>
<u>1801003</u>	<u>REPAIR OF IMPACT</u> <u>ATTENUATION SYSTEM TYE A,</u> <u>MODULE 1400 LB</u>	<u>16 EA</u>	<u>0 EA</u>

**PLANS**

**NEW PLANS**

The following Plan Sheets are hereby added to the Contract:

<u>01.13.007.A4</u>
<u>01.13.008.A4</u>
<u>02.03.050-1.A4</u>
<u>02.05.048.A4</u>
<u>02.05.049.A4</u>
<u>02.05.050.A4</u>
<u>02.05.051.A4</u>
<u>02.05.052.A4</u>
<u>02.05.053.A4</u>
<u>02.05.054.A4</u>
<u>02.05.055.A4</u>
<u>02.05.056.A4</u>
<u>02.05.057.A4</u>
<u>02.05.058.A4</u>
<u>02.05.059.A4</u>
<u>02.05.060.A4</u>

**REVISED PLANS**

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:

<u>01.02.001.A4</u>
<u>01.05.046.A4</u>
<u>01.06.005.A4</u>
<u>01.06.009-1.A4</u>
<u>01.06.009-2.A4</u>
<u>01.06.009-3.A4</u>
<u>01.07.006.A4</u>
<u>01.07.010-1.A4</u>
<u>01.07.010-2.A4</u>
<u>01.08.005.A4</u>
<u>01.13.007.A4</u>
<u>01.13.008.A4</u>
<u>02.02.001.A4</u>
<u>02.03.045.A4</u>
<u>02.03.047.A4</u>
<u>02.03.058.A4</u>
<u>02.04.031.A4</u>
<u>02.05.003.A4</u>
<u>02.08.009.A4</u>
<u>02.08.010-1.A4</u>
<u>02.08.010-2.A4</u>
<u>02.09.010.A4</u>
<u>02.09.012.A4</u>

**DELETED PLAN**

The following Plan Sheet is hereby deleted in its entirety:

02.03.051

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

The Detailed Estimate Sheets do not reflect these changes.

The Construction Completion Date has been revised in this Addendum.

The foregoing is hereby made a part of the contract.

**ITEM #0506550A – DOWNSPOUT SPLASH PAD**

**Description:** Work under this item shall consist of fabricating, furnishing, transporting and installing concrete downspout splash pads where shown on the plans and in accordance with this specification. Downspout splash pads may consist of cast-in-place or precast concrete. Also included in this item shall be all other necessary materials and equipment required to complete the work described in this item.

**Materials:** The concrete shall be Class “A” Concrete conforming to Article M.03.01 of the Standard Specifications.

**Construction Methods:** Downspouts shall be constructed where indicated in the Contract Plans. Downspout splash pads shall be a minimum of 30” Long by 12” Wide and have a minimum thickness of 1”. There shall be a trough shape, open on one side, to direct water away from the foundations. Splash pads shall be sloped a minimum of 2% and a maximum of 5%.

**Method of Measurement:** This work shall be measured for payment by the number of downspout splash pads constructed, installed, complete in place and accepted.

**Basis of Payment:** This work shall be paid for at the contract unit price per each for “Downspout Splash Pad”, complete in place, which price shall include all work associated with the furnishing, fabrication, construction and installation of downspout splash pads and all materials, equipment, tools and labor incidental thereto.

<u>Pay Item</u>	<u>Pay Unit</u>
Downspout Splash Pad	EA

February 8, 2017  
FEDERAL AID PROJECT NOS. H121(002) and N/A  
STATE PROJECT NOS. 135-301 and 301-163

Replacement of Metro-North Railroad Bridge No. 08012R  
City of Stamford  
Federal Aid Project No. H121(002) and N/A

The State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridges, facilities and Incidental Construction, Form 817, 2016, is hereby made part of this Contract, as modified by the Special Provisions contained herein. The current edition of the State of Connecticut Department of Transportation's "Construction Contract Bidding and Award Manual" ("Manual"), is hereby made part of this Contract. If the provisions of this Manual conflict with provisions of other Department documents (not including statutes or regulations), the provisions of the Manual will govern. The Manual is available upon request from the Transportation Manager of Contracts. The Special Provisions relate in particular to the Replacement of the Metro-North Railroad (MNR) Bridge over Atlantic Street and Catenary Improvements and Track 7 Extension, including the Reconstruction of Atlantic Street and South State Street in the City of Stamford.

### **COMBINED PROJECTS**

There will be but one Contract for Federal Aid Project No. H121(002) – (State Project No. 135-301) and Federal Aid Project No. N/A – (State Project No. 301-163). The two projects will be considered as a single Contract in all respects.

### **CONTRACT TIME AND LIQUIDATED DAMAGES**

For Federal Aid Project No. H121(002) – (State Project No. 135-301) and Federal Aid Project No. N/A – (State Project No. 301-163) the Construction Completion Date of November 30, 2020 will be allowed for completion of the work and liquidated damages charge to apply will be Eighteen Thousand dollars (\$18,000) per calendar day. Liquidated Damages, if any apply, under this Contract will be assessed with no maximum assessment.

GENERAL

## **NOTICE TO CONTRACTOR – ENVIRONMENTAL INVESTIGATIONS**

Environmental site investigations have been conducted that involved the sampling and laboratory analysis of soil and groundwater collected from various locations and depths within the Project limits. The results of these investigations indicated the presence of total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), RCRA-8 metals, poly-chlorinated biphenyls (PCBs), and pesticides in soils within proposed construction areas at concentrations above the Connecticut Department of Energy and Environmental Protection (CT DEEP) Remediation Standard Regulations (RSRs). Based on these findings, an Area of Environmental Concern (AOEC) and four (4) PCB AOECs have been identified within the proposed Project limits. Additionally, the remainder of the Project Area is considered a Low-Level Area of Environmental Concern (LLAOEC). Groundwater within the Project limits is also impacted with VOCs and SVOCs above applicable RSR numeric criteria. (It is noted that groundwater was limited in discovery during the investigation of overburden soils). The presence of the compounds at these concentrations will require material-handling measures for soils and groundwater beyond those required for normal construction operations and will be restricted to the methods described herein.

The Contractor is hereby notified that controlled materials requiring special management or disposal procedures will be encountered during various construction activities conducted within the Project limits. Therefore, the Contractor will be required to implement appropriate health and safety measures for all construction activities to be performed within the AOEC/PCB AOEC/LLAOEC locations. These measures shall include, but are not limited to, air monitoring, engineering controls, personal protective equipment and decontamination, equipment decontamination and personnel training. **WORKER HEALTH AND SAFETY PROTOCOLS WHICH ADDRESS POTENTIAL AND/OR ACTUAL RISK OF EXPOSURE TO SITE SPECIFIC HAZARDS IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR.**

The Connecticut Department of Transportation, as Generator, will provide an authorized representative to sign all manifests and waste profile documentation required by disposal facilities for disposal of controlled materials and contaminated groundwater.

The Sections which shall be reviewed by the Contractor include, but are not limited to, the following:

- Item No. 0101000A – Environmental Health and Safety
- Item No. 0101117A – Controlled Materials Handling
- Item No. 0101175A – PCB Waste Handling
- Item No. 0101176A – Disposal of PCB Waste

GENERAL

- Item No. 0202315A – Disposal of Controlled Material
- Item No. 0204213A – Handling Contaminated Groundwater

The Contractor is alerted to the fact that a Department environmental consultant will be on site for excavation and dewatering activities within the AOEC/PCB AOEC/LLAOEC locations to collect soil and groundwater samples (if necessary), and to observe site conditions for the State. **The Norwalk waste stockpile area (WSA) indicated on the plans is to be used exclusively for temporary stockpiling of excavated materials from within the project AOEC/ surplus excavated material from LLAOEC locations for determination of disposal classification. The Stamford waste stockpile area (WSA) indicated on the plans is to be used exclusively for temporary stockpiling of excavated PCB AOEC materials for determination of disposal classification.**

All suitable material excavated from the AOEC may be reused within the AOEC from which it was excavated as fill/backfill, in accordance with the following conditions: (1) such soil is deemed to be structurally suitable as fill by the Engineer; (2) such soil is not placed below the water table; (3) the CT DEEP groundwater classification of the area where the soil is to be reused as fill does not preclude said use; and (4) such soil is not placed in an area subject to erosion. Soils within the LLAOECs are to be reused on site prior to the use of other soils and/or fill such that no excess soils requiring off-site disposal are generated from the LLAOEC locations. Soils excavated from PCB AOECs down to 4 feet below grade are slated for disposal and are not permitted for reuse.

Information pertaining to the results of the environmental investigations discussed can be found in the documents listed below. These documents shall be available for review at the Office of Contracts, 2800 Berlin Turnpike, Newington, Connecticut.

- Task 210: Subsurface Site Investigation – Reconstruction of Metro-North Railroad Bridge over Atlantic Street, Stamford, CT; prepared by HRP Associates, Inc., dated January 6, 2015.



## **SECTION 1.08 – PROSECUTION AND PROGRESS**

**Article 1.08.01 – Transfer of Work or Contract:** *Add the following after the last paragraph:*

The Contractor shall pay the subcontractor for work performed within thirty (30) days after the Contractor receives payment for the work performed by the subcontractor. Also, any retained monies on a subcontractor's work shall be paid to the subcontractor within thirty (30) days after satisfactory completion of all of the subcontractor's work.

For the purpose of this Item, satisfactory completion shall have been accomplished when:

- (1) The subcontractor has fulfilled the contract requirements of both the Department and the subcontract for the subcontracted work, including the completion of any specified material and equipment testing requirement or plant establishment period and the submission of all submittals (i.e.: certified payrolls, material samples and certifications, required state and federal submissions, etc.) required by the specifications and the Department, and
- (2) The work done by the subcontractor has been inspected and approved by the Department and the final quantities of the subcontractor's work have been determined and agreed upon.

If the Contractor determines that a subcontractor's work is not complete, the Contractor shall notify the subcontractor and the Engineer, in writing, of the reasons why the subcontractor's work is not complete. This written notification shall be provided to the subcontractor and the Engineer within twenty-one (21) days of the subcontractor's request for release of retainage.

The Engineer will institute administrative procedures to expedite the determination of final quantities for the subcontractor's satisfactorily completed work.

The inspection and approval of a subcontractor's work does not eliminate the Contractor's responsibilities for all the work as defined in Article 1.07.12, "Contractor's Responsibility for Work."

The inspection and approval of the subcontractor's work does not release the subcontractor from its responsibility for maintenance and other periods of subcontractor responsibility specified for the subcontractor's items of work. Failure of a subcontractor to meet its maintenance, warranty and/or defective work responsibilities may result in a finding that the subcontractor is non-responsible on future subcontract assignments.

For any dispute regarding prompt payment or release of retainage, the alternate dispute resolution provisions of this article shall apply.

The above requirements are also applicable to all sub-tier subcontractors and the above provisions shall be made a part of all subcontract agreements.

Failure of the Contractor to comply with the provisions of this section may result in a finding that the Contractor is non-responsible on future projects.

**Article 1.08.03 – Utility Schedules:** Add the following: Eversource Electric Distribution, Aquarion Water Company, Frontier Communications, Eversource Gas

rev. 5/20/2013		<b>UTILITY WORK SCHEDULE</b>	
CTDOT Project Number:	135-301 / 135-326	Town:	Stamford
Project Description:	CTDOT Reconstruction of Atlantic St		
CTDOT Utilities Engineer:	Derek Brown		
Phone:	860-594-2555	Email:	Derek.Brown@ct.gov
Utility Company:	Eversource Energy		
Prepared By:	Michael Parillo	Date Prepared:	5/29/2015
Phone:	203-352-5431	Email:	michael.parillo@eversource.com
<b>Scope of Work</b>			
The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.			
<p>Install Approximately 1600' of 12 Position, 5" PVC Duct Bank amongst 10 Manholes (6 New). Civil work on South State St, Manhattan St &amp; Atlantic St was assumed to take 1 day for 10' of installed duct bank. All MH Installations were assumed to take 3 days per location using information contained on the latest drawings forwarded to CL&amp;P via email on 5/15/15. All CL&amp;P work outside of the following cannot begin until the completion of the 2 pipe jacks underneath the MNRR railroad....</p> <p>((1)) Inst. 300' of 12 Position duct bank from New MH 16 to Existing MH 17 (CIVIL ONLY). Inst. MH 16.</p> <p>((2)) Inst. 350' of 12 Position duct bank from New MH 499 to Existing MH 500 (CIVIL ONLY). Inst. MH 499.</p> <p>((3)) Pull Cable from MH 502 to MH 13 &amp; Complete Cutover of 1G16 Circuit</p>			
<b>Special Considerations and Constraints</b>			
The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..			
<ul style="list-style-type: none"> <li>- June 1 - Sept. 1 is the Summer Moratorium. No Cutover can be planned during this period.</li> <li>- Attached schedule assumes 40 hr work week, 8 or 10 hour work days.</li> <li>- Weather dependant and assumes no weather extremes</li> <li>- Assumes no road closures</li> <li>- Assumes no coordination with MNRR or MNRR Flaggers</li> <li>- Assumes minor to moderate ledge during civil work</li> <li>- Assumes no delay with Frontier or other utility conflicts during inst./transfer of cable</li> <li>- Favorable Elec. Distrib. operating condition for cable cutover with other CL&amp;P Capital Work</li> <li>- Assuming the abandoning of 4 existing MH's and associated duct in vicinity of MNRR bridge</li> </ul>			

UTILITY WORK SCHEDULE			
CTDOT Project Number: 135-301 / 135-326			
Utility Company: Eversource Energy			
Prepared By: Michael Parillo		Total Calendar Days: 241	
Schedule			
The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.			
Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
NA	Notice to Proceed	NONE	
NA	State contractor marking out critical elevations /project landmarks (i.e curblines / retaining wall)	Notice to Proceed	
NA	Acquire Town/State Permits & Order Material *Jacked Pipe Spacers carry 5 week lead time	Notice to Proceed	21
303 + 00 - 301 + 50	Inst. 150' of 12 Position duct bank from Existing MH 503 to New MH 1154 (CIVIL ONLY). Install MH 1154.	42"/48" RCP/Steel Pipe Jack Install Completion	18
303 + 00 - 300 + 00	Inst. 300' of 12 Position duct bank from Existing MH 502 to New MH 1156 (CIVIL ONLY). Install MH 1156.	42"/48" RCP/Steel Pipe Jack Install Completion	33
505 + 00 - 508 + 50	Inst. 350' of 12 Position duct bank from New MH 1155 to New MH 499 (CIVIL ONLY). Install MH 1155.	42"/48" RCP/Steel Pipe Jack Install Completion	38
508 + 50 - 512 + 00	Inst. 350' of 12 Position duct bank from New MH 499 to Existing MH 500 (CIVIL ONLY). Inst. MH 499.	Notice to Proceed	38
510 + 50 - 512 + 00	Inst. 150' of 12 Position duct bank from New MH 1157 to New MH 16 (CIVIL ONLY). Install MH 1157.	42"/48" RCP/Steel Pipe Jack Install Completion	18
205 + 00 - 208 + 00	Inst. 300' of 12 Position duct bank from New MH 16 to Existing MH 17 (CIVIL ONLY). Inst. MH 16.	Notice to Proceed	33
303 + 00 - 301 + 50 505 + 00 - 512 + 00	Pull Cable from MH 503 to MH 500 & Complete Cutover of 1G05 Circuit	Civil Completion	21
303 + 00 - 301 + 50 505 + 00 - 512 + 00	Pull Cable from MH 503 to MH 500 & Complete Cutover of 1G08 Circuit	1G05 Cutover Completion	21

UTILITY WORK SCHEDULE			
CTDOT Project Number: 135-301 / 135-326			
Utility Company: Eversource Energy			
Prepared By: Michael Parillo		Total Calendar Days: 203	
Schedule			
The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.			
Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
303 + 00 - 301 + 50 505 + 00 - 512 + 00	Pull Cable from MH 503 to MH 500 & Complete Cutover of 1G12 Circuit	1G08 Cutover Completion	21
303 + 00 - 301 + 50 505 + 00 - 512 + 00	Pull Cable from MH 503 to MH 500 & Complete Cutover of 1G09 Circuit	1G12 Cutover Completion	21
303 + 00 - 301 + 50 505 + 00 - 512 + 00	Pull Cable from MH 503 to MH 500 & Complete Cutover of 1G01 Circuit	1G09 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G14 Circuit	1G01 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G11 Circuit	1G14 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G03 Circuit	1G11 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G06 Circuit	1G03 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G07 Circuit	1G06 Cutover Completion	21
303-300,512-510+50 205 + 00 - 208 + 00	Pull Cable from MH 502 to MH 17 & Complete Cutover of 1G10 Circuit	1G07 Cutover Completion	21
Out of Project Boundaries	Pull Cable from MH 502 to MH 13 & Complete Cutover of 1G16 Circuit	NONE	14

rev. 5/20/2013		<b>UTILITY WORK SCHEDULE</b>	
CTDOT Project Number:	135-326	Town:	Stamford
Project Description:	Replacement of MNRR Bridge over Atlantic Street - Phase 1		
CTDOT Utilities Engineer:	Derek Brown		
Phone:	860-594-2555	Email:	Derek.Brown@ct.gov
Utility Company:	Aquarion Water Company of Connecticut		
Prepared By:	Carlos J. Vizcarrondo	Date Prepared:	Jun-15
Phone:	203 337-5950	Email:	cvizcarrondo@aquarionwater.com
<b>Scope of Work</b>			
<p>The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.</p>			
<p>The Aquarion Water Company will utilize the State's Contractor to cut, plug and abandon water mains in Manhattan Street (8") and South State Street (12") that are in conflict with utility and storm drainage work proposed under Project 135-326. The abandoned 8" water main in Manhattan Street will not be replaced. Approximately 835 feet of 12" water main in South State Street will be replaced by the State's Contractor extending from Canal Street westerly toward the limit of construction for future Project 135-301 on Atlantic Street.</p>			
<b>Special Considerations and Constraints</b>			
<p>The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..</p>			
<p>There are no building services on the water main segments to be abandoned. There are two hydrants connected to the water main in South State Street. Maintenance of fire flow to these hydrants is mandatory unless approved in writing by the City of Stamford.</p>			

UTILITY WORK SCHEDULE			
CTDOT Project Number: 135-326			
Utility Company: Aquarion Water Company of Connecticut			
Prepared By: Carlos J. Vizcarrondo		Total Calendar Days: 23	
Schedule			
The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.			
Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
301+45 Manhattan	Cut and Cap Existing 8 inch Water Main.	None.	2
302+75 Manhattan	Cut and Cap Existing 8 inch Water Main.	None.	2
510+90 South State	Cut and Cap Existing 12 inch Water Main.	None.	2
520+35 South State	Cut and Cap Existing 12 inch Water Main. Abandon 12 inch Water Main in South State Street.	None.	2
521+50 Canal Street	Offset 16 inch Water Main to 1.5 feet below proposed Storm Drain.	To be completed in conjunction with Storm Drain installation.	5
512+00 To 520+35	Install 835 feet of new 12 inch Water Main along South State Street.	State Contractor to excavate roadway to bottom of subgrade for water company.	10

## UTILITY WORK SCHEDULE

CTDOT Project Number: 135-301/326

Utility Company: Frontier Communications

Prepared By: Kenneth L. Sherman

Total Calendar Days: 150

### Schedule

The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.

Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
205+75	Test Pits to determine new manhole #331 for rebuild size that can fit.	Receiving funding and permits	2
511+05	Test Pits to determine new manhole size that can fit.		2
302+10	Test Pits to determine new manhole size that can fit.		2
203+00	Test Pits to determine new manhole size that can fit.		2
208+58 to 205+75	New duct structure (4-4"P) from manhole #17 to new manhole #331.	Frontier Communications to rebuild mh #331 first.	6
205+75	Breakout old conduit structures, removal existing manhole #331.		33
205+75 to 511+05	Install new manhole #331 and lower ex. Conduits and place new conduits to new manhole on South State St.		58
511+05	Install new manhole on South State Street. Breakout and shift existing structures.		4
* 511+05 to 302+10	Install conduits and spacers in boring caisson.	State Contractors must be completed with bore.	see below
302+10	Install new manhole on Manhattan Street. Breakout and shift existing structures.	Eversource must be out of their old duct structure	9
	* NOTE: AT&T work in this area		32

UTILITY WORK SCHEDULE			
CTDOT Project Number: 135-301/326			
Utility Company: Frontier Communications			
Prepared By: Kenneth L. Sherman		Total Calendar Days: 184	
Schedule			
The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.			
Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
203+00	Install new manhole on Atlantic Street. Breakout and shift existing structures.		6
302+10 to 203+00	Lower and shift ex. Conduits, place new Conduits to new MH on Manhattan St. to new MH on Atlantic St.		28
203+00 to 201+45	Lower and shift ex. Conduits into new MH on Atlantic St.		7
204+90	Abandon-in-Place Manhole #25 (brick) in place lower 3' below existing grade		2
203+80	Abandon-in-Place Manhole #18 (brick) in place lower 3' below existing grade		2
203+60	Abandon-in-Place Manhole #598 (brick) in place lower 3' below existing grade		2
108 to 302	Place cables from MH #331 Atlantic Street to new MH on Manhattan Street	Conduit work completed	25
302 to 203	Place cable from new MH on Manhattan to new MH on Atlantic Street south of RR bridge.	Conduit work completed	2
108	Splice new cables into existing at new MH #331	Cables being placed	50
302	Splice new cables into existing at new MH on Manhattan Street	Cables being placed	55
203	Splice new cables from New MH on Manhattan Street to New MH on Atlantic south of RR Bridge	Cables being placed	5



rev. 5/20/2013		UTILITY WORK SCHEDULE	
CTDOT Project Number:	135-301	Town:	Stamford
Project Description:	Railroad bridge replacement project requiring all utilities to relocate		
CTDOT Utilities Engineer:	Derek brown		
Phone:	(860) 594-2555	Email:	Derek.Brown@ct.gov
Utility Company:	Eversource Gas		
Prepared By:	Beth Jennings	Date Prepared:	1/9/2017
Phone:	(203) 596-3116	Email:	beth.jennings@eversource.com
Scope of Work			
<p>The following is a description of all utility work planned to be completed in conjunction with the CTDOT project. The narrative describes all work to be carried out by the utility or its contractor, including temporary and permanent work required by the project as well as any additional utility infrastructure work the utility intends on performing within the project limits during the construction of the project.</p>			
<p>Retire existing 12-inch steel gas main and install new 8-inch HDPE gas main: (1.) Retire approximately 400 feet of 12" cast iron gas main; (2.) Install proposed 8" HDPE gas main upon completion of road lowering on Atlantic Street from North State Street to just south of Manhattan Street.</p>			
Special Considerations and Constraints			
<p>The following describes the limiting factors that must be planned for in the scheduling and performance of the utility work. For example, restrictions on cut-overs, outages, limitations on customer service interruptions (e.g. nights, weekends, holidays), seasonal and environmental shutdown periods, long lead material procurements, etc..</p>			
<p>Eversource will retire the existing 400' of 12" cast iron main as part of the first phase of this project, known as Atlantic Street between North State Street and South State Street., The 12" cast iron main will be abandoned in place, and Eversource will not remove the main.</p>			

UTILITY WORK SCHEDULE			
CTDOT Project Number: 135-301		Total Calendar Days: 11	
Utility Company: EVERSOURCE GAS			
Prepared By: Beth Jennings			
Schedule			
The following schedule identifies each major activity of utility work in sequential order to be performed by the utility or its contractor. The location of each activity of work is identified by the baseline stationing on the CTDOT plans. All activities identify the predecessor activity which must be completed before a utility work activity may progress. The duration provided is the number of calendar days required to complete the utility work activity based on historical information and production rates.			
Location (Station to Station)	Description of Utility Work Activity	Predecessor Activity	Duration (calendar days)
210+00 to 203+20	Purge and abandon existing 12" CI main	Prior to lowering the roadway between South State Street and Manhattan Street	3
210+00 to 202+50	Install 8" HDPE gas main to new required depth and energize new main	Upon lowering of the road and prior to paving install gas main	8

**Article 1.08.04 – Limitations of Operations:** *Add the following:*

**TIME RESTRICTIONS**

In order to provide for traffic operations as outlined in the Special Provision "Maintenance and Protection of Traffic," the Contractor will not be permitted to perform any work that will interfere with described traffic operations on all project roadways as follows:

On the following State observed Legal Holidays:

New Year's Day

Good Friday, Easter\*

Memorial Day

Independence Day (except during the period from Friday, June 28, 2019 to Monday, July 8, 2019 Atlantic Street and South State Street can be closed to traffic)

Labor Day

Columbus Day

Thanksgiving Day\*\*

Christmas Day

The following restrictions also apply:

- On the day before and the day after any of the above Legal Holidays.
- On the Friday, Saturday and Sunday immediately preceding any of the above Holidays celebrated on a Monday.
- On the Saturday, Sunday and Monday immediately following any of the above Holidays celebrated on a Friday.

\* From 6:00 p.m. the Thursday before the Holiday to 8:00 p.m. the Monday after the Holiday.

\*\* From 6:00 a.m. the Wednesday before the Holiday to 8:00 p.m. the Monday after the Holiday.

During all other times

**Atlantic Street, South State Street, Canal Street, Manhattan Street and all other roadways during periods other than:**

- **Pier construction of the MNR Bridge over Atlantic Street,**
- **Demolition, SPMT roll-in operation and erection of the MNR Bridge, and**
- **Lowering of Atlantic Street, South State Street and Manhattan Street.**

Monday through Friday between 5:00 a.m. and 9:00 a.m. and between 3:00 p.m. and 8:00 p.m. and Saturday and Sunday between 10:00 a.m. and 6:00 p.m.

The Contractor will be allowed to close the roadways and detour traffic around the site in accordance with the detour routes in the Maintenance and Protection of Traffic Plans during night time periods starting at 9:00 p.m. and ending at 5:00 a.m. the following day. The detour shall not take place during a Holiday period.

GENERAL

The Contractor will be allowed to halt traffic for a period not to exceed 10 minutes to mobilize equipment or to receive deliveries during off peak travel periods with the approval of the Engineer.

For other work as shown on the Maintenance and Protection of Traffic Plans or as approved by the Engineer the Contractor may implement the detour routes for road closures as shown in the plans. The Contractor shall notify the Engineer at least 30 days in advance of the start of the roadway closure.

The Contractor shall coordinate his activities with City of Stamford for any Holidays and or other restricted periods, which may affect the work schedule (winter moratoriums, Thanksgiving Day Parade and parade preparation period which normally consists of the two-week period prior to the parade).

**Atlantic Street and Manhattan Street to construct the MNR Bridge Pier**

To construct the pier for the new MNR Bridge, the Contractor may close Atlantic Street from Dock Street to South State Street after the existing utilities have been relocated but not earlier than February 18, 2019 (M&PT Stage 1B). Traffic detours will be implemented during the periods of the road closures.

For a detailed sequence of construction, the Contractor should reference the following contact plans:

- Volume 1, Subset 04, Stage drawings 01.04.017 to 01.04.023.

**Atlantic Street, South State Street, Dock Street, Ramps and Manhattan Street for the Demolition of the MNR Bridge, SPMT roll-in operation and Erection of the MNR Bridge**

During the SPMT roll-in and erection of the MNR Bridge superstructure, the Contractor will be allowed to close the roadways affected by the SPMT roll-in operation during the period of June 28, 2019 to July 8, 2019 (M&PT Stage 2).

During the SPMT roll-in from the lay down area at John Street and Dock Street, Dock Street is to be closed from Atlantic Street to John Street. During the SPMT roll-in from the lay down area adjacent to the I-95 NB on-ramp from Elm Street, the I-95 NB on-ramp from Elm Street, South State Street from Atlantic Street to Elm Street and the Exit 8 NB off-ramp shall be closed. North to south directional traffic on Canal Street and Elm Street can be maintained during the SPMT roll-in operation with the use of Traffic Persons (Municipal Police Officer).

Traffic detours will be implemented during the periods of the road closures.

If alternate lay down areas are proposed that would require other roadway closures from those shown on the plans the Contractor shall receive advance approval from the Engineer of the sites, proposed road closures and detour routes.

This period includes activities associated with the demolition of the existing bridge superstructure, roll-in and erection of the new bridge as shown on the plans.

For a detailed sequence of construction, the Contractor should reference the following contact plans:

- Volume 1, Subset 04, Stage drawings 01.04.017 to 01.04.023.

**Atlantic Street, South State Street and Manhattan Street for the lowering and construction of Atlantic Street, South State Street and Manhattan Street**

After the new Bridge is in place, Stage 3 roadway work lowers Atlantic Street, South State Street and Manhattan Street. During the lowering operation, the Contractor will be allowed to close Atlantic Street,

South State Street and Manhattan Street within the limits of the project work for a period not to exceed 60 days unless otherwise approved by the Engineer.

For a detailed sequence of construction, the Contractor should reference the following contact plans:

- Volume 1, Subset 04, Stage drawings 01.04.017 to 01.04.023.

### **Work Restrictions**

Project 135-326 will be under construction during this project and work activities and work areas for Project 135-301 may be restricted by Project 135-326 work. Work activities in Project 135-326 that could affect Project 135-301 work, work area and schedule include but not limited to the following:

- Construction and completion of the Utility Corridor and utility duct work. The new pier for the MNR Bridge cannot be built until the existing utilities in Atlantic Street are relocated to the new duct banks and utility corridor.
- Construction and completion of the Exit 8 SB off-ramp “Flyover” Structure over Atlantic Street. The work on South State Street cannot proceed until the new ramp bridge is constructed and traffic is shifted to the new ramp alignment and bridge.
- Construction and completion of the north side of South State Street. The work on South State Street cannot proceed until traffic is shifted to the Project 135-326 South State Street alignment.
- Drainage in South State Street and connection to Canal Street. Drainage connections in Project 135-301 cannot be completed until the Project 135-326 drainage is installed.
- Construction and completion of the Sanitary Sewer work in South State Street. The work on South State Street cannot be completed until the sanitary sewer work is complete.
- Construction and completion of water main work in South State Street. The Project 135-301 water main is connecting to the Project 135-326 installed water main.
- Relocation of RR Catenary Tower 370B. The jump span work cannot proceed until the catenary is relocated.

The Contractor shall coordinate his activities with Project 135-326 work and schedule to maintain proper traffic flow at all times.

### **Additional Lane Closure Restrictions**

It is anticipated that work on adjacent projects will be ongoing simultaneously with this project. The Contractor shall be aware of those projects and anticipate that coordination will be required to maintain proper traffic flow at all times on all project roadways, in a manner consistent with these specifications and acceptable to the Engineer.

### **Contractor Requirements for Work Affecting the Railroad**

In general, unless otherwise authorized by the Railroad, the Contractor’s construction activities and operations directly over and/or adjacent to the operating railroad right-of-way can be performed only during the following track outage periods shown below.

The following outages are available, but cannot be guaranteed, for the construction of Atlantic Street Bridge (reference Volume 1, Subset 10, Stage drawings 01.10.000 to 01.10.018). For scheduling purposes, the Contractor should anticipate up to one shift per week will be cancelled or disallowed by MNR. The times provided are inclusive of MNR's effort to prepare their facilities for the Contractor's operations, as well as MNR's effort to restore their facilities prior to resuming regular operations.

<b>Stage</b>	<b>Outage</b>	<b>Time</b>
1A & 1B	Track 4 Off-Peak Weekend Nights	0001 – 0430
2A & 2B	Track 4 Continuous (9 days)	Saturday 0001 to the following Monday 0430
2A & 2B	Track 2 Continuous Weekend (2 weekends)	Saturday 0001 to Monday 0430
2A & 2B	Track 1 Weeknight	0001 – 0430
NOTE: Stage 2B occurs on the second weekend of the 9-day outage.		
3A & 3B	Track 2 Continuous (9 days)	Saturday 0001 to the following Monday 0430
3A & 3B	Track 1 Continuous Weekend (2 weekends)	Saturday 0001 to Monday 0430
3A & 3B	Track 3 or 4 Weeknight	0001 – 0430
NOTE: Stage 3B occurs on the second weekend of the 9-day outage.		
4A & 4B	Track 1 Continuous (9 days)	Saturday 0001 to the following Monday 0430
4A & 4B	Track 3 Continuous Weekend (2 weekends)	Saturday 0001 to Monday 0430
4A & 4B	Track 2 or 5 Weeknight	0001 – 0430
NOTE: Stage 4B occurs on the second weekend of the 9-day outage.		
5A & 5B	Track 3 Continuous (16 days)	Saturday 0001 to the third Monday 0430
5A & 5B	Track 5 Continuous Weekend (2 weekends)	Saturday 0001 to Monday 0430
5A & 5B	Track 1 Weeknight	0001 – 0430
5B	Track 1 Continuous Weekend	Saturday 0001 to Monday 0430
NOTE: Stage 5B occurs during the period from the second weekend through the third weekend of the of the 16-day outage. The 53B and 31A switches are installed on the second and third weekends of the 16-day outage, respectively.		
6A & 6B	Track 5 Continuous (9 days)	Saturday 0001 to the following Monday 0430
6A & 6B	Track 3 Continuous Weekend (2 weekends)	Saturday 0001 to Monday 0430
6A & 6B	Track 1 Weeknight	0001 – 0430
NOTE: Stage 6B occurs on the second weekend of the 9-day outage.		
7	Tracks 3, 1 & 2 Continuous Weekend	Saturday 0001 to Monday 0430
8A & 8B	Tracks 1, 2 & 4 Continuous (see NOTE)	Friday 2200 to the following Monday 0500
8C & 8D	Tracks 1, 3 & 5 Continuous (see NOTE)	
8E	Tracks 1, 3 & 5 Continuous (see NOTE)	
NOTE: Track outages for 8A through 8E shall be staged over the course of a single period beginning at 2200 hours on Friday, June 28, 2019 and ending at 0500 hours on Monday, July 8, 2019. The durations of individual stages (i.e. 8A, 8B, 8C, etc.) within this period shall be determined by the Contractor. During this period, two active tracks shall be maintained at all times. This period is inclusive of MNR's effort to take Tracks 1, 2 and 4 out of service (approximately 2 hours), MNR's effort to restore service to Tracks 2 and 4 and take Tracks 3 and 5 out of service (approximately 11 hours), and MNR's effort to restore service to two or more of Tracks 1, 3 and 5 (approximately 11 hours).		
9A	Tracks 2 & 4 Continuous Weekend	Saturday 0001 to Monday 0430
9B	Track 1 & 3 Continuous Weekend	Saturday 0001 to Monday 0430
9C	Track 5 Continuous Weekend	Saturday 0001 to Monday 0430

The following outages are available, but cannot be guaranteed, for the construction of Catenary (reference Volume 2, Subset 6, Stage drawings GS-1A to GS-4D). For scheduling purposes, the Contractor should anticipate up to one shift per week will be cancelled or disallowed by MNR. The times provided are inclusive of MNR's effort to prepare their facilities for the Contractor's operations, as well as MNR's effort to restore their facilities prior to resuming regular operations.

<b>Stage</b>	<b>Outage</b>	<b>Time</b>
1A, 3C, 3G	Track 4 Off-Peak Night	0100 – 0430
1A	Track 6 Off-Peak Days	0930 – 1500
2A, 2F, 2H	Tracks 5 and 7 Off-Peak Nights	0100 – 0430
2B, 2G, 3J	4-Track Weekend Night Outage	0001 – 0430
2C	Track 6 Off-Peak Days	0930 – 1500
2D, 3B, 3C, 3D, 3G, 3H	Tracks 4 & 2 Off-Peak Nights	0100 – 0430
2D	Tracks 4, 2 & 1 Weekend Nights	0001 – 0430
2D, 2E, 3A, 3B, 3D, 3E, 3H, 3I	Tracks 2 & 1 Off-Peak Nights	0100 – 0430
2E, 3A, 3E, 3F	Tracks 1 & 3 Off-Peak Nights	0100 – 0430
2E, 2F	Tracks 3 & 5 Off-Peak Nights	0100 – 0430
2E	Tracks 2, 1 & 3 Weekend Nights	0001 – 0430
2H	Track 5 Off-Peak Nights	0100 – 0430
2G	Track 5 Continuous Weekend	Saturday 0001 to Monday 0430
3A, 3E, 3I	Track 1 Off-Peak Night	0100 – 0430
3B, 3D, 3H	Track 2 Off-Peak Night	0100 – 0430
3F	Track 3 Off-Peak Night	0100 – 0430
3F	Track 3 & 5 Off-Peak Night	0100 – 0430
3G	Track 4 & 6 Off-Peak Nights	0100 – 0430
4A, 4C	Track 7 Off-Peak Day	0930 – 1500
4A	Tracks 7 & 9 Off-Peak Day	0930 – 1500
4A	Tracks 5 & 7 Continuous Weekend	Saturday 0001 to Monday 0430
4B, 4D	Tracks 5, 7 & 9 Continuous Weekend	Saturday 0001 to Monday 0430
Limited Use	Four-Track Weekend Night Outage	0001 – 0430

Note: Weekend night is either a Friday or Saturday night.

**NOTES:**

1. a. The time periods shown above should be considered allowable track outage times. These times will be subject to availability of MNR protective service staff and MNR operational needs. For scheduling purposes, the Contractor should anticipate up to one shift per week will be cancelled or disallowed by MNR.
- b. The Contractor's plan for demolition, erection, and any operation adjacent to or within the Railroad Right of Way shall be submitted to the Engineer for Railroad approval, prior to start of work.
- c. With the exception of the July 4, 2019 Holiday, no full track and/or power outages will be permitted on weekends either immediately before or after major holidays, or on any weekend between Thanksgiving and New Year's Day.

- d. The track outage periods shown above are the times that the track(s) may be taken out of train service. Refer to Section 1.05.06(1)(e)(3) for additional restrictions regarding power outages requiring de-energizing, grounding and re-energizing of the wires.
  - e. In accordance with FRA Rule 214.336, should the Contractor require a track outage and require the use of hi-rail equipment on that track, the adjacent track(s) must also be taken out of service.
- 2. All work involving rail, ties, and other track components on active tracks, unless specifically designated otherwise within the contract, will be performed by the Contractor. The Contractor may not remove abandoned (out of service) track unless given prior written approval from the Railroad and the Engineer.
  - 3. The Contractor shall assume that the wires and rails of the Railroad will be energized at all times.

**1.08.07 - Determination of Contract Time:** *Delete the second, third, and fourth paragraphs of 1.08.07 and replace with the following:*

“When the Contract time is stated on a calendar-day basis, that time shall be the number of consecutive calendar days contained in the Contract period designated in the Contract, INCLUDING the time period from each December 1 through the following March 31. The Contract time will begin to run on the date designated in the Engineer's “Notice to Proceed” as the date for commencement of the Project, and the time will be computed as herein provided on a consecutive-day basis, including all Saturdays, Sundays, holidays, and non-work days.”

**Article 1.08.13 - Acceptance of Work and Termination of the Contractor's Responsibility:** *Replace the entire Article 1.08.13 with the following:*

The Contractor's responsibility for non-administrative Project work will be considered terminated when the final inspection has been held, any required additional work and final cleaning-up have been completed, all final operation and maintenance manuals have been submitted, and all of the Contractor's equipment and construction signs have been removed from the Project site. When these requirements have been met to the satisfaction of the Engineer, the Commissioner will accept the work by certifying in writing to the Contractor, that the non-administrative Project work has been satisfactorily completed.



**ITEM #0096065A – REMOVAL OF CATENARY**

**ITEM #0096066A – REMOVAL OF SIGNAL AND COMMUNICATION CABLES**

**ITEM #0096068A – REMOVAL CATENARY PORTAL STRUCTURE**

**ITEM #0096070A – REMOVAL OF CATENARY STRUCTURE FOUNDATION**

**ITEM #0096081A – REMOVAL OF FEEDER OR AERIAL GROUND WIRE**

**ITEM #0099010A – REMOVAL OF ABANDONED RAILROAD EQUIPMENT**

**Description:** Work under these items consists of the removal of the existing catenary system, guy wires, guy foundations, aerial ground wire, catenary structures, catenary hardware and supports, abandoned cable messenger wire with or without signal and communication cables and its supports.

Work under this section includes the removal and disposal of existing portal Structures 371, 372 and 372B, including columns, pole extensions and all catenary supports and associated hardware.

Work under this section includes the removal and disposal of existing north truss sections of existing portal structures 370A, 371A and 372A, including north columns, pole extensions and all catenary supports and associated hardware. Pole extensions shall be saved and secured for re-installation after portal structures reconstruction.

Work under this section includes the removal and disposal of existing north column of existing portal Structure 370B (INTERIM) and existing 370BX pole.

Work under this section includes the removal of the foundations for existing Structures 371, 372 and 372B to a minimum of 4' below grade.

Work under this section includes the removal of the north side foundations for existing Structures 370A, 371A and 372A to a minimum of 4' below grade. This work includes north and south GA-1 foundations on structure 371A.

Where future tracks will be installed, the foundations shall be removed to a minimum of 6' below grade.

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Work for the removal of north side foundations for existing Structures 370B (INTERIM) and 370BX will be included under the REMOVAL OF EXISTING MASONRY.

Work under these items includes the removal of lead paint where required. Existing Structures 371 and 372 have been coated with paint containing lead.

Work under this item includes the removal of MOD equipment at Structure 371, which includes the control box, control cable, linkage, insulators, supports and one catenary tap each. This item includes the removal of the disconnect switch at Structure 372B, which includes the supports and one catenary tap each. It also includes the removal of the control cable for MOD equipment at Structure 372A, which includes the supports.

The Contractor shall be responsible for coordinating the necessary outages with the Railroad and the utility (Eversource Energy) company along with following the requirements set forth in the Special Provisions.

**Submittals:** Contractors proposed method of removing catenaries.

Contractors proposed method of removing existing catenary portal structures, existing foundations, signals and communication cables.

**Construction Methods:** The removal of existing aerial ground wire and attachment assemblies will occur in the vicinity of electrical energized facilities. De-energizing of the Railroad's and the utility company's electric lines will be required to perform the work. The Contractor shall perform the work in accordance with the following:

1. During the removal of the existing aerial ground wire and along track jumper wire, all equipment and persons will at all times, remain at least 20 feet clear of the utility's existing 115 kV overhead transmission lines, installed on catenary or pole structures along the railroad's mainline right-of-way. When approach closer that the specified distance is required, the Contractor will request in writing, with six months advance notice, the de-energizing of the utility lines or equipment. De-energizing of the utility power line is contingent on power demand and economic dispatch and shall be coordinated with the utility. The Contractor will assume any risk involved in the reasonable denial of a request to de-energize the utility's transmission line and the last minute cancellation of an approved request to de-energize the transmission lines. If so ordered by the Engineer, the Contractor will immediately cease all activity in the areas, where the utility's transmission lines are to be re-energized.
2. The Contractor and the utility must cooperate fully in order to avoid damage to the conductors, and to insure that no delays will occur in the progress of the work. Therefore, the Contractor shall furnish the utility with a schedule for this work, which is to include starting and completion dates and, shall notify the utility six months in advance of the commencement of construction work.

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All loose paint debris created by the removal of items covered under this section and by lead paint removal, shall be caught and/or vacuumed and disposed of as specified in DISPOSAL OF LEAD DEBRIS. Specifically the Contractor shall comply with the requirements of the OSHA Standard for Lead in Construction and any other applicable Federal and State laws and adhere to LEAD COMPLIANCE FOR MISCELLANEOUS EXTERIOR TASKS specification.

The existing catenary system is defined as the contact(trolley) wire, auxiliary trolley wire, messenger wire, hangers and insulators, switches, and other items incidental thereto including hanging beams, grounded messengers and bridle wires, structural supports for messengers, pull-off wires and tail wires.

The existing catenary system shall be removed, as shown on the plans, and disposed of by the Contractor.

When any loads are temporarily added to structures, such as dead-ending of messengers, trolley wires, bridles, feeders, aerial ground wire, etc., adequate back guys are to be installed in order to prevent overloading or excessive deflection of the structure. Back guys are to be terminated to adequately sized, suitable anchors. The Contractor shall calculate all temporary loads to be so terminated and submit for approval, the loads, methods and procedures to be used, materials and anchor locations.

All 2/0 ground wire shall be removed, and shall be replaced as per the contract drawings. Installation of new ground wire shall be covered under AERIAL GROUND WIRE SYSTEMS. Removal shall be coordinated with replacement so that grounding is maintained at all times.

Form 817 Section 1.04.06 applies and Contractor shall dispose of all removed structures, and wires, which shall become property of the Contractor unless the Engineer instructs the Contractor otherwise. Signal and communication cables shall become property of the Contractor.

No signal or communication cables, platform, transformer, switch or control box shall be removed until removal has been authorized by the Railroad's Signal Department and/or Power Department. Prior to the removal of such items, a walkthrough shall be performed by the Contractor, the Engineer and the Railroad to confirm abandoned equipment and removals.

Catenary portal structures (371, 372 and 372B) shall be removed where called for on the plans. Removal shall be coordinated with staging of the work. Catenary portal foundations, guy foundations, and main messenger dead end pole foundations shall be demolished to a minimum depth of 4 feet (or 6' where future tracks will be installed as part of this project) below grade, except as noted elsewhere in this section. All demolished foundation material and concrete shall be disposed of off-site by the contractor.

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The MOD at Structure 371 and disconnect switch at Structure 372B being removed under REMOVAL OF ABANDONED RAILROAD EQUIPMENT shall be turned over to the Railroad upon removal. The Contractor shall deliver the materials to 50 Union Avenue, Bridgeport, CT.

**Method of Measurement:** REMOVAL OF CATENARY will be measured for payment based on the linear feet of the existing catenary system removed, on each track, measured along the baseline. For payment purposes, the linear foot measurement, along the baseline, for the existing catenary system in inclusive of all messenger, auxiliary trolley and trolley wires. The messenger, auxiliary trolley and trolley wires shall not be measured for payment separately. There shall be no separate payment for the removal of tail wires, but the cost thereof shall be included in the item REMOVAL OF CATENARY.

REMOVAL OF FEEDER AND AERIAL GROUND WIRE will be measured for payment based on the linear feet of wire removed measured along the base line.

REMOVAL OF SIGNAL AND COMMUNICATIONS CABLES will be measured for payment based on the linear feet of messenger wire removed, regardless of the number of the signal and communications cables bundled together, and measured along the base line.

The item REMOVAL OF SIGNAL AND COMMUNICATION CABLES includes the removal of signal and communications cable including messenger support wire. There shall be no separate payment for the removal of messenger support wire at locations where both the messenger support wire and signal and communications cable is to be removed, but the cost thereof shall be included in the item. For locations where removal of messenger support cable, without signal and communication cable is required, the work shall be paid as linear feet for the amount of messenger support cable removed under the item REMOVAL OF SIGNAL AND COMMUNICATION CABLES.

Removal of catenary portal structure shall be measured for payment based on the number of structures removed under the pay item REMOVAL OF CATENARY PORTAL STRUCTURE. A portal structure shall include, but is not limited to, the truss, columns, pole extensions, catenary supports and associated catenary hardware.

Removal of catenary portal foundations shall be measured for payment based on the number of foundations removed under the pay item REMOVAL OF CATENARY STRUCTURE FOUNDATION.

There shall be no separate payment for the disposal of demolished foundation material and concrete, but the cost thereof shall be included in the item for REMOVAL OF CATENARY STRUCTURE FOUNDATION.

Paint recovery and disposal shall be paid for under the item DISPOSAL OF LEAD DEBRIS.

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There shall be no separate payment for lead paint removal, but the cost thereof shall be included in the items in this section.

REMOVAL OF ABANDONED RAILROAD EQUIPMENT includes the removal of MODs and Disconnect Switches and shall be measured for payment based on the number of switches removed. There shall be no separate payment for the removal of control boxes, control cables, linkage, insulators, supports and catenary taps and deliver of abandoned equipment but shall be included in the cost of REMOVAL OF ABANDONED RAILROAD EQUIPMENT.

The temporary removal and restoration, if any, of a member of the structure or of signal cables, signal cases, ladders, platforms or other impediment attached to the structure, in order to facilitate the removal of the catenary system, signal and communications cables, signal heads, catenary portal structures and feeder or aerial ground wire, will not be paid for separately, but the cost thereof shall be included in the pay item(s) included in this section.

**Basis of Payment:** This work will be paid for at the contract unit prices for the following unit prices, which shall include all transportation, materials, equipment, tools and labor incidental thereto:

<b>Pay Item</b>	<b>Pay Unit</b>
REMOVAL OF CATENARY	LF
REMOVAL OF SIGNAL AND COMMUNICATION CABLES	LF
REMOVAL OF CATENARY PORTAL STRUCTURE	EA
REMOVAL OF CATEANRY STRUCTURE FOUNDATION	EA
REMOVAL OF FEEDER AND AERIAL GROUND WIRE	LF
REMOVAL OF ABANDONED RAILROAD EQUIPMENT	EA

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 ITEM #0096070A  
 ITEM #0096081A  
 ITEM #0099010A

## **ITEM #0096084A – MOTOR OPERATED DISCONNECT SWITCH**

**Description:** Work under this Section consists of furnishing and installing new motor operated disconnect (MOD) switches complete with all attachment hardware, operating tubes, guides, structure mounted motor operator mechanism, new feeder jumpers, cabling, clamps, supports, personal ground mats and all else necessary for complete installation and operation of the switch.

This item includes the installation of new cabling with all attachment hardware for existing MOD at Structure 372A.

The grounding and bonding systems shall meet the requirements of National Electrical Code and the technical and safety recommendations of ANSI and IEEE. Grounding and bonding of personnel ground mats, disconnect switch operating shaft, control box and the disconnect switch shall be provided at disconnect switch locations.

**Applicable Standards:** Pertinent provisions of the following listed standards shall apply to the work of this Section, except as they may be modified herein, and are hereby made a part of this Specification to the extent required:

<u>Organization</u>	<u>Number</u>	<u>Title</u>
ANSI	C37.30	Standard Definitions and Requirements for High-Voltage Air Switches, Insulators and Bus Supports
ANSI	C37.32	Standard Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide for High-Voltage Air Switches, Bus Supports and Switch Accessories
ANSI	C37.34	Test Code for High-Voltage Air Switches (and supplements)
ANSI	C37.35	Guide for Application, Installation, Operation and Maintenance of High-Voltage Air Disconnecting and Load Interrupter Switches
ANSI	Z55.1	Gray Finishes for Industrial Apparatus and Equipment
ASTM	B187	Copper Bus Bar, Rod and Shapes
NFPA	70	National Electrical Code (NEC)
NFPA	78	Lightning Protection Code

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IEEE	81	Recommended Guide for Measuring Ground Resistance and Potential Gradients in the Earth
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<u>Organization</u>	<u>Number</u>	<u>Title</u>
IEEE	142	Recommended Practice for Grounding of Industrial and Commercial Power Systems
UL	467	Grounding and Equipment
ASTM	B8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

**Submittals:** The Contractor shall submit shop/working drawings, design test reports, technical data, schematics, catalog cuts, material/procurement specifications of component parts and all relevant information for the installation, operation and maintenance of related disconnect switches. Component, small part steel or assembly drawings shall be prepared using the latest version of AutoCAD.

Spare parts list, and technical manuals.

Complete technical details and ratings of each part of operating mechanism of MOD.

Design and production test plan, test procedures and certified test reports.

**Materials:** The disconnect switches shall be for outdoor service and of single pole single throw design. They shall be mounted as per the plans. MODs shall be operated by DC power through control mechanisms. They shall also be capable of being manually operated through the control linkage, in the event of motor operator malfunction. The manual handle operator shall be pad lockable. The design of the hand operation feature and its interlocking with the motorized mechanism shall be subject to the approval of the Engineer.

The switches shall be assembled on galvanized steel channel base with standard NEMA mounting holes and arranged in coordination with the supporting members as shown on the plans.

Current carrying parts shall be of hard-drawn copper. Contacts shall be high pressure, silver-to-silver, self cleaning by wiping action, self aligning, and shall be capable of breaking system charging currents.

High strength, high conductivity metals shall be used for all live parts. These metals shall not be subject to cracking due to weather conditions and shall be non-ferrous.

Solder-less, NEMA terminal pads of a compatible design shall be provided.

Springs, pivots, bearing and ferrous material shall not be part of a current carrying circuit.

The disconnect switches shall be furnished with mounting bolts, nuts, washers, lock washers, grounding stud and all other parts and materials necessary for complete mounting of the switch and its attachment to the supporting members. All switch bases and associated stationary parts shall be rigidly bolted in place.

The bases of all disconnect switches shall be grounded. Operating rods, shafts, and control mechanism enclosures shall also be suitably grounded. All grounding components shall conform to or be interchangeable with the Railroad's standard components.

Conductors for grounding and bonding shall be ASTM B8, Class B stranded annealed copper, and sized as indicated on the plans.

Connectors and Clamps: Bolts, washers and stop nuts shall be a high copper alloy, such as Everdur, Durium, Duronze or silicone bronze. Ferrous hardware will not be acceptable. Buried ground connections shall be exothermic welded.

Ground rods shall be copper, or copper-clad steel, not less than 3/4 inch in diameter, and in ten-foot lengths, threaded at one or both ends as required for extension.

Ground wire imbedded in foundations and aerial ground wire shall be 4/0 AWG HD stranded copper conductor.

Personnel ground mats shall be fabricated with minimum #6 AWG bare copper wire on 6" X 6" spacing. Overall mat size shall be 4' X 6'.

The switches shall be designed and constructed to assure satisfactory operation under all weather conditions, including snow, sleet and ice, independent of lubrication. Cotter pins shall not be used to transmit stresses. All current carrying parts of the switch as well as contacts shall be designed to operate without lubrication and maintain electrical clearance to all non-live parts.

The MOD control box and the operating mechanism shall be of proven design for outdoor applications and cater to the electrical schematic requirements for remote/local operation and its interface with SCADA RTU as per the plans. Suitable control and interposing relays shall be provided in the motorized operating unit for local/remote control and operation from RTU controlled from the supervisory control system. Safeguards against the initiation of both clockwise and counter-clockwise movement at the same time will be incorporated in the supervisory control. All steel parts shall be hot-dip galvanized. Provision shall be made for 30 percent spare auxiliary contacts in the control box for additional electrical interlocking requirements. The design of the motor operated mechanism shall have a torque at its output shaft under minimum operating voltage adequate to operate the switch under 3/4" ice. Operating time and torque values required shall be in accordance with the switch manufacturer's recommendations and subject to the approval of the Engineer.

Motor operators shall be capable of providing field adjustable speed and torque output, torsion or reciprocal operating movements as required. Motor operator enclosure shall be gray NEMA 4 equivalent for outdoor duties with high resistance to corrosion and weather-proof construction with side panels and front cover removable for complete accessibility to all internal parts. The



outer construction shall be suitable for protection against vandalism. The door latch shall be operated with a single handle with provision for padlocking the housing. The equipment shall be suitable for installation on railroad catenary structures as per the plans and withstand satisfactorily the vibrations transmitted from the running trains without affecting its operation and long-term reliability. Suitable mounting brackets and necessary hardware to suit individual structure needs shall be provided.

The motor of the MOD shall be designed for the intended duty and frequent operations without any restrictions. The motor shall have bearings sealed against moisture, dust and fumes and require no lubrication. The motor circuit shall be suitably protected against blocked armature current flow more than the intended duty. Dynamic braking shall be used for motor braking. The opening and closing circuits shall be mechanically and electrically interlocked. In the event of failure of control power supply after disconnect switch movement has been initiated, the movement of the switchblade shall be completed or it shall not start. The design shall be suitable to prevent damage to the operating mechanism in case of attempted operation of the disconnect switch to a position already occupied or from a firmly iced-up position.

The MOD shall not have a local\remote selector switch inside the motor enclosure.

The switches shall be rated as follows:

Rated voltage	13.8kV (to ground)
Poles	1
Minimum Voltage class	25kV
Rated current, continuous	1,200 A
Rated current, momentary	61,000 A
Rated frequency	60 Hz
BIL	150kV
Control Voltage	125V DC
Range of Control Voltage	90V - 140V DC
Auxiliary Contact Rating	3 A at 125V DC

The insulators shall be station post type NEMA TR-208 or approved equal.

The design shall provide for effects of any short circuits up to the maximum value of 20kA. Due to the exposed nature of catenary system, short circuits may be frequent and have varying duration and severity.

Switch identification number shall be made of standard manufactured reflective tape for exterior use, "Scotchlite" or equal.

**Construction Methods:** The disconnect switch assemblies and the operating mechanisms shall be installed in accordance with recommendations of the manufacturer, the plans and to the satisfaction of the Engineer. Switch shall be examined for broken insulators. All insulators shall be wiped clean after the installation is complete.

Personnel ground mats shall be installed at every MOD or manual operator location on the side where operating handle is located and they will be bonded to the structure

Ground rods shall be driven vertically to the depth of ten feet. Rod points shall be provided with a steel alloy cone and the driven end provided with removable driving stud. Ground rods shall be separated from adjacent buried metallic structure or pipe by a minimum of two feet.

The work shall be arranged in such a manner that each part of the grounding system which is laid below finished grade shall be completed and inspected before backfilling is done. All precautions shall be taken to assure that no damage is done to the grounding and bonding conductors or connections during backfilling, compacting and concreting operations. Testing for ground resistance shall be performed in accordance with the requirements of this Specification before any finish surfacing is laid above the grounding and bonding conductors

Ground tap connections from the equipment to the grounded structural members shall be provided, as required. All paint, scale, rust, oxidation, or other foreign material shall be thoroughly removed from the points of contact on all metal surfaces before any ground connections are made

Any shortfall in the existing ground conductors, when connected to the new structures, shall be dealt with by splicing additional ground wire.

Bond all non-energized connections to structures so that there are no neutral or floating components (i.e., strap across any pin or clevis connection).

Field-testing shall be thorough, continuing throughout the installation, and fully documented, with the following as a minimum and as applicable:

Electrical resistance tests shall be made during installation to verify continuity of the grounding system.

Measure, record, and report the ground resistance at each location, while disconnected from the MNR ground grid, where grounding system is installed. The required ground resistance is five ohms or less. Corrective measures shall be taken by the Contractor to achieve the specified ground resistance.

Resistance-to-earth tests shall be witnessed by the Engineer and written results of these tests shall be submitted to the Engineer for evaluation.

#### Factory Testing:

Factory tests shall include design and production tests, especially those required by ANSI, NEMA, and all alternative standards to which the equipment may be designed. New design tests may not be required where tests equal to, or more stringent than, those specified here have been performed and documented by the Contractor on essentially identical equipment manufactured at the same facility to that being used on this project. The Contractor may provide to the Engineer for review certified documentation of previous tests, and where the specified design test

requirements are met, the Engineer at his option may waive certain design tests. The Engineer may inspect the manufacturing and quality assurance procedures during the factory tests on equipment. The factory tests shall be conducted on the various equipment including but not limited to the following items:

**Motor Operated Disconnect Switches and Manually Operated Disconnect Switches**

**Design Tests:** All the design tests, described in ANSI C37.34 and supplements, shall be, or shall have been, performed on one manual disconnect switch and one motor operated disconnect switch.

**Production Tests:** All the production tests, described in ANSI C37.34 and supplements, shall be performed on all manually operated disconnect switches/motor operated disconnect switches.

**Method of Measurement:** This work will be measured for payment based on the number of new motor operated disconnect switches installed.

No direct payment will be made for personnel ground mats and associated grounding and bonding work and dismantling of the existing manual disconnect switches, if any, but the cost thereof shall be included in the unit price for the pay item MOTOR OPERATED DISCONNECT SWITCH.

No separate payment will be made for feeder jumpers, connections, operating linkage, cables and/or buss bar, but the cost thereof shall be included in the unit prices for the pay items covered under this section.

Payment for buss bar supports shall be made under the item STEEL (MISCELLANEOUS).

**Basis for Payment:** The work will be paid for at the contract unit prices for the following pay items including all transportation, materials, equipment, tools and labor incidental thereto:

<b>Pay Item</b>	<b>Pay Unit</b>
MOTOR OPERATED DISCONNECT SWITCH	EA

## **ITEM NO. 0101175A – PCB WASTE HANDLING**

### **Description:**

Work under this Item is intended to provide specific procedural requirements to be followed by the Contractor during the excavation of polychlorinated biphenyl-contaminated material (PCB Waste) from within the four (4) PCB Areas of Environmental Concern (PCB AOECs), as shown on the Project Plans. This supplements Specifications Section 2.02, 2.03, 2.05, and 2.06 and Contract Special Provisions for excavation wherever materials contaminated with PCBs in concentrations of 1 part per million (ppm) or greater are encountered. Work under this item shall include either direct-loading of the PCB Waste into lined roll-off containers or lined dump trailers for direct transport to an approved disposal facility, or transported in lined roll-off containers/dump trailers to the Waste Stockpile Area (WSA) located on Myrtle Avenue for temporary staging. Note that all materials excavated within the PCB AOECs down to a depth of four (4) feet below surface grade are to be considered PCB Waste. Soils excavated below four (4) feet are to be considered Controlled Material and handled under Special Provision 010117A.

Work under this Item is also intended to provide specific operational and maintenance requirements at the **existing** waste stockpile area (WSA) located at Myrtle Avenue beneath Interstate 95 in Stamford, as designated on the Project Plan (ENV-07) and in accordance with Contract Documents. Work under this item shall include repair, replacement, and/or resetting of construction blocks, damaged asphalt, the existing anti-tracking pads and chain link fence and gate(s); cleaning of the existing catch basin(s) and pipes(s) at the WSA; stockpiling of the excavated materials at the WSA, and covering, securing, and maintaining the stockpiled materials throughout the duration of the Project.

Controlled Materials consisting of regulated levels of PCBs have been documented to exist within the Project. Such contamination is documented in the reports listed in the “Notice to Contractor – Environmental Investigations.” Where PCB-contaminated materials are excavated, such soil shall not be reused as backfill, and require special handling, disposal and documentation procedures.

### **Materials:**

The required materials are detailed on the Project Plans. All materials shall conform to the requirements of the Contract.

Lined Roll-Off Containers: Lined roll-off containers shall be of watertight, steel-body construction, of the size specified and able to handle the storage and subsequent transportation of material to the disposal facility.

Polyethylene Liner: Each roll-off container or dump trailer shall be lined with a 6-mil polyethylene liner specially constructed for the roll-off container or dump trailer, prior to loading any PCB Wastes.

Covers for roll-off containers and dump trailers: Each roll-off container or trailer shall be equipped with a cover that shall be made of polyethylene plastic, or similar water-tight material, that is of sufficient size to completely cover the top opening, free of any defects, and can be securely fastened to the container.

If the Myrtle Avenue WSA is used for temporary staging of any PCB AOEC material, the following additional materials information is applicable:

Anti-tracking pad shall conform to the requirements of Item #210100.

Bituminous concrete pad shall conform to Section 4.06.02 of the Specifications.

Construction blocks shall be solid precast rectangular concrete 6 feet meters in length, 3 feet in height, and 2 feet in width.

Chain link fence and gate shall conform to Section 9.13 of the Specifications.

Hay bales shall confirm to the requirements of Section 2.18.02 of the Specifications.

Polyethylene plastic sheeting for underlayment shall be at least 30 mil thick. Polyethylene plastic sheeting for covering excavated material shall be a thickness of 10 mil. Both shall be at least 10 feet wide.

Sandbags used to secure polyethylene covers shall be at least 30 pounds.

Bedding sand shall conform to Section 6.51.02 of the Specifications.

Construction sign shall conform to Section 12.20 of the Specifications.

Sorbent boom shall be 8 inches in diameter and 10 feet long and possess petrophilic and hydrophilic properties. Sorbent booms shall also have devices (i.e. clips, clasps, etc.) for connection to additional lengths of boom.

### **Construction Methods:**

#### **A. General**

When PCB Waste is encountered during the course of the work, health and safety provisions shall conform to the appropriate sections of the Contract. Provisions may include implementation of engineering controls, air and personal monitoring, the use of chemical protective clothing (CPC), personal protective equipment (PPE), and decontamination

procedures. CPC or PPE used during work with PCB wastes shall be placed into the containers used for the disposal of PCB wastes after use.

Materials removed from any excavation within a PCB AOEC down to a depth of four (4) feet below surface grade shall be direct-loaded into lined roll-off containers or lined dump trailers. The lined roll-off containers shall be staged on site or at an alternate location as directed by the Engineer. The excavated PCB Waste may be staged in the lined roll-off containers for up to a maximum of 30 days prior to transport to an approved disposal facility. The lined dump trailers shall be transported directly from the point of generation on the Project to the approved disposal facility, as specified in Item 0101176A, "Disposal of PCB Waste.", or to the WSA located on Myrtle Avenue for temporary staging. The Contractor shall plan excavation activities within the PCB AOECs in consideration of storage time limits for the lined roll-off containers, the availability of lined dump trailers or lined-roll-off containers, and/or temporary staging capacity at the Myrtle Avenue WSA. **No claims for delay shall be considered based on the Contractor's failure to coordinate excavation activities as specified herein.**

The Engineer will sample the stockpiled PCB AOEC waste at a frequency and for the constituents to meet the acceptance criteria of the treatment/recycling/disposal facilities submitted by the Contractor. 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 stockpile is ready for sampling, and ending with the Contractor's receipt of the laboratory analytical results. Any change of intended treatment/recycling/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.**

#### B. Transportation and Staging

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

1. Transported PCB Waste shall be covered prior to leaving the point of generation and is to remain covered;
2. All vehicles shall have secure, watertight containers free of defects for material transportation;
3. No material shall leave the point of generation until there is a lined roll-off container or lined dump trailer, constructed and lined as specified, located at the direction of the Engineer.

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Excavated PCB Waste shall be direct-loaded and transported off site in the lined dump trailers, temporarily staged in the lined roll-off containers, or temporarily stockpiled at the Myrtle Avenue WSA as directed by the Engineer. The excavated PCB Waste may be staged in the lined roll-off containers or the Myrtle Avenue WSA for up to a maximum of 30 days prior to transport to an approved disposal facility. The Contractor shall post a sign on each lined roll-off container/covered WSA stockpile indicating the date on which PCB wastes were first placed in the container/WSA bin and this date is the start of the 30 day maximum storage period and must be recorded on the waste manifest at the time the roll-off container is removed from the site.

#### C. Lined Roll-off Containers Maintenance

The Contractor shall provide all necessary materials, equipment, tools and labor for anticipated activities with the lined roll-off/storage containers. Such activities include, but are not limited to, handling and management of stockpiled PCB Waste in the lined roll-off containers and drummed CPC/PPE (if these materials are not placed into the disposal containers); uncovering and recovering the soil stockpile; maintenance of lined roll-off/storage containers; replacement of damaged components (i.e. sand bags, plastic polyethylene sheeting, etc.); and waste inventory record management. The Contractor shall manage all materials in the lined roll-off/storage container in such a way as to minimize tracking of potential contaminated materials across the site and off-site, and minimize dust generation.

The lined roll-off containers shall be securely covered, when not in active use, with a cover of sufficient size to prevent generation of dust and infiltration of precipitation. The cover shall be maintained to prevent wind erosion.

The stockpiled soil shall be inspected at least daily by the Contractor to ensure that the cover and containment have not been damaged and that there is no apparent leakage from the container. If the cover has been damaged, or there is evidence of leakage from the lined roll-off containers, the Contractor shall immediately replace the cover or containment as needed to prevent the release of material to the environment from the stockpiled PCB Waste.

An inventory of stockpiled materials and drummed CPC/PPE shall be conducted on a daily basis. Inventory records shall indicate the approximate volume of material/drums stockpiled per day; the approximate volume of material/drums stockpiled to date; and material/drums loaded and transported off-site for disposal.

#### D. WSA Maintenance

If the Myrtle Avenue WSA is used for temporary PCB Waste staging, the Contractor shall provide all necessary materials, equipment, tools and labor for anticipated activities within

the WSA. Such activities include, but are not limited to, handling and management of stockpiles and drummed CPC/PPE; uncovering and recovering stockpiles; maintenance of WSA; replacement of damaged components (i.e. sand bags, plastic polyethylene sheeting, construction blocks, chain link fence and gate, etc.); and waste inventory record management. The Contractor shall manage all materials in the WSA in such a way as to minimize tracking of potential contaminated materials across the site and off-site, and minimize dust generation.

Anti-tracking measures shall be replaced at the WSA to ensure the vehicles do not track soil from the WSA onto a public roadway at any time.

A sign shall be posted and maintained that is visible from a distance of at least 25 feet at the WSA identifying the name of the permittee (State on Connecticut, Department of Transportation (DOT)), the DOT field office phone number, the hours of operation for the WSA, and the phrase, "Temporary Soil Staging Area". Lettering shall be at least 2 inches high with a minimum overall sign dimension of 4 feet wide by 1 foot high. Such sign is only required if the capacity of the WSA is equal to or greater than 1,000 cubic yards. If initially the WSA capacity is less than 1,000 cubic yards and the WSA capacity is subsequently increased, the Contractor shall post and maintain the required sign at no additional cost to the State, prior to stockpiling the additional material.

Each stockpile shall be securely covered when not in active use with a cover of sufficient size to prevent generation of dust and infiltration of precipitation.

The staged stockpiles shall be inspected at least daily by the Contractor to ensure that the cover and containment have not been damaged and that there is no apparent leakage from the pile. If the plastic cover has been damaged, or there is evidence of leakage from the piles, the Contractor shall immediately replace the cover or containment as needed to prevent the release of materials to the environment from the piles.

An inventory of stockpiled materials and drummed CPC/PPE shall be conducted on a daily basis. Inventory records shall indicate the approximate volume of material/drums stockpiled per day; the approximate volume of material/drums stockpiled to date; material/drums loaded and transported off-site for disposal; any materials loaded and transported for on-site reuse; and identification of stockpiles relative to their points of generation.

Following the removal of all stockpiled Controlled Materials, residuals shall be removed from surfaces of the WSA as directed by the Engineer. This operation shall be accomplished using dry methods such as shovels, brooms, mechanical sweepers or a combination thereof. Residuals shall be disposed of as Controlled Materials. If the results from dry methods are unsatisfactory to the Engineer, the Contractor shall modify decontamination procedures as required.

#### E. Dewatering



Dewatering activities are not anticipated. Should dewatering be required, the water shall be containerized and disposed of at the direction of the Engineer.

#### F. Decontamination

All equipment shall be provided to the work site free of 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 either at the point of origin or at the Myrtle Avenue WSA. 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, or 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 washed 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, the decontaminated equipment may leave the Project or be used in other areas of the site.

#### G. Dust Control

The Contractor shall implement a fugitive dust suppression program in accordance with the Contract to prevent the off-site migration of particulate matter and/or dust resulting from excavation, loading and operations associated with PCB Waste. It shall be the Contractor's responsibility to supervise fugitive dust control measures and to monitor airborne particulate matter. The Contractor shall:

1. Employ reasonable fugitive dust suppression techniques.
2. Visually observe the amounts of particulate and/or fugitive dust generated during the handling of PCB Waste. If the apparent amount of fugitive dust and/or particulate matter is not acceptable to the Engineer, the Engineer may direct the Contractor to implement corrective measures at his discretion, including, but not limited to, the following:
  - a. Apply water to pavement surfaces;

- b. Apply water to equipment and excavation faces; and
- c. Apply water during excavation, loading and dumping.

#### H. Permit Compliance

The Contractor shall comply with the terms and conditions of the Connecticut Department of Energy and Environmental Protection (CTDEEP) “General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer)”, including the General Operating Conditions and the Specific Operating Conditions, except that the Engineer will conduct all soil/sediment characterization and perform all record keeping. In particular, the Contractor shall:

1. Construct, operate, maintain, and repair the WSA in conformance with the requirements of the General Permit.
2. Maintain a communications system capable of summoning fire, police, and/or other emergency service personnel.
3. Prevent unauthorized entry onto the stockpiles by the use of fences, gates, or other natural or artificial barriers.
4. Separate incidental excavation waste to the satisfaction of the receiving facility or to an extent that renders the contaminated soil and/or sediment suitable for its intended reuse.
5. Isolate and temporarily store incidental waste in a safe manner prior to off-site transport to a facility lawfully authorized to accept such waste.
6. Not store more than 100 cubic yards of incidental waste at any one time.
7. Sort, separate, and isolate all hazardous waste from contaminated soil and/or sediment.
8. Prevent or minimize the transfer or infiltration of contaminants from the stockpiles to the ground as detailed in “B. Transportation and Stockpiling” above.
9. Securely cover each stockpile of soil as detailed in “D. WSA Maintenance” above.
10. Minimize wind erosion and dust transport as detailed in “G. Dust Control” above.
11. Use anti-tracking measures at the WSA to ensure the vehicles do not track soil from the WSA onto a public roadway at any time.
12. Instruct the transporters of contaminated soil and/or sediment of best management practices for the transportation of such soil (properly covered loads, removing loose material from dump body, etc.).

13. Control all traffic related to the operation of the facility in such a way as to mitigate the queuing of vehicles off-site and excessive or unsafe traffic impact in the area where the facility is located.
14. Ensure that except as allowed in section 22a-174-18(b)(3)(C) of the Regulations of Connecticut State Agencies, trucks are not left idling for more than three (3) consecutive minutes.

**Method of Measurement:**

The work of “PCB WASTE HANDLING” will be measured for payment by the number of cubic yards of PCB Waste excavated within the PCB AOECs to be transported directly off-site for disposal or to the Myrtle Avenue WSA, if available, for temporary staging. This measurement shall be in accordance with and in addition to the quantity measured for payment of the applicable excavation item in Specification Sections 2.02, 2.03, 2.05, 2.06, or the Contract Special Provisions, as applicable. Excess excavations made by the Contractor beyond the payment limits specified in the Contract will not be measured for payment and the Contractor assumes all costs associated with the appropriate handling, management and disposal of this material.

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 all transportation from the excavation site to the roll-off staging area (if used) or Myrtle Avenue WSA (if used), including any intermediate handling steps; covering, securing, and maintaining the lined-roll-off containers and WSA-staged soil throughout the duration of the Project; and all tools, equipment, material and labor incidental to this work.

The repair, replacement, and resetting of construction blocks, damaged asphalt, existing anti-tracking pads, and chain link fence and gates(s); and the cleaning of the existing catch basin (s) and pipe(s) at the Myrtle Avenue WSA will not be measured separately for payment.

This price shall also include equipment decontamination; the collection of residuals generated during decontamination and placement of such material in a lined roll-off container or lined truck trailer; and the collection and disposal of liquids generated during equipment decontamination activities.

Payment for dust control activities shall be made under the appropriate Contract items.

Pay Item  
**PCB Waste Handling**

Pay Unit  
**C.Y.**

ITEM #0101175A

## **ITEM #0202528A – REMOVAL OF RAILROAD TRACKS**

**Description:** Work under this item shall consist of the removal and satisfactory disposal of existing railroad tracks for jump spans and for all tracks over the Atlantic St. Bridge to facilitate construction. This includes the removal of rail, turnout components, ties, plates, fasteners, joint bars, bolts, rubber railroad crossing material, bituminous material immediately thereon and all other associated appurtenances.

Work under this section includes the removal of existing ballast and sub-ballast, on areas where existing tracks and associated appurtenances as described above will be removed.

**Construction Methods:** The Contractor shall comply with provisions of Codes, Specifications, Standards, and recommended practices of the most recent edition, and addenda thereto, of the AREMA Manual: American Railway Engineering and Maintenance of Way Association, Manual for Railway Engineering and the Metro-North Railroad MW-4.

Authorized representatives of the State and of the Metro-North Railroad shall approve, in the field, the specific locations of the beginning and ending of track removal. Where jointed rail is used, the rail shall be removed to the nearest joint. Where continuous welded rail is used, ends shall be staggered a minimum of 4 feet as per AREMA standards.

Wooden ties removed by the Contractor shall be transported to the central Waste Stockpile Area (WSA), for testing. Concrete ties, if any, shall not be taken to the central WSA, but shall be disposed of in accordance with Form 817 and in a manner acceptable to the Engineer.

Caution measures should be observed on the removal of existing ballast and sub-ballast, as not to disturb adjacent areas existing ballast section as not to produce sinking of adjacent tracks. Avoid fouling of existing ballast to remain.

All materials shall be disposed of in accordance with Form 817, including all supplemental thereto, and in a manner acceptable to the Engineer.

**Method of Measurement:** This work will be measured for payment by the number of linear feet of railroad track removed, measured along the centerline of track, including transportation to the Waste Stockpile Area or disposal. One track consists of two rails, connecting ties, and all appurtenances. Where rail ends are staggered, the average of the two rail ends shall be used as the point of measurement. Turnouts shall be considered as two individual tracks measured between the point of switch and the last long tie. Track shall be measured in place prior to removal.

Measured number of linear feet of railroad track removed shall include the removal and disposition of all removed track and associated appurtenances, removed ballast and sub-ballast as described under this Item Description section.

**Basis of Payment:** This work will be paid for at the contract unit price per linear foot for REMOVAL OF RAILROAD TRACKS. This price shall include all equipment, labor, and tools necessary to complete the work, and disposal of the removed material at either the Waste Stockpile Area or at an approved off-site location.

There shall be no separate payment for the required removal and disposition of ballast and sub-ballast and for any caution measures observed to avoid disturbance or fouling of adjacent ballast and sub-ballast.

Final disposal of wooden railroad ties will not be paid for under this item.

Backfilling of voids created by track removal as shown on the plans or as directed by the Engineer shall be paid for, but shall be considered part of the general cost of the work.

<b>Pay Item</b>	<b>Pay Unit</b>
REMOVAL OF RAILROAD TRACKS	LF

## **ITEM #0213904A – BALLAST MAT**

**Description:** This work consists of furnishing and installation of a vibration mitigating ballast mat with geotextile fabric for materials separation as indicated on the Contract Drawings. Ballast mats shall be provided on the deck and curbs of the safety walks.

### **Materials:**

1. Ballast mat shall consist of reinforced natural rubber designed to provide reduction of ground or structure borne vibrations, of the impact on structures and of the crushing of ballast. The upper structure of the mat shall be textured to permit ballast to nest for trackbed stability and be designed for protection against attack by contaminants that may filter through ballast over time. The subsurface shall contain fabric reinforcement for strength and load distribution. The underside shall provide for subsurface drainage under the mat.
2. Other items required for ballast mat installation are as follows:

Appurtenances and installation of tools for joining and sealing abutting mat edges as recommended by the manufacturer.

Galvanized steel retention devices (flashing) and bolts furnished by the Contractor to retain ballast and secure the mat respectively.

### **Ballast Mat Properties:**

- A. Ballast mat material shall satisfy the following requirements:

Capacity: An axle load of 44 tons.

#### Dimensions:

- 1) Width no less than 48", not including joint overlaps.
- 2) Thickness 9/16"

#### Fabric:

- 1) Tensile strength  $\geq 60$  lb/inch
- 2) Elongation at break  $\geq 10\%$

### **Elastomer Properties (natural rubber unless otherwise specified):**

- 1) Tensile strength  $\geq 200$  psi
- 2) Elongation at break  $\geq 100\%$
- 3) Tear-resistance 50 lb/inch
- 4) Hardness (Shore A) = 53 ( $\pm 7$ )

Dynamics: Dynamic to static stiffness ratio (related to a preload of 8.5 psi)  $K_d = 1.7 (+0.1/-free)$ .

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Temperature Range: Standard quality is suitable for service where ballast mat temperature range between (-) 4 degrees F and (+) 158 degrees F.

- B. The material used for the sealing of ballast mat joints shall be an integral extension of the top surface of the mat or a separate material having strength characteristics equal to those of the top layer of the ballast mat.

### 3. Quality Control:

- A. A representative of the manufacturer of the ballast mat shall be present on the project site at least two days prior to the commencement of ballast mat installation and shall remain on the site and to otherwise supervise the ballast mat installation work for the duration of the installation or for a period of at least one week, as deemed necessary by the Engineer to ensure proper installation.
- B. Securely store and properly protect ballast mat and all associated materials required for installation and take necessary precautions for the handling and delivery to the job site. Damaged materials will not be accepted for installation.
- C. Provide an independent testing laboratory certification of the test results certified by a recognized independent authority that the material specifications of the ballast mat to be installed on this project is as specified herein and is compatible with substrates on which the mat is to be installed.

### 4. Submittals:

- A. Submit complete details of the proposed ballast mat and any required related materials, including shop drawings and a detailed procedure for the storage, handling, transport, installation and protection of the ballast mat (including compaction procedures and equipment for initial layer of ballast) for approval by the Engineer.
- B. Contractor shall investigate delivery time for ballast mat materials in order to assure timely delivery for stages of work.

## **Construction Methods:**

### 1. Preparation:

Construction of the track bed and bridge deck shall be completed as shown on the Contract Drawings. The bridge deck ballast mat shall be continued upward from the floor along the vertical face of the concrete safety walk. Other inside and outside, horizontal and vertical wall corners shall be square. Ballast mat shall be continuous across all phases of staged construction.

### 2. Ballast Mat Installation:

- A. Prior to installation of the ballast mat, the railroad deck waterproofing shall be thoroughly cleaned of all debris and dust. Rough or uneven area shall be removed until the surface is made to be acceptable by the Engineer.
- B. Unroll ballast mat from reels positioned close to point of installation in accordance with approved procedures and as directed by the manufacturer's representative. At bridge decks, push one end under the upper floor plate and measure to accurately determine the length of mat required. Edges shall be cut straight and smoothly to assure a uniform fit at all joints, tapered at trackway curves, and at ends, which shall be sealed as recommended by the manufacturer.
- C. Secure ballast mat at all seams as recommended by the manufacturer providing a watertight seam at abutting mats.
- D. At all times exercise extreme care to prevent intrusion of silt and debris into the void space provided under the mat. The joints shall be protected and the galvanized steel strips shall be placed over the edges of the ballast mat as soon as the mat is installed. At no time shall water, silt, and debris be allowed to enter into newly installed ballast mat from the trackway or from other sources.

Temporary positive seals shall be installed along the open edges of the mat to prevent such intrusion. Permanent seals with an approved mastic shall be installed on the open edges of the ballast mat. Ballast mats contaminated with silt and debris shall be removed, cleaned, and re-installed or replaced with new materials at no additional cost to the State.

- E. Place a caulking sealant compatible with the ballast mat at all extremity edges, mat joints where the mat interfaces concrete and/or steel surfaces to assure water tightness.

### 3. Placement of Ballast:

- A. The Engineer will witness the handling and compaction of ballast over top of ballast mat. Equipment to be used for tamping of ballast shall be subject to approval by the Engineer. Ballast mat shall be protected per manufacturer's requirements prior to placement of ballast.
- B. Ballast shall not be transported across the ballast mat. Trucks and any other construction equipment shall not operate on the ballast mat unless it is covered with at



least six (6) inches of ballast.

**Method of Measurement:** This work will be measured by the square foot furnished and installed including all materials and incidentals shown on the Contract Drawings, measured in place prior to backfilling with ballast.

**Basis of Payment:** Payment for Ballast Mat will be paid at the contract unit price per square foot “Ballast Mat” complete in place, which price shall include all technical support, materials, equipment, tools and labor incidental thereto.

**Pay Item**

**Pay Unit**

Ballast Mat

S.F.

**ITEM #0503020A – RAILROAD TRACK WORK****ITEM #0503471A – TURNOUT INSTALLATION****ITEM #0503004A – LIFT AND LINE EXISTING TRACK**

**Description:** This work shall consist of installing timber ties, rail, turnouts, tie plates, Pandrol clips or spikes, rail anchors, switch machines, and all other materials necessary to construct the railroad tracks to the lines and grades as shown on the Plans or as ordered by the Engineer.

A survey shall also be conducted on the final as-built conditions of any new or replaced track work, which shall include the new crossovers, new Track 7, new track over Atlantic St Bridge, new track replacing jump spans, as well as any length of track that has been surfaced.

**Materials:** All materials necessary to construct the track structure shall conform to the American Railway Engineering and Maintenance of Way Association's Manual for Railway Engineering (AREMA) and the MNR MW-4. A copy of the MNR MW-4 will be provided to the contractor after award of the project.

1. Contractor-Furnished Materials – Rail and Turnouts shall be furnished by the Contractor. Turnouts include rail, switch, frog, guard rails, turnout ties, rail braces, fasteners, and any and all other appurtenances required to complete a turnout. Switch machines shall be provided by the Railroad.
2. Contractor-Furnished and Installed Materials – Switch Heaters
3. Contractor-Furnished and Installed Materials - Crossties– Per AREMA, MNR MW-4, AWPA M2, M3, P2, U1 and T1, RTA, NFPA 130, and the following:
  - a. Unless otherwise indicated, crossties, bracket ties and switch ties shall conform to all relevant requirements of current AREMA practice and recognized standards existing in countries where the timber is harvested and/or where the products are produced.
  - b. The following woods shall be acceptable species for the manufacture of crossties, tie blocks, switch ties and bracket ties:
    - i. Group A: Black Locust, Black Walnut , Honey Locust , Red Oak and White Oak
    - ii. Group B: Beech, Birches, Catalpa, Cherries, Elms, Hackberry, Hard Maples, Mulberries, Sassafras, Soft Maples, Sycamore and White Walnut.
  - c. No Water Oak or Ash will be accepted.
  - d. Unless otherwise specified, a minimum of 85% of any order shall be filled from Group A materials and a maximum of 15% from Group B materials.

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4. Contractor-Furnished and Installed Materials – Insulated Joints – Per AREMA Volume 1, Chapter 4, MW-4, ASTM E10, E18, D1002, A490 and D570, and the following:
5. Contractor-Furnished Materials – Other Track Materials - Per AREMA, MNR MW-4 and the following:
  - a. Tie Plates: Canted double shoulder for 6-inch base rail, new or relay, not less than 14-inches in length.
  - b. Spikes: New, 5/8" x 6" high carbon steel track spikes per AREMA.
  - c. Compromise Joints: New, six-hole forged steel compromise joints per AREMA. Compromise bars shall be sized to fit the rail on both sides of joint
  - d. Bolt Assemblies: New, appropriate size for the compromise and joint bars, per AREMA.
  - e. Rail Anchors: New per AREMA.
  - f. Pandrol Rail Fastening Assemblies: As an alternative to conventional tie plates, cut spikes and rail anchors, the Contractor may supply Pandrol brand rail fastening assemblies as follows:
    - 1) Tie Plates – Canted design, new or fit second hand for six-inch base rail with round holes for screw spikes.
    - 2) Elastic Rail Clips – New, Pandrol design e-2055 or PR601A or accepted equal. For joint bars, provide either Pandrol “J” model clips or the Pandrol “C” clip assembly or approved alternative.
    - 3) Screw Spikes/Coach Screws – 15/16" diameter by 6" length.
  - g. Bumping Posts: New bumping posts of a heavy duty type as shown on the Plans.
  - h. Hand Throw Switch Stand: New non-automatic type New Century Model 51-A, or approved equal, with bow style backsaver style handle
  - i. SUBBALLAST and STONE BALLAST shall be furnished and installed in accordance with specification Sections 0213902A and 0728020A.
  - j. Derail: New Western-Cullen-Hayes Model HB sliding derail and operating stand or approved equal, as shown on the Plans.

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**Submittals:**

## Insulated Joints

- Each submittal shall include the following:
  - Supplier, identification of material, manufacturer, model number
  - Drawings shall include identification number, title, date and revision number
  - Joints bars, rails, end posts, bushings, rail insulation, adhesive, bolts, nuts & washers;
  - Product Quality Plan
  - Product Qualification Plan, including test and inspection procedures detailing steps and criteria
  - Comprehensive Installation Procedure to ensure the proper installation of the product.
- Each Test and Inspection Report shall include as applicable:
  - Purchase Order and Title
  - Name and signature of the person performing the test or inspection
  - Identification of the product tested or inspected
  - The specified requirements for which testing or inspection were performed
  - Acceptance and rejection criteria
  - The results of the test or inspection.

## Ties

- The Supplier shall submit the following information;
  - Procedure for inspection of treated crossties.
  - Compliance: Supplier or manufacturer's certification that the materials delivered to the site are in compliance with this specification.
  - Test: Certified test results, as required to demonstrate compliance.

## Switch Heaters

Rail System, including ties plates, spikes, compromise joints, bolts, pandrol fastening systems  
Bumping Post

**Construction Methods:** Track installation shall be in conformance provisions of Specifications, Standards, and recommended practices of the most recent edition, and addenda thereto, of the AREMA Manual and the MNR MW-4.

Clearing and grubbing shall be in accordance with Section 2.01.

Grading shall be in accordance with Sections 2.02 and 2.07.

Installation of ties, rail, turnouts and switch machines shall proceed in a sequence approved by the Engineer to yield as little impact as possible upon yard operations.

Tie Criteria

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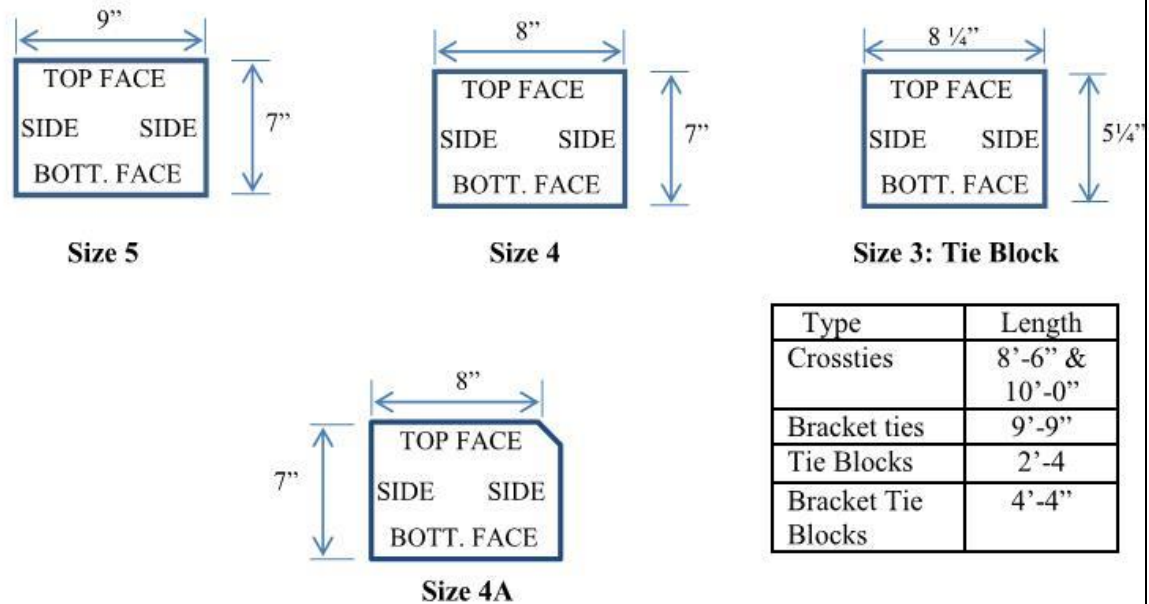
## Quality – Ties

- Except as hereinafter specified, all ties shall be free from any defects that may impair their durability or strength, such as decay, splits, large checks, large shakes, slanting grain, large or numerous holes or knots.
- Except as hereinafter provided, all ties shall be straight, well sawed, cut square at the ends, have bottom and top parallel, and have bark entirely removed.
- As a general rule, wood defects within the two rail-bearing areas [the regions from eleven inches (11”) to thirty-one inches (31”) from each end of an 8’-6” tie] can cause serious problems and shall be avoided.
- All crossties, bracket ties, switch ties and tie blocks shipped to the project must be production (mill) runs produced specifically for the project. The Engineer must be given the opportunity for mill inspection as specified hereinafter.

## Dimensional Requirements – Ties

- All timber ties shall be sawed on top, bottom and sides, and shall be sized according to drawings, and switch timber shall be as specified. Dry or treated timber may be ¼ inch thinner or narrower than the specified sizes. Ties exceeding these dimensions by more than 1 inch shall be rejected.
- Crossties, bracket ties, switch ties and tie blocks: All rail-bearing areas shall have seven inches (7”) grade crossties (except for tie blocks). The grade of each tie shall be determined at the point of most wane on the top face of the tie within the rail-bearing areas. The rail-bearing areas are those sections between 20” and 40” from the center of the tie. The top of the tie shall be narrowest face and/or the horizontal face farthest from the heart or pith center. The cross section shall be as follows (thickness, width, and length specified are minimum dimensions for green ties):

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Type	Length
Crossties	8'-6" & 10'-0"
Bracket ties	9'-9"
Tie Blocks	2'-4"
Bracket Tie Blocks	4'-4"

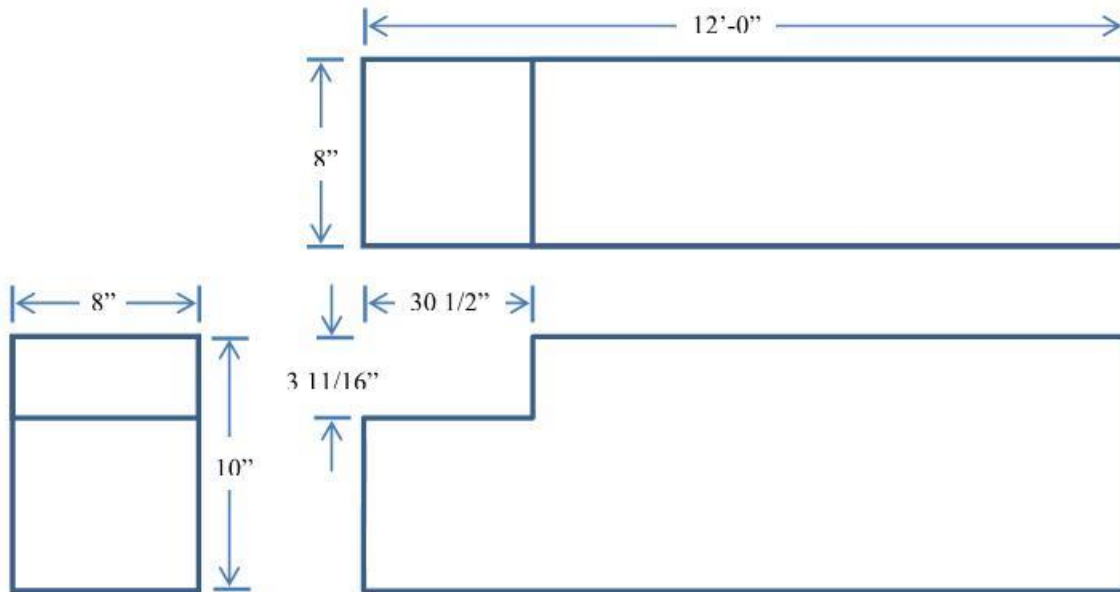
**Figure A: Typical Tie Section and Lengths**

- Ties shall be sized as follows:

Size	7" x 9" x 8'-6" & 7" x 9" x 10'-0" Cross Ties	7" x 9" x 9'-9" Bracket Ties	5 1/4" x 8 1/4" x 2'-4" Tie Blocks	5 1/4" x 8 1/4" x 4'-4" Bracket Tie Blocks
Size 5	80%	100%	-	-
Size 4 & 4A	20%	-	-	-
Size 3	-	-	100%	-
Size 3	-	-	-	100%

- Unless otherwise indicated on the Drawings or in the Bid documents crosstie, bracket tie, switch tie and tie block dimensions shall be subject to the following:
  - A tolerance of plus or minus 1/4 inch in width (plus or minus 1/8 inch for tie block only).
  - A tolerance of plus or minus 1/4 inch in thickness (plus or minus 1/8 inch for tie block only).
  - A tolerance of plus 1 inch and minus 1/4 inch in length.
  - A tolerance of plus or minus 1/16 inch for fabricated holes.
- Notched Headblock Ties: The following dimensions shall be provided for notched headblock ties, used with Wabco M-3 switch machine:

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**Figure B: Notched Headblock Timber dimensions - for use with Wabco M-3 Switch Machine.**

- **Straightness And Alignment**

- Crossties, bracket ties, switch ties and tie blocks shall be straight on all surfaces, with the opposite sides parallel. All ties will be considered straight when the surface of their top and either sides do not deviate from a straight line from the middle of one end of the middle of the other end at any point more than the following:

- **Crossties, Bracket Ties and Switch Ties:**

<u>Overall Length</u>	<u>Top</u>	<u>Side</u>
4 ft-4 in. to 12 ft.	5/16 in.	5/8 in.
12 ft. to 15 ft.	½ in.	1 in.
15 ft. to 18 ft.	¾ in.	1 3/16 in.
18 ft. to 25 ft.	1 in.	1 9/16 in.
25 ft. and up	1 ¼ in.	1 ¾ in.

- **Tie Blocks:**

<u>Overall Length</u>	<u>Top</u>	<u>Side</u>
2 ft.- 4 in. or less	1/8 in.	5/16 in.

- A tie is not well-sawn when its surfaces are cut into with scoremarks more than ½ inch deep, or when its surfaces are not even.
- For proper seating of nail plates, tie ends must be flat, and will be considered square with a sloped end of up to 1/2 inch, which equals a 1 in 20 cant.

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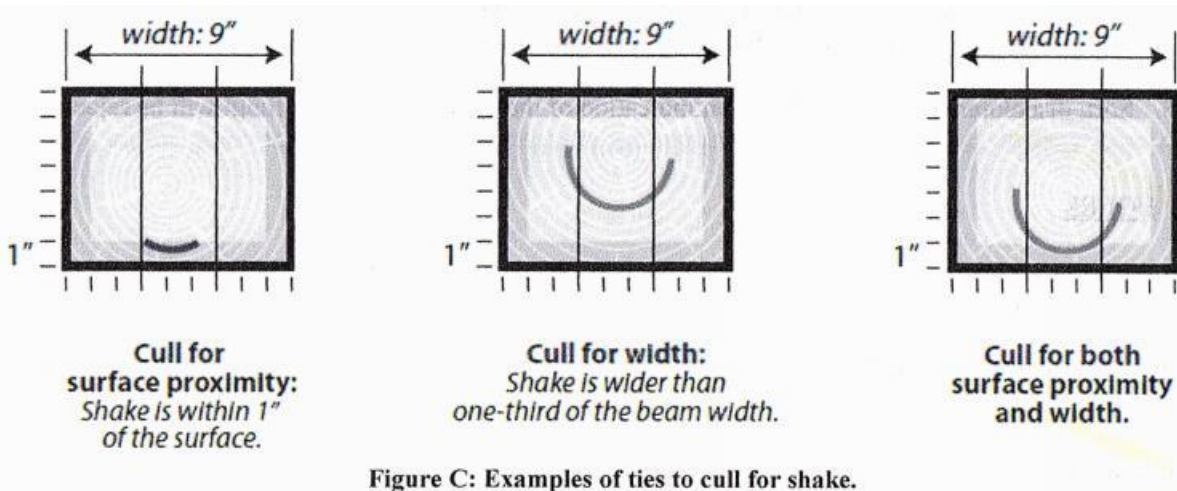
## Physical Requirements – Ties

- Decay and Pith
  - All ties having decay and/or pith will be rejected. Brown-to-red and white-to-yellow mold stains are not allowed. “Blue Stain” is not decay and is permissible in any wood.
  - Soft, discolored areas are typically an indication of the presence of decay fungi will be rejected.
- Holes
  - All ties with large holes cannot support the stresses placed on the track, therefore they cannot be placed into service.
  - A large hole is defined as:
    - A cavity within the rail bearing area of the tie or tie block which is more than ½ inch in diameter and more than 1 ½ inches deep, or a hole of any diameter less than ½ inch but up to 3 inches deep, the section of the tie between twenty inches (20”) and forty inches (40”) from its middle.
    - A cavity outside the rail bearing area the tie or tie block which is greater in diameter than ¼ the width of the surface on which it appears and more than 1 ½ inches deep.
- Knots
  - A large knot is one whose average diameter exceeds one-third (1/3) the width of the surface on which it appears; but such a knot may be allowed if it occurs outside the bearing areas. Numerous knots are any number equaling one-half of a large knot in damage effect.
- Bark Seams
  - Bark Seam will be allowed provided they are not more than two inches (2”) below surface, one-quarter inch (1/4”) wide and /or ten inches (10”) long.
- Slope Grain (Crossgrain)
  - Except in woods with interlocking grain, crossties shall not exceed slope of grain in excess of 1 in 15.

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- Wane
  - Wane is defined as bark or the lack of wood. Timber wane shall not exceed one inch (1") wide on the surface on which appears and/or over one-third (1/3) the length of the timber. See section Dimensions for rail bearing area.
- Shake
  - Shake which is not more than one-third (1/3) the width of the tie will be allowed, provided it does not extend nearer than one inch (1") to any surface. Any shake that extends nearer than one inch (1") to any surface of a timber is unacceptable. Multiple Ring Shakes are unacceptable.
  - Timber containing a shake of more than one-eighth of an inch (1/8") wide and/or a length of more than three inches (3") is not acceptable.



- Checks
  - Check has been defined as a separation of the wood along any end surface of a crosstie or tie block.
  - Timber with continuous checks whose depth is greater than one and one-half inches (1-1/2") deep or one-half inch (1/2") wide in the rail-bearing area and longer than one-third (1/3) the length of the timber will be rejected.
  - Seasoned hardwood timbers with checks less than one-eighth of an inch (1/8") in width and/or ten inches (10") in length are acceptable as is.
  - Seasoned hardwood timbers with end checks less than one-quarter (1/4) of the thickness and shorter than one-half (1/2) the length of the tie are acceptable only if a nail plate is applied.

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- Splits
  - A split has been defined as the separation of the wood extending from one surface, through the piece, to an opposite surface or to an adjacent surface.
  - In unseasoned crossties, a split no more than one-eighth of an inch (1/8") wide and/or four inches (4") long is acceptable.
  - In a seasoned crosstie, a split no more than a quarter inch (1/4") wide and/or longer than the width of the face across which it occurs is acceptable.
  - In seasoned cross-ties, a split exceeding the limit is acceptable, provided split limitations and anti-splitting devices are approved by the Engineer.
  - End splits and shrinkage cracks that do not impair the ability of the wood to hold a fastening or that does not affect the strength of the material will be permitted.
- Twist
  - Any twist in a timber shall not exceed one-eighth inch (1/8") in any eight feet (8') length.
- Manufacturing
  - Any timber containing a manufacturing defect will be evaluated by the inspector and judged accordingly.
  - Ties need to be bark-free, free of warp, and cut squarely. For proper seating of nail plates, tie ends must be flat, and will be considered square with a sloped end of up to half inch (1/2").

#### Mechanical Requirements – Ties

- These properties are represented as the average mechanical properties of the oak wood species, most commonly measured and represented as “strength properties” for design, as shown in the following table, for use in crossties, bracket ties, switch ties and tie blocks:

Common and botanical names of species	Moisture Content	Static Bending		Compression parallel to grain (psi)	Shear parallel to grain (psi)
		Modulus of Rupture (psi)	Modulus of Elasticity (x10 <sup>6</sup> psi)		
Oak, Red					
Black	Green	8,200	1.18	3,470	1,220
	12%	13,900	1.64	6,520	1,910
Cherrybank	Green	10,800	1.79	4,620	1,320

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	12%	18,100	2.28	8,740	2,000
Laurel	Green	7,900	1.39	3,170	1,180
	12%	12,600	1.69	6,980	1,830
Northern Red	Green	8,300	1.35	3,440	1,210
	12%	14,300	1.82	6,760	1,780
Pin	Green	8,300	1.32	3,680	1,290
	12%	14,000	1.73	6,820	2,080
Scarlet	Green	10,400	1.48	4,090	1,410
	12%	17,400	1.91	8,330	1,890
Southern Red	Green	6,900	1.14	3,030	930
	12%	10,900	1.49	6,090	1,390
Willow	Green	7,400	1.29	3,000	1,180
	12%	14,500	1.90	7,040	1,650
Oak, White					
Bur	Green	7,200	0.88	3,290	1,350
	12%	10,300	1.03	6,060	1,820
Chestnut	Green	8,000	1.37	3,520	1,210
	12%	13,300	1.59	6,830	1,490
Live	Green	11,900	1.58	5,430	2,210
	12%	18,400	1.98	8,900	2,660
Overcup	Green	8,000	1.15	3,370	1,320
	12%	12,600	1.42	6,200	2,000
Post	Green	8,100	1.09	3,480	1,280
	12%	13,200	1.51	6,600	1,840
Swamp chestnut	Green	8,500	1.35	3,540	1,260
	12%	13,99	1.77	7,270	1,990
Swamp white	Green	9,900	1.59	4,360	1,300
	12%	17,700	2.05	8,600	2,000

#### Conditioning Prior to Treatment – Ties

- Timber Crossties shall be shall be seasoned in accordance with the current American Wood Preservers Association (AWPA) Standard C6, Crossties and Switch Ties- Preservative Treatment by Pressure Processes, except as follows:
  - Timber crossties shall be conditioned by either air seasoning, steam conditioning, vapor drying, Boulton process or kiln drying, except that the duration of air seasoning shall be that which results in a final moisture content of the wood below 50% prior to treatment for oaks or 45% for mixed hardwoods (moisture levels shall be determined by a moisture meter.
  - Timber crossties shall be dressed on the top and bottom surfaces to the required dimensions prior to treatment.

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- After seasoning, the top and bottom surfaces of tie blocks, crossties and timbers shall be finished to the required dimensions. “To finish to the required dimensions” means to produce flat and even surfaces of the specified dimensional tolerances, and free of any defects produced by the handling of the piece by a mechanical device such as excess score marks, rough surface cuts, indentations or steps, grooves, etc.

#### Marking – Ties

- Switch ties, crossties, bracket ties and tie blocks shall be marked after seasoning in accordance with the AREMA Manual, Chapter 30, Specifications for Timber Crossties, Marking Ties to Indicate Size Acceptance, except as specified below:
  - Marking shall indicate the manufacturer’s name or trademark, the month and year of production and the manufacturer’s plant identification in figures at least ½ inch high. If dating nails are used, only the last two digits of the year of manufacture shall be shown.
  - Marking shall be by dating nails, hot-iron branding or tagging. When anti-splitting devices are applied, brands or tags shall appear. Tags, if used, shall be of stainless steel conforming to ASTM Designation A240. Dating nails shall conform to the requirements of the AREMA Manual for Railway Engineering chapter 3 Ties and Wood Preservation, section 1.8, Specifications for Dating Nails, dated 1975 or later.
- Each bundle of switch ties, crossties, bracket ties and tie blocks accepted by MNR shall be branded by MNR’s inspector by hammering a distinctive mark approved by MNR for this purpose. The exposed face of each tie or tie block in each bundle and the end of each tie or tie block in the bundle shall be clearly marked.

#### Incising Ties

- All timbers shall be incised on four sides in accordance with AREMA incising pattern as described in Part 3 Section 3.6. The incisions prior to surfacing shall be three-quarters inch ( $\frac{3}{4}$ ”) deep with teeth not more than seven-thirty seconds inch ( $\frac{7}{32}$ ”) thick.
- This pattern produces a nominal 17 incisions in any Six inch by Six inch (6”x6”) area and each timber shall have a minimum of 14 incisions in any Six inch by Six inch (6”x6”) area of the sides.

#### Timber Identification – Ties

- Timber for the Railroad shall be identified by a distinctive “MNR” marking on one end of the timber, in accordance with metal plate identification shown on the plans.

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- Marking shall be so placed that it may be read correctly, with the wider heart- wood of the timber faced downward.
- “MNR” brand Marking Iron shall be supplied by Vendor, subject to the Engineers approval, or in accordance to plans.
- Timber shall be marked to indicate manufacturer, year, Bridge number, and tie number. Markings shall be subject to approval by the Engineer.

#### Air Seasoning – Ties

- Timbers shall be conditioned prior to treatment by a procedure which will render it receptive to penetration by preservative without reducing its strength
- Moisture determination shall be made on a representative sample of each lot ready for seasoned inspection. Moisture determination and allowable moisture contents shall be in accordance with the American Railway Engineering and Maintenance-of-Way Association Manual for Railway Engineering (AREMA) part 3 section 3.6.3 and the American Wood Protection Association (AWPA) standard M2, section 2.
- All stacks of seasoning timbers shall be supported on treated or non-decaying sills, and the first layer shall be off the ground 12” or more. Space between rows of stacks shall not be less than 3 feet.
- Crossing timbers shall be stacked using the “German” ricking method.
- “Boulton Conditioning” may be used when time constraints make air seasoning impractical with the prior approval of the railway

#### Anti-Splitting Devices – Ties

- All timber ties shall have an anti-splitting device on each ends. Splits longer than four inches (4”) can be gang plated before treatment. After application, the nail plate must be flush with the tie ends and there must be no observed separation along the plane on split line.
- The nail plates shall be sufficiently sized to fully cover the split. The plates shall be at least 18 gauge-galvanized steel with four to five 9/16” teeth per square inch. The steel sheet shall meet ASTM A653 structural steel (SS) grade 40 or better with a minimum coating designation G60 (0.60 oz./ft<sup>2</sup>).

#### Preservative Treatment

- All ties shall be preservative treated with any of the following preservatives. Any other preservative treatment shall be submitted to the Engineer for review and approval.

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- Coal tar creosote in accordance with the current AWWA Standard P1, Standard for Coal Tar Creosote for Land and Fresh Water Use.
- Creosote coal tar solution in accordance with the current AWWA Standard P2, Standard for Creosote and Creosote Solutions, Grade A.
- Creosote petroleum solution in accordance with the current AWWA Standard C6.
- Copper Naphthenate solution, as follows:
  - Preservative treatment of crossties and timbers shall be by the pressure process and in accordance with the latest AWWA Standards and AASHTO Designation M133.
  - Crossties and timbers to be treated with Copper Naphthenate shall be in accordance with AWWA P9 Type A Hydrocarbon Solvent.
- Treatment shall be in accordance with AWWA U1 of the American Wood Preservers Association by the Empty Cell Process with Initial Air.
- Retention shall be seven (7) lbs. of solution per cubic foot of wood determined as specified in the AWWA Standards.
- All retentions shall be calculated by cubic foot volumes for ties supplied to the Railroad.
- Complete plant treating reports shall be submitted with each shipment in accordance with AREMA, Wood Preservative, "Records of Treatment and Reports of Inspection".
- AREMA Part 3 section 3.6.3 a through 3.6.3d shall be considered as guideline in determining whether wood is dry enough to treat. The railway however ultimately reserves the right to specify acceptable moisture content for any hardwood or softwood specie before treatment.
- Timbers shall be treated in accordance with the latest edition of American Railway Engineering and Maintenance of Way (AREMA), Part 3, Section 3.6 "Wood Preserving", However, ties designated as "High Density" timbers, those ties destined for installation site within the "Deterioration Zone" as identified as Zones 3, 4, and 5 in AWWA U1, shall receive the following treatment in lieu of that outlined in AREMA:

Red Oak	7.0 lb. /cu ft.	Preservative Solution P2
Gum & Hard Maple	7.0 lb./cu ft.	Preservative Solution P2

Under no circumstances shall "High Density" timbers consist of White Oak.

#### Inspection – Ties

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- Inspection shall be performed by vendor to the standards described herein and as per AWWA M2 “Inspection of treated timber products”. An inspection procedure shall be submitted to the Engineer for approval. Vendor shall send one copy of the daily inspection report for the Railroad’s Director of Contract Administration and Procurement and one copy to a designated representative of the Engineer for each day’s production. The Engineer reserves the right to inspect timber both before and after treating and at any time during the treating process.
- Inspectors shall make a reasonably close examination of the top, bottom, sides and ends of each timber. Each timer shall be judged independently, without regard for the decisions on others in the same lot. Rafted or boomed timbers too muddied for ready examination shall be rejected. Timbers handled by hoists shall be turned over as inspected, at the expense of the vendor.
- The treating plant shall provide, free of charge, suitable facilities and any equipment and assistance necessary for the Railroad’s inspector to work efficiency.
- The Engineer shall have the right at any time to test the preservative to be used in treating its ties. Samples may be taken from any container in which the preservative is stored or used. As shall be examined in accordance with American Wood Preservers’ Association Standard M2, latest revision.
- The Engineer shall have the right to examine any of the equipment used on any process or method of treatment at any stage in the treatment.
- Timber ties and all materials and processes, shall be subject to inspection prior to shipment to MNR’s facilities. The vendor (contractor) shall afford MNR’s inspector, at no additional cost to MNR, all necessary facilities, equipment and labor at the manufacturer’s plant to enable MNR’s inspector to perform proper inspections, as deemed necessary by MNR, during normal working hours.
- The Engineer will make reasonably close inspection of the top, bottom, sides and ends of each switch ties, crossties, bracket ties and tie blocks subsequent to seasoning. Each tie or tie block shall be judged independently without regard for decisions on other ties or tie blocks in the same lot.
- The Engineer will inspect the processes relative to seasoning switch ties, crossties, bracket ties and tie blocks in accordance with these specifications.
- Inspection of switch ties, crossties, bracket ties and tie blocks regarding their conformance with the moisture content requirements shown in paragraph 3.5.B.1 shall be performed using a Brookhuis FMD Moisture Meter, or functional equivalent (if an equivalent moisture meter is used, it must have any of the wood species listed in paragraph 2.1.2 pre-programmed as one of the choices). Moisture content shall be

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determined at a depth of not less than one inch from the top or bottom surface at the approximate mid-point of the length of the tie block, tie or timber.

- The Engineer reserves the right to make any additional inspections of all ties prior to seasoning and subsequent to seasoning, during fabrication and after delivery to determine conformity to these specifications. However, the plant inspection will be considered final with respect to the preservative treatment materials and processes.

#### Testing – Ties

- The vendor (contractor) shall, at no additional cost to the Engineer, have performed all tests necessary to assure that all switch ties, crossties, bracket ties and tie blocks are in accordance with these specifications.
- If the results of any test indicate that any switch ties, crossties or tie blocks do not conform to these specifications, an additional test shall be made on a further group of switch tie, crosstie, bracket tie and tie block specimens from the same lot. If the results of the additional tests indicate that any switch ties, crossties, bracket ties or tie blocks do not conform to these specifications, then the entire lot may be rejected.

#### Shipment – Ties

- All ties shall be shipped to the locations indicated in the Bid Documents.
- When specified, timber ties shall be identified for installation purposes with numerals not less than half inch (1/2”) in height, stamped on metal tags and affixed to the tie on the mark end as shown in the contract plans.
- Switch ties, crossties, bracket ties and tie blocks shall be banded in bundles of the same size and type. Unless otherwise indicated, the ties and timber shall be packaged as follows:
  - Ties and tie blocks less than 10 feet in length shall be banded in bundles of 20, except for bracket ties as noted below.
  - Bracket ties (9’-9” in length) shall be banded in bundles of 15.
  - Ties equal or greater than 11 feet but less than 18 feet in length shall be banded in bundles of 15.
  - Ties equal to or greater than 18 feet in overall length shall be banded in bundles of 10.
- Switch tie bundles shall be identified with, the name of the vendor, the description and the quantity of ties or timber contained therein. Bundle all timber ties with number tags facing in the same direction.

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- Switch ties bundles shall be banded with at least two (2) metallic straps. The banded bundles shall be further banded together in units weighing less than 6,000 pounds each. Breathing strips can be used in all bundles to allow air circulation
- Switch ties, crossties, bracket ties and tie blocks shall be delivered via flatbed trucks, or logging trucks to the locations indicated in the Bid Documents.
- MNR shall provide proper and adequate flagging protection to facilitate the delivery operations, as is deemed necessary by the railroad.
- On Railroad Premises: Timber shall be delivered and stacked as specified in the purchase agreement. If they are to be inspected, they must be placed so all the timbers are accessible to the inspector.

#### Acceptance – Ties

- Ties that do not comply with this specification or which, notwithstanding tests, inspection or acceptance at any previous time or location are found to contain deficiencies shall be subject to rejection and returned to the supplier.
- Final acceptance of switch ties, crossties, bracket ties and tie blocks will be subject to verification of count and inspection after delivery to the locations indicated in the Bid Documents and receipt of required shipping documents and inspection reports.
- The supplier shall be entitled to a joint inspection of the defective timber ties at the railroad premises.
- The vendor (contractor) shall bear the cost of handling and transporting (in both directions) rejected material, regardless of when or where the rejection was made within thirty (30) days after the date of the inspection. All rejected material not removed by the end of this period will become the property of the railroad.

Following final surfacing, all rail shall be set to the neutral temperature specified in the MNR MW-4.

#### Track Criteria

1. Gage: Standard gage of track shall be 4 feet 8½ inches.
  - a. Gage shall be measured with a standard track gage. It shall be measured at right angles to rails between points 5/8 inch below top of rails. The Contractor's track gages shall be checked at frequent intervals for accuracy.
2. Alignment, Grade, Track Centers and Cross Level: Definitions are as follows:

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- a. Alignment – Horizontal location of track as described by curves and tangents. Alignments shall be as established on the Plans.
  - b. Grade – Ratio of rise, or fall, of the grade line to its length. Grade shall be as established by the profiles shown on the Plans.
  - c. Track Centers – The distance between center lines of adjacent tracks, measured in a horizontal plane and at right angles to one of the tracks.
  - d. Cross Level – The difference in elevation of the tops of opposing rail of a track measured in a horizontal plane at right angles to the alignment.
3. Tolerances: Deviation from established gage, cross level, profile grade and horizontal alignment shall not exceed the criteria specified below.

TRACK SURFACE AND ALIGNMENTTOLERANCES

- |  |      |
|--|------|
| a. Deviation from a true gage of 4 feet – 8 ½ inches, measured at a plane 5/8 inch below top of rail on the inside face may not exceed | 1/8" |
| b. Deviation from design profile may not exceed  | 1/2" |
| c. Deviation from uniform profile on either rail at the mid-ordinate of a 62-foot chord may not exceed                                 | 1/4" |
| d. Deviation from zero cross level at any two points less than 62 feet apart on tangents or curves may not exceed                      | 1/8" |
| e. Deviation from uniform alignment between any two points less than 62 feet apart on tangent and curved track may not exceed          | 1/8" |
| f. Deviation from design alignment may not exceed  | 1/2" |

General Track Installation Procedures

1. SUBBALLAST and STONE BALLAST shall be installed in accordance with Item Nos. 0213902A and 0728020A, respectively.
2. Place timber ties on properly compacted ballast, normal to the centerline of track such that the heartwood of the ties is down and the bottom surface of the ties have uniform bearing against the ballast. The ends of 8'-6" ties shall be brought to a uniform line, 18½" from the edge of the base of rail on the line side. The line side shall be the northern side of the track in tangent and curved track and the straight side of each turnout.

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3. Install tie plates on the longitudinal centerline of each tie and place square to the centerline of the rail so that the outside shoulder of the plate bears fully against the rail base. Place plate with the downward cant toward the center of the track. Where using conventional tie plates and spikes, rail shall be spiked with a minimum of two rail holding spikes and one plate holding spike per tie plate. Where using Pandrol plates, place two screw spikes on the gage side of the rail and one screw spike on the field side. Holes must be pre-bored in the ties for the screw spikes and a minimum of three spikes per plate must be installed. Additional spikes shall be placed in curves per MW-4.
4. Rail joints must be staggered by a minimum of 36" and be secured by at least three bolts on each end of the joint. Outside of turnouts, the minimum length of rail allowed is 19 feet. Compromise joint bars must be fabricated and installed in such a manner that any gage mismatch of rail ends is less than 3/32" and a vertical mismatch that is no greater than 3/32". If CWR strings of greater than 78 feet in length are installed when the air temperature is below 80 degrees Fahrenheit, rail neutral temperature must be adjusted in accordance with procedures in the AREMA Manual and MNR's MW-4. When cutting rails, cuts must be clean and square using a rail saw or abrasive cutting disc only. Do not cut rails with a torch.
5. Welding of rail to be done using specifications flash-butt or thermite weld process. Thermite welds shall be made per the manufactures, AREMA fabrication and inspection requirements.
6. Lay and weld CWR to produce zero thermal stress in the rail. Install rail in such a manner that damage to ties or other track materials is avoided, and ties are not dislodged from their proper position. Install temporary six hole 36-inch joints using 4 bolts prior to surfacing and aligning track. Before welding CWR strings, the track shall be brought to within one (1) inch of the final line and grade and the CWR strings shall have their lengths adjusted for zero thermal stress temperature, be vibrated to relieve internal rail stress, and be fully fastened. Contractor shall destress rail by vibration and thermal adjustment after track has been brought to within one inch of final line and grade through initial surfacing and aligning. Destressing of track shall be completed prior to final surfacing and aligning. Field cuts in rail shall be made only after receiving the approval of the Engineer. Designate locations of field cuts by track designation, station of cut end of rail string, and right or left rail determined by facing in the direction of increasing stationing. Lay rail so that shop welds in opposite strings are staggered at least ten feet. Handle, and move as necessary, rail in such a manner and by use of such equipment that will prevent bumping or striking of rail and will avoid damaging or excessively bending the rail. Lay rail in a manner, which will prevent damage to rail, ties, fasteners, and structures. Do not drop rail. Use rollers to facilitate movement and placement and to reduce risk of damage to ties, fasteners and track appurtenance. Cut rails square and clean using a rail saw. Do not cut rails for installation of a bolted joint within 30 inches of a shop weld. Accurately space and drill holes for bolting of rail in accordance with requirements of the current AREMA Manual for Railway Engineering, Specifications for

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Steel Rails, Chapter 4, Part 1. Drill holes with an approved rail drill. For temporary joints drill two holes only, leaving first hole blank. Drill cylindrical holes of specified diameter for the size bolt required through and perpendicular to web of rail. Use a template, as a drilling guide, to locate holes both vertically from bottom of rail and horizontally from rail end. In no case shall a joint bar be used for this purpose. Remove all rough edges from holes. Cut out rail segments containing holes that are rejected by the Engineer. Install 6 hole, 36 joints using 4 bolts per joint for temporary installations prior to initial surfacing. Allowable length of time that bolted joints may be in shall be 45 days. Welding will be as specified previously and the following:

- a. Closure welds shall be accomplished following initial surfacing and rail distressing.
- b. Closure welds will be made by the welding process specified previously and by personnel trained in the method.
- c. The electric flash butt weld will not be used in a turnout nor within 400 feet from each end of the turnout as measured from the limit shown on the Plans.
- d. Closure welds shall meet all criteria as specified previously.
- e. Closure weld inspection and magnaflux testing shall be performed by the welding crew and each weld certified free of defects. Cutout welds that fail the inspection and testing and re-weld in accordance with these Specifications.
- f. Closure weld manual and detector car ultrasonic testing shall be performed by independent testing companies.
- g. Manual ultrasonic testing acceptance criteria will be as specified.
- h. Any weld found to be defective during the above ultrasonic tests shall be cut out and replaced with a 19 foot section of new rail welded into the track at no additional cost to Railroad.
- i. Closure welds will be made in accordance with the welding contractor's recommendations.
- j. Removal of rail anchoring shall not exceed 200 feet in both directions when making a weld.
- k. Rail puller capable of exerting tension in excess of 70 tons will not be allowed unless approved by the Engineer.
- l. Closure welds will be warranted as specified.

Thermal adjustment shall follow initial surface and alignment to the tolerances as specified. Rail temperature shall be taken after track has been initially surfaced and lined just prior to rail adjustment. The temperature reading shall be used in computation of rail adjustment. Determine rail temperature by an AREMA standard rail thermometer as specified in the current AREMA Manual for Railway Engineering, Chapter 5, Plan Number 34-71. Determine temperature of rail by placing rail thermometer on shaded side of rail base next to web and leaving it there for not less than five minutes and until no change in its reading is detected. During adjustment of rail constantly monitor and record rail temperature readings of CWR on the Rail Clipping Record form made part of this Section.

During thermal adjustment, determine the gap or rail movement between CWR strings and between CWR and bolted rail by the equation:

$$G=(t-T) LK + Q$$

Where: G = Rail gap (inches)

t = Zero Thermal Stress temperature of 95 degrees Fahrenheit.

T = Actual rail temperature at time of laying (degrees Fahrenheit)

L = Length of CWR being laid (feet)

K = Coefficient of thermal expansion for rail steel (0.000078 inches per foot per degree Fahrenheit).

Q = Rail gap as required by respective manufacturer of field weld kit and bonded standard joint. For bolted standard joint Q = 0.125 inches, and for insulated joints Q equals the end post thickness. Q shall be deleted from above formula if field weld is not expected to be completed prior to operation of the first train over newly installed rail.

After rail has been laid and prior to thermal expansion insert between the ends of CWR strings a short piece of rail equal in length to “G” minus ½ inch were “G” is determined by the formula above. This requirement does not apply if calculated rail gap “G” is less than 1- ½ inches. Insert short rail at time rail is laid to prevent damage to rail ends during rail laying, ballasting, and other operations requiring passage of on-track equipment over rail joints. Remove short rail prior to anchoring and when rail temperature results in a calculated closure of the rail gap. In no case shall short pieces of rail remain in track when returning track in service for train operation.

Prior to placing equipment on newly laid rail, secure rail, allowing for proper gauge, surface, and alignment, in a manner that will prevent damage to CWR, rail fastening assemblies, ties, and other material. Move equipment over partially secured track in such a manner as to prevent damage to structures and track work materials. Prior to surfacing, fully spike all ties to allow for track raise and alignment. Remove fastenings to adjust rail to its zero thermal stress length.

7. Anchoring shall not proceed until the track has been sufficiently ballasted to prevent tie or track movement due to thermal expansion or contraction and until the track has been initially raised, tamped and aligned. Anchors shall be applied flush to the side of the tie, on each rail with every other tie fully box-anchored. Anchors shall be omitted from a point four ties in advance of and behind switch points and at all locations where it is not possible to install anchors on each rail. For strings of welded rail 78 feet in length or greater, a minimum of 10 consecutive ties on each side of the rail joint at the end of the string shall be fully box-anchored excepting the conditions in the previous sentence.
8. Surface and align track by methods which will prevent undue bending of the rail, straining of the joints or damaging rail fastening assemblies, and only after the cribs have been filled with ballast. No surfacing or aligning work shall be performed on track when the ambient rail temperature is greater than the temperature of the rail at the time it was anchored, nor less than 20 degrees Fahrenheit. Rail temperature shall be measured using a rail thermometer as specified in the current AREMA Manual, Chapter 5 by pacing the rail thermometer on the shaded side of the rail base and leaving it in place for a minimum of five minutes or until there is no change in its reading. When tamping ties, the ballast shall be firmly tamped for 16 inches on each side of all rails.
9. Final surfacing and aligning of the new track and turnouts shall be in accordance with the geometries shown on the Plans. Where tracks are being replaced (over new Atlantic Street Bridge, jump spans, temporary track removals), the final track geometries shall be the same as the existing. The final raise shall consist of a lift of no greater than two inches to bring the track surface to the final grade shown on the Plans. Where tracks constructed by this Contract connect to existing tracks, run out the surfacing into the adjoining tracks a distance as indicated by MNR's MW-4.
10. After the final surfacing and aligning of the track and turnouts, ballast shall be adjusted so that all cribs, excepting those beneath switch rods, are full. Leave the cribs open beneath the switch rods so that there is a minimum of five inches of clear space beneath them. Dress the ballast shoulder so that it extends beyond the ends of the ties of at least one foot horizontally in the plane of the top of tie at which point the shoulder may drop at a maximum rate of two horizontal to one vertical. Excess ballast shall not be left on top of the ties or timbers and shall not be allowed in flangeways or between stock rails and switch points. Final surfacing and alignment shall be within the tolerances listed in this specification.

11. Bumping post at the end of new Track 7, near Structure 369B North shall be installed by the Contractor prior to releasing the track for operations.
12. Turnouts shall be installed in the same general manner as listed above in accordance with the geometric criteria in the Contract Documents. Survey is required to layout the Point of Switch, PITO, and Point of Frog prior to the installation and to be confirmed after completion of turnout installation.
13. In order to determine the acceptability of the completed track and turnouts, the Engineer will schedule MNR to make a final inspection to establish that the track and turnout construction is within the tolerances specified herein. The Contractor shall correct track deviations, as disclosed by the inspection, which exceed tolerances specified herein at no additional cost. The Contractor shall notify the Engineer two weeks in advance of the anticipated date(s) when the track will be ready for MNR inspection.

### Insulation Joint Criteria

#### Material Requirements – Insulated Joints

- All materials and processes for this specification shall conform to AREMA Manual for Railway Engineering; Section 3.8 Specifications for Bonded Insulated Rail Joints, except as otherwise specified or directed by the Chief Engineer.
- Bonded insulated joint assemblies shall consist of joint bars, rails, end posts, bushings, rail insulation, adhesive, bolts, nuts and washers. Separator blocks shall be provided for guard rail bonded insulated joint assemblies.
- Bonded insulated joint assemblies shall be manufactured to conform to MNR Standard Drawing TS - 2136, bid documents and as specified herein.
- Joint Bars
  - Joint bars shall be in accordance with the current AREMA Specifications Volume 1, Chapter 4. Use of alloy steel bars or fiberglass bars shall be subject to MNR approval.
- Rail
  - Rail section shall be as specified in bid documents.
  - Rail shall be provided by vendor and shall be head-hardened or fully heat-treated to a Brinell hardness in accordance with the latest AREMA specification for steel rails.

- Rail dimensions and the location of holes for drilling shall be as indicated on MNR Standard Drawing TS -2136. The length of the rails shall be as indicated in the Invitation to Bid.
- The rail shall be cut within a variation in end squareness of not more than 1/32 inch.
- All burrs from saw-cutting and drilling shall be removed.
- The adjacent sawed ends of the rails shall be joined by bonded insulated joint bars.
- All raised letters within the joint area shall be removed by grinding to conform to the existing rail prior to joint assembly.
- Lengths of bonded insulated joint assemblies, type of rail and desired drilling to be used will be specified on invitation to bid.
- Drilling Pattern: Rail ends to be blank or as specified on bid documents.
- Insulating Material
  - End posts shall be electrical grade polypropylene or polyamide (nylon) epoxy laminate, epoxy glass laminate or approved equal. Phenolic micarta based materials will not be acceptable. The end post thickness shall be 0.1875 inch (3/16") ± 0.0156 inch (1/64").
  - Water absorption of end post shall be in accordance with the current ASTM Designation D570, Standard Test Method for Water Absorption of Plastics.
  - Bushings shall be filament wound insulator thimbles of synthetic fiber.
  - Rail Insulation shall be an electrical grade para-aramid synthetic fiber laminate and have a pre-molded minimum thickness of 0.0295 inch.
  - The entire joint shall be painted with GE Glyptal 1201 red insulating paint, or MNR approved equal, for additional protection from contaminants.
- Fasteners
  - Bolts, nuts and washers shall be in accordance with the latest ASTM Specification A490, "Quenched and Tempered Steel Bolts for Structural Joints" and have Class 2A or 2B thread fit.



- Adhesive
  - Adhesive shall be a structural thermoset compound and provide minimum lap shear strength of 3500 psi at 75°F in accordance with ASTM D-1002.

#### Manufacturing Requirements – Insulated Joints

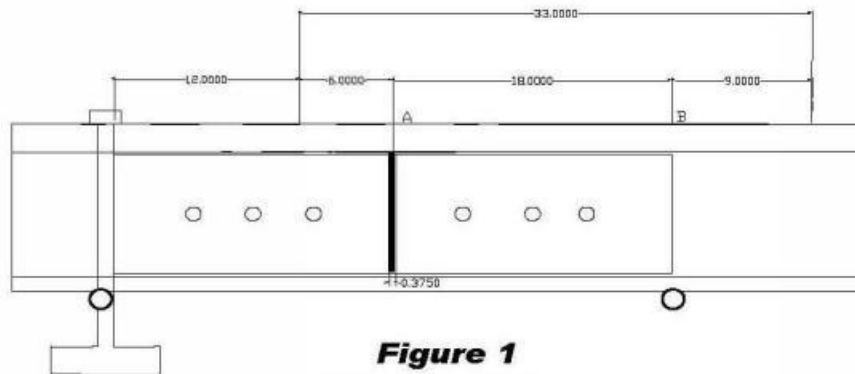
- Joint to be offset from center of assembly (approx. 3 feet) for ease in handling with crane.
- Insulated joint rail ends to be bonded shall be thoroughly cleaned to bare metal and degreased. The preparation of the joint assembly adhesive, its application and curing shall be in accordance with the adhesive manufacturer's application/usage instructions.
- Bonded insulated joint adhesive shall be applied to the entire assembly to ensure distribution throughout the entire insulation contact area, end post, bolt holes and exposed threads. Excess compound shall be distributed around the joint bars and exposed fasteners.
- Bonded Insulated joint assemblies shall be fabricated and finished in a manner such that no openings or exposed surfaces of insulation material exist which would permit the penetration of moisture or other foreign substances.
- Bonded Insulated joint rails shall be drilled in accordance with the current AREMA Standard for Steel Rail (Vol. 1, Chap. 4). Holes at extreme ends shall only be drilled when specified on the invitation to bid.
- Contact Surfaces
  - Joint bars to be 48 inches  $\pm$   $\frac{1}{8}$  inch long. The contact surface of the joint bars adjacent to the rail shall be a smooth and straight with a tolerance of  $\pm$   $\frac{1}{32}$  of an inch using a 36-inch straight edge.
- Adhesive
  - Insulation material thickness for the outside walls of the bushings shall be 0.048 inch, subject to a tolerance of plus 0.016 inch and minus none.
  - Shear strength tests of adhesive shall be performed in accordance with the current ASTM designation D1002; Standard Test Method for Strength Properties of Adhesives.
- Fastener Torque

- Bonded insulated joint assembly dimensions shall be as indicated on the MNR Standard Drawing TS – 2136 and in the Invitation to Bid.
- The joint bar section shall provide full contact to the rail web area with an appropriate allowance for the rail insulation thickness. The bars supplied are required to accommodate the installation of Pandrol “E” clips or Fast clips to hold the rail.
- Bolts and nuts shall be of a nominal diameter of at least 1 inch and meet the material and mechanical requirements specified in accordance with ASTM A490 and the referenced specifications.
- Shop Drawings shall specify the amount of torque required for bolts, as determined for the design/application of the Insulated Joints. Bolts shall be torqued to the manufacturer’s specification as indicated on the Shop Drawings.

#### Qualification Testing – Insulated Joints

- Qualification testing shall proceed after the Shop drawings have been received and approved by the Engineer. Test results performed within the last 5 years on joints with identical rail section may be accepted in lieu of performing qualification testing described herein. For each design and/or material and/or process change, the manufacturer shall be required to perform these qualification tests.
- Three (3) bonded insulated joints shall be tested by the manufacturer as follows: Two (2) bonded insulated joints shall be tested as specified in section 1.7.2 (longitudinal compression test) of this specification. The third bonded insulated joint shall be tested in accordance with section 1.8.2 (electrical tests) then subjected to the test specified in section 1.7.3 (rolling load test). The joint shall again be subject to the electrical tests.
- The Engineer shall be notified not less than 30 days in advance of dates scheduled for any tests or inspections. The Engineer retains the right to witness any assembly process, inspection and tests.
- All design qualification and production testing shall be performed by a test facility that is staffed, equipped and experienced to perform the specified tests, approved by MNR Engineering, in advance of any testing.
- Longitudinal Compression Test

- The two (2) joint assemblies shall then be sawed in half where the rails are butted together. The sawing shall be performed in a manner that will prevent overheating and damage to the bonding agent. The cuts shall be perpendicular to the centerline of the top of the rail with a tolerance of  $\pm 1^\circ$ . The cut ends of the bars at one end of the test piece, and the end of rail at the other, shall have fair bearing in a test machine to ensure that the loading and reaction are through the centroid of the rail and parallel to its axis.
  - Load shall be applied parallel to the running surface of the rail in increments of 25,000 pounds. Each load increment shall be constant until the longitudinal deflection of the rail ceases before increasing the load by the next increment.
  - The load shall be increased in these increments until a total load of 650,000 pounds is attained for rail weights of 132 pounds or greater, or failure occurs. For rail weights of less than 132 pounds, a total load of 600,000 pounds shall be used. The load and differential movement of the rail and joint bars shall be recorded at each increment of loading and shall not exceed 0.001 inch.
  - If an alternate method of this test is to be performed, the manufacturer shall submit its procedure for MNR approval prior to implementation.
  - At no time shall any of the bonded insulated joints show any indication of slippage during or before total prescribed load is applied to the joint. When the test is complete and after the load on the rail has been released, the relative position of the rail and the joint bar shall be within 0.020 inch of its original value.
- Rolling Load Test
    - The bonded joint shall be mounted on a 33-inch stroke rolling load test machine and supported on 36-inch centers with the joint centered between supports.
    - A wheel load of 44,000 pounds shall be applied to the rail. The stroke shall have a range of 33-inches, centered as shown in Figure 1. The load on the rail shall be applied for 2,000,000 cycles and the deflection of the rail at the center line of the rail shall be measured and recorded when the wheel load is over both points A and B for every 500,000 cycles and recorded to the nearest 0.001-inch.
    - At all times, the deflection of the bonded insulation joint shall not exceed 0.065 inch. (AREMA Acceptance Criteria).



**Figure 1**  
**Rolling Load Test**

*The above figure is representative and may not depict the actual insulated joint to be tested.*

#### Post Production Testing – Insulated Joints

- Post-production testing shall proceed upon completion of bonded insulated rail joint production. Each bonded insulated rail joint produced shall be tested in accordance with the Electrical Testing section herein.
- The Engineer or its designated representative reserves the right to inspect or witness post-production testing.
- Post production test results shall be sent to the Engineer for review and approval. Any bonded insulated rail joint that fails the tests described in this section shall not be accepted. Any additional cost associated with failed tests shall be the Vendor's responsibility.
- Electrical Test
  - Resistance Test
    - A complete joint assembly shall be used for the electrical resistance testing. The dry rail and joint assembly shall be supported on dry dielectric nonconducting material. The resistance of the joint shall be measured by either method as specified in this section.
    - The acceptance criteria shall be a minimum measurement of 20 MΩ.
  - Megohmmeter Test

- A voltage of 500 VDC shall be applied rail to rail and each rail to one (1) bar for a duration of five (5) seconds, measure and record the current flow (I) through the joint to the nearest 0.10 microampere. Calculate the resistance (R) using the following formula and record:

$$R \text{ (ohms)} = \frac{500 \text{ (volts)}}{I \text{ (amps)}}$$

Or directly read the resistance utilizing a megohmmeter that reads in megohms.

- High Potential Test

- Apply 3000 VAC at 60 Hz from rail to rail for a period of 60 seconds. There shall be no flashover or puncture through the insulation from the application of such voltage or this shall be considered a failed test.

#### Markings – Insulated Joints

- Each bonded insulated joint assembly shall be identified with the manufacturer's name, serial number, rail section and date of manufacture on the web of the rail nearest the joint. Such markings shall be designed to stay in place and remain readable for the life of the product.
- The bonded insulated joint rail shall be marked with the total length of each joint on each extreme end on the top of the rail approximately one foot from the end.
- The centerline of each bonded insulated joint assembly's length shall be marked on the head of the rail.

#### Packaging and Handling – Insulated Joints

- Bonded insulated joint assemblies shall be shipped to the locations indicated in the Bid Documents.
- Care shall be afforded when loading and transporting joints so as to prevent damage to epoxy bond.
- Bonded insulated joint assemblies shall be loaded head up and in layers and shall be positioned between 5 strips of wood (2x6) to prevent damage during shipment.

- Bumping and/or striking of the prefabricated bonded insulated joint during handling or delivery is not permitted. Nicked or gouged rail shall be rejected as determined by the Engineer.
- Bonded insulated joint assemblies that do not comply with MNR requirements of this specification, or are found to contain deficiencies, will be rejected.

#### Acceptance – Insulated Joints

- The prefabricated bonded joint assembly and materials shall conform to the requirements of this specification.
- Qualification test results shall be sent to the Engineer for review and approval. If the results of any test do not conform to the specifications, an additional test series of each kind shall be made on two samples from the same lot. Failure of any of these additional tests will be cause for rejection of the entire lot.
- After approval of test results, the Vendor shall arrange a date and time of delivery so the Engineer can inspect and field-test each joint.
- The Vendor shall assume the expense of handling and transporting rejected material.

#### Quality Assurance and Quality Control – Insulated Joints

- The intent of this specification is to insure that the prefabricated bonded insulated joint assemblies are produced in accordance to this specification, thoroughly tested and inspected to provide a minimum 20 year service life. Efficient methods of design, production, testing, and product evaluation shall be utilized in order to eliminate in-service failure.
- The manufacturer shall have an implemented Quality Management System compliant to ISO 9001.
- The Vendor shall submit with its proposal a Quality Management System Manual compliant to the requirements of ISO-9001 or submit their current ISO certification, if certified. If the Vendor does not normally prepare material in its own plant(s), it is acceptable for the Vendor to have his proprietary formulations prepared at another non-owned facility. This facility shall be subject to the same Quality Assurance procedures and systems the Vendor uses in their own facilities, and shall be subject to audit by the Engineer under the requirements of this specification. If such an outside facility is used, the Vendor must submit with its proposal the proposed supplier's Quality Management System Manual compliant to the requirements of ISO-9001 or submit their current ISO

certification, if certified.

- The Engineer reserves the right to inspect facilities and evaluate by objective evidence the Vendor's capability to provide the specified product prior to award. The results of this evaluation may determine the acceptance or rejection of the Vendor as a qualified source for the subject procurement.
- Evaluations performed by the Engineer may include, but not limited to, an inspection of materials and equipment, and/or a review of the methods and procedures utilized in producing items for the Engineer use as delineated in this specification.
- The Engineer reserves the right to inspect and witness tests of the bonded joint assemblies at the Vendor's plant prior to shipment, and the inspector may place a designated mark on any sections of the packaged bonded joints when they are inspected.
- The Engineer also reserves the right to inspect and test the bonded joint assemblies prior to acceptance of delivery; non-conforming material will not be accepted and returned to the Vendor at the Vendor's expense.
- Test Equipment
  - Test Equipment shall be in good operating condition, of adequate capacity and range and accurately calibrated.
  - Testing Equipment calibration shall be certified and traceable to National Institute of Standards and Technology (NIST).
- Qualification Testing
  - Qualification Testing shall be performed on all new procurements or as specified herein.
  - Qualification Testing shall also be required on previously supplied product which has had a manufacturing or design change of the product or processes previously supplied.
  - Qualification Test Report shall be submitted with equipment specifications, calibration methods of all testing equipment used, and Test Records specifying the accept/reject criteria for each test implemented.
  - Material Certification shall be submitted for Rail, Bonding adhesive, and Fasteners.

Lift and Line Existing Track

1. Track to be lifted and lines shall be lifted vertically and lined horizontally to the line and grade shown on the Plans. The finished line and grades shall meet the Track Surface and Alignment Tolerances shown under the Track Criteria part of this specification.
2. The Contractor shall replace 30% of the existing ties with new ties as directed by the Engineer. Tie plates and anchors shall be reused and reinstalled using new spikes. The tie replacement shall be considered incidental to Lift and Line Existing Track and no additional payment shall be made.

To facilitate the construction of the temporary jump span on Track 3, the 53B switch and turnout will be removed and replaced. The 53B switch and turnout shall be installed and put back into service as part of the same outage as the installation of the temporary jump span. When the new jump span and Track 3 are placed back into service, the 53 cross-over shall also be placed into service at the same time.

After the construction of the new Atlantic Street Bridge, the entire 53 cross-over will be removed and fully replaced in kind.

**Method of Measurement:** RAILROAD TRACK WORK will be measured for payment by the actual number of linear feet of track, measured along the centerline, installed and accepted. One track consists of two rails, connecting ties, tie plates, spikes, anchors, elastic fasteners, lining, lifting and tamping, and any and all appurtenances required. Where rail ends are staggered, the average of the two rail ends shall be used as the point of measurement. Bumping posts, joint bars, compromise joint bars will not be measured for payment but shall be considered incidental to the Railroad Track Work.

TURNOUT INSTALLATION will be measured for payment by the actual number of turnouts installed and accepted. One turnout includes switch ties, frog, switch points and stock rails, closure rails, and all throw rods as provided by the Contractor. The Railroad will provide the switch machines. Each turnout unit shall be considered as beginning at the Number Zero tie ahead of the point of switch and extending to the Last Long Timber beyond the frog. Other track outside of this zone will be measured by the linear foot as indicated above. Furnishing and installation of switch machines, rods, connections, etc., where shown on the Plans, shall be incidental to the turnout installation. No separate payment shall be made for all temporary and final conditions but the cost thereof shall be included in the unit cost of TURNOUR INSTALLATION.

LIFT AND LINE EXISTING TRACK shall be paid by the actual number of linear feet of track raised and lined. One unit consists of raising the track from 0" to 6" vertically and 0" to 24" horizontally. Lifts greater than 6" vertically and 24" horizontally shall be divided by 6" and rounded up to the next whole number. For example, for a lift of 15 inches, the quantity would be

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3 times the linear feet lifted ( $15/6 = 2.5$ ; rounded up to 3). A turnout will be measured as two tracks starting at the point of switch and ending at the last long tie.

SUBBALLAST and STONE BALLAST will be measured for payment in accordance with specification Sections 0213902A and 0728020A.

There shall be no separate payment for final as-built surveys of new crossovers, new track and surfaced track areas, but the cost thereof shall be included in the unit price of RAILROAD TRACK WORK.

There shall be no separate payment for cutting or welding rail incidental to construction of the new Bridge, including temporary jump span activities, but the cost thereof shall be included in the appropriate unit prices.

**Basis of Payment:** This work will be paid for at the contract unit price per linear foot for RAILROAD TRACK WORK, per each for TURNOUT INSTALLATION, and per linear foot for LIFT AND LINE EXISTING TRACK, complete in place, which price shall include all material, equipment, tools, labor and work as described noted above and incidental thereto.

<b>Pay Item</b>	<b>Pay Unit</b>
RAILROAD TRACK WORK	LF
TURNOUT INSTALLATION	EA
LIFT AND LINE EXISTING TRACK	LF

## **ITEM #0601980A – PRECAST CONCRETE PLATFORM-TYPE 1 (10’ WIDE)**

**6.01.01 Description:** Work under this item shall consist of furnishing and erecting precast concrete platforms as shown on the plans, including all materials, plates, keeper plates, neoprene elastomeric pads, fasteners, anchors, guardrail anchors, equipment, tools, and labor incidental thereto. The tactile warning strips and timber rub rails are not included in this item and shall be paid for under Item #0062680A – Tactile Warning Strip and Item #0100233A – Timber Rub Rail.

**6.01.02 Materials:** All materials for new platforms shall meet MTA Metro-North Railroad Station Standards including but not limited to the following:

1. Design shall conform to applicable state codes, ACI, ADA, ASTM and PCI and applicable industry standards.
2. Design live load shall be at least 150 psf (pounds per square foot).
3. A minimum compressive strength for all cast-in-place concrete shall be of 4,500 psi (pounds per square inch) at an age of 28 days. A minimum compressive strength for all precast concrete shall be 5,500 psi at an age of 28 days.
4. Cement shall conform to the requirements for either type II or Type IIA Portland Cement in accordance with ASTM C150. C3A content to be 8% maximum. Alkali content  $Na_2O+0.658 K_2O$  less than 0.60%. Minimum cement content shall be 7.5 sacks/cubic yard.
5. Cast-in place for platform slabs and all precast concrete shall have 45 lbs./cy of microsilica added to the mix, for a total cementitious content of 720 lbs./cy. Microsilica admixture shall be Force 10,000, as manufactured by W.R. Grace & Co., or approved equal.
6. Concrete shall also contain DCI Corrosion inhibitor, as manufactured by W.R. Grace & Co., or approved equal. The dosage rate for the corrosion inhibitor shall be 3 gal./cy.
7. For cold weather applications, refer to the latest version of the State of Connecticut Department of Transportation’s Standards and Specifications.
8. Air-entraining admixtures shall be in accordance with ASTM 260 and ASTM C138.
9. Accelerating admixtures shall be in accordance with ASTM C494.

**6.01.03 Construction Methods:** All new concrete platforms shall be constructed to MTA Metro-North Railroad Station Standards including but not limited to the following:

The members shall be manufactured in accordance with the plans. Concrete shall be finished as follows: -Rough form finish in areas not exposed to view (backfilled areas) -Smooth finish in areas exposed to view (such as pier surfaces) -Broom finish shall be utilized on all walking surfaces and finished perpendicular to the normal walking path to provide a wet-slip coefficient of 0.5 or greater. -All exposed edges of concrete elements shall have a 1 inch chamfer, unless otherwise provided. -A 1 inch x 1 inch quarter round continuous parallel drip void shall be cast into the underside edge of all platforms.

Concrete shall be reinforced as follows: -Reinforcing steel: ASTM A615, grade60, Hot-Dip Galvanized ASTM 767 (with supplementary requirements S1, S2, and S3, including Class 1 coating). -Welded wire fabric: ASTM A185, 4 x 4-7/7, Hot-Dip Galvanized ASTM 767 (with supplementary requirements S1, S2, and S3, including Class 1 coating).

New platform surfaces including the front vertical edge and the return to the drip notch under the platform edge shall be coated with a Silane sealer. After applying the Silane sealer, when the tactile warning strip is placed, the second coat shall also be applied over the front vertical edge, and to the drip notch under the platform edge. This product shall be a latex vinyl copolymer emulsion, and a factory apportioned catalyst with abrasion resistant aggregates and a Corrogard MCI.

The detectable warning strip shall be installed 4" from the edge of concrete platform along the full length of the platform as shown on the plans.

**Shop Drawings:** Before fabrication, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Subarticle 1.05.02-3. These drawings shall include complete details of the methods, materials and equipment he proposes to use for the fabrication precast concrete.

**Fabricator Qualifications:** The precast concrete members shall be manufactured by a fabricator participating in the Prestressed Concrete Institute's (PCI) Plant Certification Program and be designated a PCI Certified Plant.

**Erection Drawings:** The Contractor shall prepare and submit erection drawings, signed and sealed by a Connecticut registered Professional Engineer for the erection of the precast concrete platforms. The drawings shall describe all necessary temporary supports, including the sequence of installation. In addition, a description of the work methods, materials, and/or special equipment needed to complete the work of the section shall be provided.

**6.01.04 Method of Measurement:** This work will be measured for payment by the actual number of linear feet of precast concrete platform installed and accepted. Measurement will be made along the centerline of each member.

**6.01.05 Basis of Payment:** Payment for this work will be made at the contract unit price per linear foot for "Precast Concrete Platform-Type 1 (10' Wide)", as shown on the plans, completed and accepted, including all materials, plates, keeper plates, neoprene elastomeric pads, fasteners, anchors, guardrail anchors, equipment, tools, and labor incidental thereto.

## **ITEM #0714016A – LAGGING**

**Description:** Work under this item shall consist of furnishing all labor, materials, tools, equipment, transportation, and installation of permanent lagging along the front and side faces of the proposed Bridge 08012R abutments as specified herein and shown on the Contract Drawings. The WT's cut and welded to the micropiles shall be included in this work.

**Material:** The material for lagging shall be precast reinforced concrete and uncoated structural steel conforming to Section M.06.02.

**Method of Measurement:** Lagging will be measured for payment by the number of square feet completed and accepted. This area will be measured or computed from the horizontal and vertical payment limits shown on the plans or as ordered. If no payment limits are shown on the plans, the limits used for payment will be the actual horizontal and vertical limit of lagging installed and accepted.

**Basis of Payment:** Payment for this work will be made at the contract unit price per square foot for "Lagging" measured as described above. The price shall include all design, materials, equipment and labor incidental to the construction of the lagging required at the locations specified on the plans; including removal of obstructions, repair and correction, adjustments or reconstruction required.

Pay Item  
Lagging

Pay Unit  
S.F.

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