STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
16 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0016

JOHN ELIAS BALDACCI
GOVERNOR

DAVID A. COLE
COMMISSIONER

November 5, 2010
Subject: **Westport - Windham**
State Pin No: 017860.01
Amendment No. 2

Dear Sir/Ms:

Make the following changes to the Bid Documents:

In the Bid Book (page 23), **REMOVE** the "PROJECT DESCRIPTION", 1 page dated October 15, 2010 and **REPLACE** with the attached new "PROJECT DESCRIPTION", 1 page dated October 26, 2010.

In the Bid Book (pages 24 thru 26), **REMOVE** the "GENERAL NOTES", 3 pages dated October 15, 2010 and **REPLACE** with the attached new "GENERAL NOTES", 3 pages dated October 26, 2010.

In the Bid Book (pages 73 thru 90), **REMOVE** "SECTION 647 – RAILROAD TRACK CONSTRUCTION", 18 pages dated October 15, 2010 and **REPLACE** with the attached new "SECTION 647 – RAILROAD TRACK CONSTRUCTION", 17 pages dated November 1, 2010.

The following question has been received:

Question: The tie plate spec you are currently asking for can not be manufactured. We have contacted the plate manufacture and they will not make the 6 hole punch plate you have requested on this project. They do make an 8 hole punch, 7-3/4x13 for 5-1/2" base rail. The 8 hole punch plate is available.

Response: The 8 hole punch plate is acceptable.

Question: The current spec is asking for a 5-1/2" long track spike. This length is an odd size, the industry standard is a 5/8x6 track spike on 7x9" cross ties.

Response: A 6" long track spike is acceptable.

Consider this change and information prior to submitting your bid on November 17, 2010.

Sincerely,

FOR

Scott Bickford
Contracts & Specifications Engineer

October 26, 2010

Westbrook-Windham
Mountain Division Rail Restoration
PIN 17860.01

PROJECT DESCRIPTION

The project involves reinstalling new rail track along the existing Mountain Division railroad corridor from Bridge Street in Westbrook, Maine to Route 4/202 in Windham, Maine as shown on the location map. The project begins approximately 1000 ft north of the Bridge Street crossing and extends northerly for a distance 4.75 miles, up to the Route 4/202 crossing in Windham.

This railroad corridor was abandoned and the rail infrastructure has been removed. The purpose of this project is to reinstall the rail infrastructure that was previously removed. The construction will be completed in phases. The first phase (phase I) is to install as much track as possible while skipping over the paved road crossings. Subsequent phases will occur to finish the track and crossing work.

Please note that the paved at-grade crossings with Bridge Street, Pierce Street, Presumpscot Estates Subdivision Road, Rousseau Road, Depot Street and Route 4/202 as well as the bridge crossing with Mallison Falls Road are excluded from this project. Track installation associated with this scope of work will stop approximately 50 ft. from existing paved road crossings and approximately 300 feet from the Mallison Falls bridge.

The proposed work will be contained inside the existing railroad right of way. The project will include clearing, grubbing, ditch cleaning, minor grading, track ballast, tie and rail installation work. Work also includes installation of numerous private/farm crossings consisting of timber plank crossing panels and bituminous paved crossing approaches.

New rail shall be 115 RE with approximately 2.5 track miles furnished by MaineDOT in the form of 16 - 1,650 foot strings – with a joint bar 480 feet from one end of six of the strings, located along the north end of the currently active rail corridor in Westbrook. Additional rail of the same section will be furnished by the Contractor in 78 or 80 foot lengths. All other track material will be furnished by the Contractor. The 16 rail strings will be moved by the Contractor along the rail corridor to the Project area.

Westbrook-Windham
Mountain Division Rail Restoration
PIN 17860.01

GENERAL NOTES

1. All work contemplated under this contract shall be governed by and be in conformity with the latest Maine DOT Standard Specifications, Standard Details, Supplemental Specifications, except as modified by the Special Provisions.

2. The utilities involved in this Contract are as follows:
   Central Maine Power
   City of Westbrook
   Maritimes Northeast Pipeline

3. All utility facilities shall be adjusted by the respective utilities unless otherwise noted.

4. Clearing limits shall be as defined in the Specifications.

5. The actual lines for clearing shall be established in the field by the Contractor as indicated in the specifications and approved by the Resident.

6. When directed by the Resident, Item 631.20 Stump Chipper Rental, may be used to remove stumps.

7. All inslope and ditches in cut areas shall be graded as shown on the typicals or flatter, or as directed by the Resident.

8. All waste material not used on the project shall be disposed of off the project in waste areas approved by the Resident.

9. Existing culverts to remain shall be cleaned as directed by the Resident. Payment will be made under Item 631.32 Culvert Cleaner (Including Operator).

10. No existing drainage shall be abandoned, removed or plugged without prior approval of the Resident.

11. Unless otherwise noted Seeding Method No. 3 shall be utilized on all slopes disturbed during ditching operations.

12. Existing right-of-way fences shall be maintained during all phases of construction as directed by the Resident. Maintenance of these fences will be incidental to the Contract.

13. No separate payment for superintendent or foreman will be made for the supervision of equipment being paid for under the equipment rental items.

14. “Undetermined Locations” shall be determined by the Resident.

15. Stations referenced are approximate.

16. All work shall be done in accordance with the latest version of the Maine Department of Transportation’s Best Management Practices for Erosion Control & Sediment Control.

17. The Contractor shall be responsible to survey the existing rail corridor and design the horizontal and vertical alignment of the new track as detailed in Section 647 of the Special Provisions.

18. The Contractor shall exercise extreme care to not damage the MaineDOT furnished CWR rail strings or roadway surfaces during the process of moving the rail from the active rail corridor to the Project locations. The location of the rail and other information is detailed in Section 647 of the Special Provisions.

19. All track work under this Contract shall be supervised by a foreman with at least 10 years of experience in construction of railroad track work.

20. Contractor shall be responsible to utilize rail strings furnished by MaineDOT with the minimum amount of cutting the rails and provide a schematic plan of the project to the Resident at the beginning of the Contract showing proposed location of rail strings and any proposed cuts.

21. During the Project, the Contractor is responsible for the proper disposal of any railroad ties stockpiled or loose along the right-of-way that cannot be used on site. The Contractor is responsible to have the unused ties disposed of as demolition waste at a landfill approved to accept demolition waste/debris. Payment for labor, materials, equipment and fees associated with disposal considered incidental to 203.20 payment item. If the Contractor encounters any other potential demolition debris and is not sure of how dispose, the Contractor shall notify the Resident. The Resident shall contact the hydrogeologist in MaineDOT’s environmental office at 207-624-3100 for clarification. The Contractor shall also remain alert for evidence of petroleum and hazardous waste/materials contamination. The Contractor shall secure the excavation, stop work in the contaminated area, and immediately notify the Resident. The Resident shall contact the hydrogeologist in MaineDOT’s environmental office at 207-624-3103 and the Maine Department of Environmental Protection at 800-482-0777. Work may only continue with authorization of the Resident.

22. Any damage to the existing roads, sidewalks, slopes, pipes or drainage structures caused by the Contractor’s equipment, personnel, or operation shall be repaired to the satisfaction of the Resident. All work, equipment and materials required to make repairs shall be at the Contractor’s expense.

23. Excavations accomplished as part of this Project shall be constructed in accordance with subpart P of 29 CFR part 1926.650-652 (Construction Standard for Excavations).

24. Temporary erosion control measures shall be maintained as specified in the soil erosion and water pollution control plan. Payment will be made under Item 656.75.

25. The Contractor shall keep his equipment and soil disturbances within the railroad right-of-way.

26. The Contractor shall access the project site from paved public roads only. Contractor shall use care when accessing the project site to ensure existing roadway infrastructure is not damaged. Any modifications to the roadway infrastructure required for site access shall be restored to existing conditions at the completion of work. Payment for associated work, materials and labor considered incidental to pay item 659.10.

27. See MaineDOT Standard Details 803(01) for additional railroad general notes.

SECTION 647 -- RAILROAD TRACK CONSTRUCTION

647.01 Description. This work consists of clearing the right-of-way, field survey and design of horizontal and vertical track geometry, grading and compacting the existing roadbed, remediating areas of unsuitable subgrade material or bearing capacity, and new timber cross tie and ballasted track construction. Track will be constructed on an existing rail road bed where track has been removed using treated timber ties, rock ballast and other track material (OTM) furnished by the Contractor. A portion of the track construction will use new 115 RE CWR strings furnished by MaineDOT and the balance of the track will use new 115 RE rail in 78 foot or 80 foot lengths furnished by the Contractor. All track shall be constructed in accordance with these specifications and referenced sections of the current "Manual for Railway Engineering" of the American Railway Engineering and Maintenance Association, hereinafter referred to as AREMA.

Related work is specified in other sections as follows:

Clearing of right-of-way is specified in Standard Specification Section 201.
Demolition and removal of existing concrete signal foundations is specified in Standard Specification Section 202.
Excavation, placement of granular borrow and grading is specified in Standard Specification Section 203.
Reinforcement geotextile fabric is specified in Standard Specification Section 620.
Timber and bituminous private grade crossings are specified in Section 648.
Right-of-Way ditching and cleaning is specified in Section 654.

All work shall stay within the right-of-way as depicted on the valuation plans.

647.011 General Information. MaineDOT is furnishing 26,400 linear feet of new 115 RE CWR strings consisting of 16 pieces at 1,650 feet long with joint bars applied 480' from the ends of six pieces. These rails are located along the currently active railroad right-of-way in Westbrook, just east of the Project and are located between the Bridge Street crossing and the switch to the Sappi paper mill. The ends of the rails are drilled for standard 36" joint bars with the end holes blank. The Contractor will move this rail along the rail corridor to the Project location and use that rail for the first 2.5 miles of the Project. The Contractor will furnish additional 78 foot or 80 foot lengths of new 115 RE rail for some portion of the balance of the Project, the exact amount contingent upon the total bid price. All rail installed will not be welded but bolted with four bolts per six hole joint bar leaving rail end holes blank. Rail will be laid on new double shoulder tie plates, cut spike fastened to new 6" x 8" x 8' – 6" pressure treated ties restrained with rail anchors. The ballast, OTM, and ties shall be furnished by the Contractor. A nominal depth of eight inches of new ballast (plus or minus 2 inches) shall be placed under the ties as shown on the Contract Drawings. Contractor shall perform initial track surfacing and lifts during track construction.

Track will not be constructed through existing paved, public and private grade crossings or across the Mallison Falls Road undergrade bridge. The crossings that are currently paved and that will be omitted include the following locations from south to north:

1. Bridge Street
2. Pierce Street

3. Presumpscot Estates Drive
4. Rousseau Road
5. Depot Street
6. Route 4/202

It is intended that these gaps will be closed at a future date prior to placing the railroad in service. Track construction will stop approximately 50 feet from existing paved road crossings noted above and approximately 300 feet from the Mallison Falls undergrade bridge. Private, gravel crossings shall have timber plank and bituminous crossings installed where indicated on the drawings.

647.012 Survey Requirements and Criteria to Establish Horizontal and Vertical Track Alignment. The Contractor shall engage the services of a licensed professional surveyor to establish the horizontal track alignment and a top of rail profile for the proposed track. The horizontal alignment shall be based on the tangent and curves defined on the railroad valuation plans with the addition of easement spirals at the beginning and end of curves. To the extent possible, the new track shall be located within the center of the existing track bed. The surveyor shall establish a control survey tied into a rectangular coordinate system and set a sufficient number of semi permanent control points with swing ties to allow future recovery of the control survey. The centerline of track geometry shall be defined by rectangular coordinates at beginning and ends of spirals and a sufficient number of points along tangents and curves to allow the alignment to be established in the field. The spiral lengths shall be determined as follows:

1. Calculate the required actual superelevation (Ea) in track with 1 ½" unbalanced (Eu) elevation as follows: Ea = Ee-Eu where Ee = the amount of superelevation required for equilibrium. (Railroad curves are normally not designed to equilibrium elevation)
   Ee = 0.0007 x D x V^2 - Where Ee is the required superelevation for equilibrium, D is the degree of curve, decimally and V is the design speed of 60 MPH.
2. Take the result of above equation and subtract Eu (1.5") and then the spiral length shall be the greater length derived from the two formulae in 3 below but never less than 62 feet:
3. Ls = 1.63 x Eu x V, where Ls is the length of spiral in feet and Eu is 1.5" and V is 30 MPH (at 1.5"Eu and 30 MPH, LS = 73.35', round up to 75 feet)
   Ls = 62 x Ea (Note that Ea should never be less than 1")

Based on the forgoing, the proposed geometry shall be staked out along the rail corridor. If the alignment does not fall within the centerline of the rail bed, contractor shall make alignment adjustments to best fit curves and tangents to existing conditions and report any deviations from the valuation plan data to the Resident.

The curves shall be constructed with the amount of superelevation (Ea) derived from the forgoing, rounded up to the nearest ¼" but never less than 1".

The surveyor shall establish vertical control based on a MaineDOT approved reference datum. Take top of existing centerline of roadbed shots at 100 foot maximum interval. At road crossings, take top of road surface shots at center line of road way and both pavement edges (3 points) at a minimum of the following locations:

a. Along the proposed track centerline
b. 30 feet from centerline of track, both sides
c. 60 feet from centerline of track, both sides.

From the vertical data, set a top of rail profile that provides a nominal eight inches of ballast under

the ties while maintaining uniform profile gradients with a minimum number of vertical curves which requirements are defined below. At road crossings, set a top of rail profile that is within minus 3 inches to plus 3 inches above the road surface at a point 30 feet from centerline of track. The first requirement may require grading the roadbed to minimize locations where ballast depth below tie would be greater than plus or minus 2 inches from the 8 inches nominal dimension. The criteria at grade crossings to avoid "humped" crossings or abrupt roadway approach profiles may require excavating the rail roadbed well in advance of the crossing. The following top of rail profile criteria shall be adhered to:

1. Maximum grade = 1.75%
2. Preferred minimum length of constant grade = 500 feet.
3. Absolute minimum length of constant grade = 200 feet.
4. Minimum length of vertical curve in feet = $0.05 \times D \times V^2$ where D = the algebraic difference of connecting grades in percent and V is the maximum proposed passenger speed in the future (assumed to be 60 MPH). Vertical curves shall never be less than 100 feet in length.
5. A vertical angle point (instead of a vertical curve) may be used when the algebraic difference in connecting grades is 0.10% or less.

Any deviations from above shall require approval of the Resident.

647.013 Quality Assurance – Treated Timber Cross Ties

The Resident or his representative shall have free entry at all times to the facilities to observe the milling, treating, and loading of ties. This observation, if made, will be general in nature and will not alter the fact that acceptance/rejection of the product will be made upon delivery.

The supplier shall employ an Independent Certified Inspector, acceptable to the Resident, to perform tests and inspections specified in Chapter 3 of the 2009 Manual for Railway Engineering and Maintenance Association (AREMA Manual) and these specifications.

Tie inspection and testing shall be made at the treating facility prior to shipment.

To be accepted ties shall meet the requirements of the AREMA Manual and these Specifications.

Ties will not be accepted until unloaded at the job site and are at supplier's and Contractor's risk until accepted. Material not accepted shall be removed and replaced with acceptable ties at no additional cost to MaineDOT.

647.014 Submittal Requirements – Treated Timber Cross Ties

Submittals will be reviewed for general conformance with these Specifications. This review will not relieve the Contractor of final responsibility for the quality of the material furnished. Submittals identified below shall be submitted to the Resident at least two weeks before the shipment of ties commences.

The Contractor shall submit certified inspection and test reports from the manufacturer as specified in the AREMA Manual.

Submit the name and qualifications of the independent, certified tie inspector for approval.

Submit proposed shipping schedule for crossties.

647.015 Submittal Requirements – Standard Control Cooled Rail Prior to shipment, the supplier shall furnish to MaineDOT records of manufacture and inspection of the rail as specified in AREMA Chapter 4, Part 2, Section 1, Article 14.

MATERIALS

647.02 Materials. Materials shall meet the requirements specified in this section as follows:

647.021 Geotextile Fabric. Geotextile fabric used under track bed shall conform to the requirements of Stabilization/Reinforcement Geotextile as specified in Section 620 of the Standard Specifications.

647.022 Treated Timber Cross Ties New Cross ties shall be manufactured of mixed hardwoods of the order consisting of Oak, Beech, Birch, Cherries and Hard Maples.

Anti-splitting end plates shall be selectively applied and shall be galvanized steel plate gang nail type.

(a) ***Design.*** .

Cross ties shall be 8 feet 6 inches in length and shall be 6 inches by 8 inches in cross section with a maximum of 1 inch of wane allowed in the rail bearing areas. A maximum of 30 percent of the order may be 6 inches by 7 inches in cross section with no wane allowed in the rail bearing areas.

The lengths and thicknesses specified are minimum dimensions. Ties over one inch wider or thicker, or over three inches longer, at any point, than the dimensions specified above, will be rejected.

Anti-splitting gang nail end plates shall be 5 inches by 6 inches. It shall be manufactured from 18 gauge galvanized steel plate with teeth extending at least 3/8 inches beyond surface of plate. Plates shall be installed centered on end of tie and fully driven with no evidence of excessive bending or mashing of teeth.

(b) ***Manufacture.*** Cross ties shall be manufactured from sound, live timber and must be free from any defects that may impair their strength or durability as cross ties as further described in this section.

All ties shall be straight, well sawn on four sides, cut square at the ends, have top and bottom parallel and have bark completely removed. A tie will be considered straight when a straight line along the top, from the middle of one end to the middle of the other end, is entirely within the tie and when a straight line along a side, from the middle of one end to the middle of the other end, is everywhere more than 2 inches from the top and bottom of the tie. The top and bottom will be considered parallel when any difference in the thickness at the sides and ends is less than or equal to 1/2

inch. Cross ties shall be free from the following defects:

1. Decay - Ties that show decay of any nature and ties that show stain from being left in the log too long will be rejected. "Blue stain" is not decay and is permissible in any wood.

2. Holes - Ties will be rejected if a large hole, or numerous holes with the net effect of a large hole, is present. A large hole is one exceeding 1/2 inch in diameter and 3 inches deep within the RBA*, or more than one-fourth the width of the surface on which it appears and 3 inches deep outside the RBA*.

3. Knots - Ties with a large knot, or numerous knots with the net effect of a large knot within the RBA* will be rejected. A large knot is one whose average diameter is greater than one-fourth the width of the surface on which it appears.

*RBA - Rail Bearing Area - the area of the top of tie between 20 inches and 40 inches from its middle.

4. Shake - Shake greater than one-third the width of the tie will be cause for rejection of the tie.

5. Split - A tie will be rejected if a split exceeds 5 inches long or 1/2 inch wide.

6. Slanting Grain - A tie will be rejected if a slant in grain in excess of 1:15 is present, except in the case of woods with interlocking grain.

7. Wane - Excessive wane will be cause for rejection of the tie.

(c) ***Seasoning.*** Cross ties shall be air seasoned prior to treatment. Ties shall be stacked for seasoning in accordance with AREMA Specifications, Chapter 3, Part 5, Section 6. Seasoning shall continue for at least 12 months and no more than 18 months.

In the absence of air seasoned cross ties, the Vapor or Boulton drying process may be used with the permission of MDOT, or their designee. If the Vapor or Boulton process is used, conditioning should continue until moisture removal rate indicates a percent moisture retained equal to a 12 month air dried cross tie, but not less than 45 percent by weight.

A minimum of 20 borer cores per treatment charge shall be taken of seasoned ties to determine that adequate drying has taken place so that ties may be satisfactorily penetrated with preservative.

On air seasoned ties the borer cores shall be taken mid-way between the ends and mid-way between the top and bottom faces of the tie. Three (3) inch borer cores shall be taken to determine moisture content.

Prior to seasoning, selected ties shall have anti-splitting devices applied at each end of the tie.

(d) ***Treatment.*** Prior to treatment anti-splitting plates must be checked to ensure that plates are firmly imbedded in the tie. If plates are found to be loose or not flush against the end of the tie, plate shall be firmly pressed against the tie before treatment begins.

Cross tie treatment shall be to retention of seven pounds or to refusal of 60/40 creosote coal tar solution per cubic foot of timber in accordance with the latest AREMA Manual, Chapter 3, Parts 7, 8, & 9.

A minimum of 20 borings shall be taken per charge after treatment to determine proper penetration. Verified test results from borings shall be provided to MaineDOT project manager to assure proper penetration.

(e) ***Delivery***
Handle ties during all phases of processing and loading so as not to cause damage to the material.

Load crossties either loose or banded in bundles in standard, low side rail gondolas parallel to ends of the gondola if transported by rail or banded in secure bundles if transported by flatbed truck.

647.023 New 115 RE Running Rail. New standard running rail shall be supplied in 78 foot or 80 foot lengths.

Short rails, in lengths as follows, shall be accepted up to 10 percent of the total order.

Rail Length Supplied	Acceptable Short Lengths
78 foot	60 to 76 feet
80 foot	60 to 78 feet

(a) Material. Standard running rail shall be new, standard control cooled steel rails of the weight specified.

(b) Drilling – Rail ends to be drilled for 36" – six hole joint bars for 1 inch: diameter track bolts, but with the end holes left blank.

Chemical composition of standard rail shall conform to AREMA Chapter 4, Part 2, Section 1, Article 3.

Hardness of standard rail shall conform to AREMA Chapter 4, Part 2, Section 1, Article 4.

(b) Manufacture. Standard running rail workmanship shall be in accordance with

AREMA Chapter 4, Part 2, Section 1, Article 2.

(c) Inspection. Rail shall be ultrasonically inspected along its full length for rail flaws.

The manufacturer or supplier of new standard running rail shall be responsible for all tests and inspections necessary to ensure that rail is in conformance with these specifications.

Prior to shipment, the supplier shall furnish to MaineDOT records of manufacture and inspection of the rail as specified in AREMA Chapter 4, Part 2, Section 1, Article 14.

In addition to the above, all rails are subject to inspection by the MaineDOT or approved designee, at delivery, for conformance with this specification. The inspection at delivery shall include, but not be limited to, visual inspection and measurements to verify that all rail meets the requirement of this specification.

Standard running rail is at the risk of the Contractor until accepted by the MaineDOT. Rail rejected because of non-compliance with this specification will be returned at Contractor's expense.

647.024 Tie Plates. Tie plates shall be new double shoulder plates per AREMA Plan 5-1-5 (13" wide) for 5 ½" base rail, have a 1:40 cant and B-6 punching. Tie plate material and manufacture shall be as specified in AREMA Chapter 5, Part 1, Section 1.

647.025 New Rail Anchors - Drive-on Type. Anchors shall be for 115 RE rail section.

(a) Materials. Drive-on type rail anchors shall be manufactured from heat-treated steel and shall conform to AREMA Manual, Chapter 5, Part 7.

(b) Manufacture. Drive-on type rail anchors shall be one piece, heavy duty type, such as Channeloc anchors, or approved equivalent designed to be fastened to the rail base and exert anti-creepage force against the edge of tie to resist rail movement. Drive-on type rail anchors shall be manufactured as specified in AREMA Manual Chapter 5, Part 7 to allow both mechanized and manual application and shall be capable of removal and reapplication without appreciable loss of anchoring capability. Each rail anchor shall be stamped to indicate the rail section for which it is designed and the year of manufacture.

(c) Testing. The manufacturer shall perform tests specified in AREMA Manual Chapter 5, Part 7 and certify in writing prior to shipment that representative samples of the anchors offered have met or exceeded the specified tests.

(d) Submittals. Prior to shipment, the manufacturer shall submit certified test results as described above.

(e) Shipment. Rail Anchors shall be packed 50 anchors per bag in heavy canvas or other suitable bags and waterproof tags applied. Tags shall be marked with style and base of rail of anchor design.

(f) Delivery. To be accepted, rail anchors offered shall conform to this specification in all respects. Rail anchors are subject to inspection at delivery and are at the Contractor's risk until acceptance. Anchors rejected for non-compliance with this specification shall be returned at the Contractor's expense.

647.026 New Joint Bars and Fastenings. New standard joint bar material and manufacture shall be in accordance with AREMA Manual for Railway Engineering, Chapter 4, Part 2 - Specifications for "Quenched Carbon-Steel Joint Bars and Forged Compromise Joint Bars."

Joint bars shall be 36" six hole joint bars drilled with standard drilling for 115 RE rail section and be of a toeless head free design. Drilling shall be for elliptical head, 1" diameter track bolts

Track bolts and nuts material and manufacture shall be in accordance with AREMA Manual, Chapter 4, Part 2, "Specifications for Heat-Treated Carbon-Steel Track Bolts and Carbon-Steel Nuts." Furnish elliptical head 1 inch diameter bolts to match joint bar drilling.

1. Prior to shipment entire bolt thread shall be coated with an approved oil or grease to protect threads.

2. Bolt and nut shall be assembled by turning nut onto bolt at least 2 threads exposed beyond the nut head.

Lockwashers material and manufacture shall be in accordance with AREMA Manual, Chapter 4, Part 2, "Specifications for Spring Washers."

(a) Design. Joint bars shall be for 115 RE rail as specified herein. All other rail section joint bars shall conform to AREA Manual, Chapter 4, Part 1 with length and punching as specified to fit 115 RE rail section.

Compromise joints bars shall be of size required to fit 115 RE rail to existing rail section at end of Project. No more than 25 lb per yard difference will be allowed in one joint. At least 19 and 1/2 feet of intermediate rail section will be required where rail section difference exceeds 25 lbs per yard. Contractor shall field verify rail sections to be joined to. Joint bars used to join relay or existing rail shall have allowance for rail wear as appropriate.

Track bolts shall be rolled, button-head, elliptic-neck bolts with wrench fit thread and shall be provided with standard square nuts all per AREMA Manual Chapter 4, Part 1. Bolt diameter shall be 1 inch and length shall be as recommended in AREMA Manual for rail sections used on the project.

Lock washer diameter shall be as required to fit track bolts supplied and washer configuration shall conform to requirements of ANSI, B27.1, for "Extra Heavy Duty Helical Spring Lock Washers."

(b) Inspection. Inspection and testing shall be in conformance with the inspection procedures outlined in AREMA Manual, Chapter 4, Part 2.

Prior to shipment, the manufacturer or supplier shall submit certified inspection and

test reports.

Joints, bolts and nuts, and lock washers are subject to inspection at delivery and are at suppliers risk until accepted by MaineDOT.

(c) Delivery. Joints shall be wired into pairs, palletized and strapped for shipment.

Bolts and nuts shall be packed in sealed kegs with a maximum of 200 pounds per keg. Kegs shall be palletized and wrapped or strapped for shipment.

Lock washers shall be packed in steel pails or kegs with a maximum of 200 pounds per container.

Material rejected because of non-conformance with this specification will be returned at supplier or Contactor's expense.

647.027 New Cut Track Spikes. New cut track spikes shall conform to material and workmanship specifications of the AREMA Manual for Railroad Engineering, Chapter 5, Part 2 - "Specifications for Soft-Steel Track Spikes".

(a) Design. Cut track spikes shall be 5 ½" long and as shown on Figure 5-2-1, in Chapter 5, Part 2, Section 2.2 of the AREMA Manual.

647.028 Stone Ballast

(a) Material

Aggregate for stone ballast shall be clean and graded crushed stone aggregate and/or processed slag with a hard, dense, angular particle structure providing sharp corners and cubicle fragments with prime consideration for drainage efficiency.

The material retained on the ⅜ inch sieve shall contain not more than 5 percent, by weight of flat and elongated particles when performed in accordance with test method ASTM D 4791, Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate, using a dimensional ratio of 1:5.

The material shall have an absorption no greater then 1.5 percent by weight and a bulk specific gravity of less than 2.60 as determined in accordance with AASHTO T 85 modified for weight of sample.

The material shall not exceed 30 percent loss on AASHTO T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

The material shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Type 4	Type 4A

2 ½ inch		100
2 inch	100	90-100
1 ½ inch	90-100	60-90
1 inch	20-55	10-35
¾ inch	0-15	0-10
3/8 inch	0-5	0-3
No. 200	1.0 max.	1.0 max.

For this Project, furnish Type 4 gradation ballast material.

(b) Handling.

1. Shipping

Load ballast only into rail cars or trucks which are in good order, tight enough to prevent leakage and waste of material, and clean and free from rubbish or any substance which would foul the ballast.

2. Handling

a. Handle prepared ballast at production plant, during shipment, and at work site so that it is kept clean and free from segregation.

b. Do not make repeated passes of equipment over the same level in stock pile area.

(c) Delivery. To be accepted, stone ballast offered shall conform to this specification in all respects. Stone ballast is subject to inspection at delivery and is at the supplier's risk until acceptance. Stone ballast rejected for non-compliance with this specification will be returned at the supplier's expense.

CONSTRUCTION REQUIREMENTS

647.03 Clearing Clear all trees, brush and debris within 25 feet of centerline of proposed track location. All clearing shall remain with the right-of-way limits.

647.04 Removal of Concrete Signal Foundations. Existing concrete railroad structures including signal foundations, old battery vaults and other concrete foundations will be demolished to a point not less than two feet below finished grade and removed from the right-of-way.

647.05 Subgrade Preparation Prior to any track construction, the horizontal and vertical survey and geometric design defined under 647.012 shall have been completed. To correct profile irregularities in the existing roadbed, grade the surface of roadbed, removing high points and filling in low points with granular borrow or suitable excess material from roadbed excavation. If unsuitable material or poor subgrade conditions are found, excavate as directed by the Resident,

backfill and compact those areas to the design profile less typical track template section depth. At all locations where track is to be constructed, run a vibratory roller to locate any weak subgrade conditions that need further remediation and to thoroughly compact the trackbed. At direction of Resident, place reinforcement geotextile fabric over areas of clay, fine sand or wet locations after excavation, backfill and compaction and prior to placing ballast.

Existing stone bounds marking the original centerline of location exist at a number of locations along the rail bed. Contractor shall take precautions to not disturb these bounds during grading and other operations along the railbed.

A 12" cast iron pipe runs across the right-of-way at a very shallow depth at approximately station 314+76 in Westbrook. This pipe shall be removed and disposed of and the location backfilled with granular borrow.

647.06 Moving MaineDOT Furnished CWR Rail Strings MaineDOT is furnishing 26,400 LF of new 115 RE CWR strings consisting of 16 pieces 1,650 feet long with joint bars applied 480 feet from the ends of six pieces . These strings are run out along the railroad ROW at the south end of the Project in Westbrook between Bridge Street and the switch to the Sappi paper mill. Rails are drilled for 36 inch joint bars but with the end holes left blank. The Contractor shall move these rail strings along the rail corridor to the Project site and use on the first 2.5 miles or so of the Project. Due to the distance involved and intervening grade crossings, care must be taken to not damage the rail or paved surfaces. Suitable rollers and other means shall be employed to prevent the rail from being dragged over surfaces or projections that may damage the rail. Care must also be taken to prevent damage to roadway surfaces during movement of the rail strings. Contractor shall also plan final location of furnished rail strings to minimize cutting the rail to fit between gaps created by not constructing track through the paved crossings.

647.07 Placement of Initial Ballast Layer Ballast shall be placed on graded and compacted subgrade as defined above. Prior to placement of ballast, Contractor shall confirm that subgrade layer has been thoroughly compacted and accepted by the Resident. In addition, Contractor shall survey surface of subgrade to determine that it is within plus or minus 2 inches of design top of rail profile minus the depth of rail, tie plate, tie and 8 inches of ballast. Contractor shall re-grade and compact subgrade where necessary to meet this requirement.

Place and compact an initial four inch layer of ballast on prepared subgrade. Prior to distributing ties, at his option, the Contractor may place and compact additional ballast as necessary to bring track to finished grade. Deliver ballast at a rate no faster than can be satisfactorily incorporated into the work, maintaining a proper interval of operations, and at such times as to permit proper inspection by the Resident. To the extent possible, unload ballast in position for use with a minimum of redistribution and dressing. .

Thoroughly compact each ballast lift until stones are firmly interlocked and surface is true and unyielding. Compact each lift with not less than four passes of a roller or a vibratory compactor subject to the following requirements:

(a) Compact by rolling using either a self-propelled, three wheel, two axle roller of such weight that will provide compression under the rear wheels of not less than 350

pounds per linear inch of tread: or using a two or three-wheel tandem roller having a weight per inch of drive roll of not less than 350 pounds, and every part of the surface receiving compression from the drive wheels.

(b) Compact by vibration using vibration compactors of either the roller or pad type. Dynamic force for either type shall be not less than 20,000 pounds and the frequency range shall be 1100 to 1500 vpm. Use machines equipped with a governor which can be set and locked to control rate of impulse. Provide a tachometer or other suitable device for accurately checking the frequency of vibration during compaction operation.

647.08 Cross Tie Installation. Carefully place and distribute ties on compacted ballast section. Place timber ties so that heartwood is down. Handle ties in a manner to avoid breaking and bruising. Do not throw ties from cars or trucks onto rails or rocks. Place ties normal to center line of track. In placing or spacing treated ties, handle only with tongs or suitable devices. Do not use bars, chisels, forks, mauls, picks, punches, shovels, or sledges for moving ties or placing them in position beneath the rails. Avoid unnecessary handling, redistribution, and reloading of ties. To extent practical, distribute ties in proper position for use without further handling. Remove ties damaged as a result of improper handling by the Contractor and rejected by the Resident and replace with undamaged ties at no additional cost to MaineDOT.

647.081 Machining Crossties:

Boring:

1. Boring for spike holes shall conform in size and location to plans for the rail fasteners with plus or minus 1/16 inch permitted in each distance between holes. The spike holes shall be centered across the width of the tie in such a way that the fasteners will center on the tie when the spikes are driven. A tolerance 1/8 inch in the centering of the holes across the width of the tie is permissible.

2. Spike holes shall be bored no deeper than the length of the spike.

3. When the head diameter of the drill bits has been reduced 1/16 inch by wear, bits shall be replaced. Cutting heads of bits shall be sharpened at regular intervals to insure clean boring.

4. Any unused holes will be completely filled with treated plugs.

The ends of standard 8 foot 6 inch cross ties shall be brought to a uniform line, 18 1/2 inches from the edge of base of rail on the line side. The line side shall be the northerly side unless otherwise directed by the Resident.

Ties shall be spaced at 20 inches average, with no two ties spaced closer than 18 inches nor greater than 22 inches.

647.082 Tie Plates. All ties installed shall be plated. Tie plates shall be applied and placed so the shoulder is in contact with the rail base or a joint bar for the full length of the shoulder. The tie plate shall be centered on the tie and the shoulder shall not be under the rail base. Canted tie plates

must be placed to cant the rail inward toward centerline of track

647.083 Cut Spike Fastening. Ties shall be pre-bored 9/16 inch diameter by 5 inches deep prior to spiking. The only exception will be if an automatic, hydraulic type spiker is used. Number of spikes per plate to be as indicated on the plans. Track spikes shall be started and driven vertically and square with the rail and must not be bent against the rail. Spikes shall have full bearing against the rail base and driven so as to allow 1/8 inch to 3/16 inch gap between the under side of the spike head and the top of the rail base. Spikes shall not be over-driven or driven against the end of a joint bars or in a joint bar slot. The removal of spikes once driven, shall be avoided whenever possible. If spikes are pulled, the holes shall be plugged with new creosote-treated tie plugs.

647.09 Rail Installation. Rail installation consists of both CWR strings up to 1,650 feetlong and 78 to 80' stick rail. All rails, regardless of length, will be joined with 36 inch six hole joint bars with end holes left blank. Any rail over 400 feet long shall be anchored by box anchoring every other tie with approved rail anchors. The 80' rails and rail strings less than 400' long will be treated as jointed rail and shims provided to produce a rail end gap per the schedule below and anchored as jointed rail with a minimum of 16 anchors per 80 feet of rail and bolted. Rail joints in track shall be staggered by no less than 18 feet. No rails less than 19 and 1/2 feet long shall be laid in track without the permission of the Resident.

Rails shall be cut squarely and cleanly by means of a rail saw. Cutting rails or burning holes in rails by means of a heat dependent device is prohibited. Holes for bolting cut rails shall be drilled by an approved type of rail drill and with use of a template with the end hole left blank. Under no circumstances shall new holes be drilled between two existing holes. End holes shall be left blank for future welding of rail.

647.091 Expansion Shims. Standard expansion shims must be provided and care used in placing them so that the proper opening will be left between the rails. A standard rail thermometer shall be used to determine the temperature of the rail. Determine temperature of rail by placing rail thermometer on shielded 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. For the temperature then shown, the thickness of shim required for the proper expansion opening between the rails shall be used, as provided in the following table:

Rail Temperature (Deg. F)	80 Foot Rail Rail End Gap (inches)	up to 400 Foot Rail Rail End Gap (inches)
26 to 45	Not allowed	Not allowed
46 to 65	¼	Not allowed
66 to 85	1/8	Not allowed
over 85	None	1/4

For rail lengths between above limits (or shorter), extrapolate value for 80 foot rails and set an end gap to the next higher (or lower) increment, but not over 1/4 inches.

647.092 Joint Bar Installation. CWR rail strings furnished by MaineDOT have drilling for standard 36 inch joint bars with end holes left blank. Contractor shall drill rail ends created by cutting rails to fit field conditions using a rail drill and the proper template for 36" joint bar assemblies furnished. Prior to joint bar application, the Contractor shall clean and coat the rail ends

within the joint bar area, including webs, fishing surfaces, bolt holes and inside surfaces with an approved oil or grease as specified in AREMA Specification, Chapter 5, Part 5. The joint bars shall be positioned on the rail, bolts inserted and washers and nuts applied by hand. The bars shall be in a vertical (uncocked) position as one of the center bolts is tightened. All bolts shall be completely tightened when the rail is laid to a tension range of 20,000 to 25,000 pounds per bolt and in the proper sequence to properly seat the rail joint, beginning at the center and working in both directions toward the end. To assure that the joint bars maintain their vertical position, the toes of the bars should be tapped with a maul as the bolts are tightened. After the rail has been laid all bolts shall be tightened again.

647.093 Allowable Compromise Joints and Installation. No rail compromise joints in excess of 25 lbs per yard shall be allowed. Where two rail sections in excess of that difference meet, a transition of not less than 19 and 1/2 feet of intermediate rail shall be required with a second set of compromise joints at the opposite end. Compromise joint locations shall be staggered at least 20 inches. Contractor shall be responsible for ordering joints required based on existing rail sections being joined with allowance for head wear in the existing rail section.

647.094 Rail Anchor Installation. Track shall be anchored to the following patterns. Any rail over 400 feet in length shall have every other tie box anchored throughout its length. Rails shorter than 400 feet shall be anchored with a minimum of 16 anchors per 80 feet of rail as indicated in Diagram 1 of Chapter 5, Part 5, Section of 4 of the AREMA Manual. Place anchors to achieve full bearing against the ties and fully drive or attach anchors following manufacturer's instructions.

647.10 Initial Surface and Alignment. The Contractor shall surface and line all track constructed sufficient to provide a running surface for on-track maintenance equipment and within 1 inch of final elevation and horizontal alignment. Also included will be making proper runoffs into existing side tracks and at the ends of track construction.

647.101 Final Track Surfacing and Alignment Tolerances. Final track alignment and surfacing will be accomplished only after all track work has been completed by the Contractor up to and including Initial Surface and Alignment as noted above. The tolerances for completed track work shall be as follows:

TRACK SURFACE & ALIGNMENT	TOLERANCES
Deviation from uniform profile on either rail at the mid-ordinate of a 62-foot chord may not exceed --	1/2 inch
Deviation from zero cross level at any point on tangent or designated elevation on curves may not exceed --	1/4 inch
The difference in cross level between any two points less than 62 feet apart on tangents or curves may not exceed --	1/4 inch

Deviation from uniform alignment between any two points less than 62 feet apart on tangent and curved track may not exceed -- 1/2 inch

Negative superelevation will not be allowed.

647.102 Allowable Track Raises/Runoff. Any track raise in excess of 4 inches in one surfacing pass will not be allowed. Track shall be fully tamped after each track raise prior to performing additional raises. The final surfacing and lining operation to place the track to the tolerances indicated above will be limited to 1 inch. The runoff at the end of an incomplete raise, into existing sidings, or at the ends of the project track work, shall not exceed 1/2 inch in 31 feet of track unless otherwise approved by the Resident.

647.103 Tamping. Tamping operations during track construction shall be performed with an approved 16 tool power tamper of the vibratory squeeze type. The power tamper shall have tamping tools with a tamping end of sufficient area to tamp each tie to the satisfaction of the Resident. Tamping ends shall be repaired or replaced after 30% wear of the working surface. Final surfacing shall be accomplished with a fully automatic model as specified in Subsection 647.094.

Cross ties shall be tamped from a point approximately 15 inches but not less than 13 inches inside each rail on both sides of the tie to the tie end. Tamping shall not be permitted at the center of tie between these limits. The center area shall be filled with ballast. Both ends of the tie shall be tamped simultaneously and tamping inside and outside of the rail shall be done at the same time.

All cross ties shall be tamped tightly to provide good bearing against the base of rail after the track and turnout is raised to true surface. All "down" ties and switch timber shall be brought up to the base of rail and machine tamped by the Contractor. The resultant surface and alignment shall be of uniform and smooth quality. Surfacing of turnouts shall include all four rails.

Tamping of track in snow and frozen ballast conditions will not be permitted.

647.104 Final Surfacing and Alignment. Track raise during final surfacing and alignment will be limited to one inch or less. All track work constructed shall be final surfaced and lined using a 16 tool minimum, fully automatic machine. This machine shall be supported by a ballast regulator with a mechanical broom capable of removing all ballast from the surface of the ties and forming a smooth ballast shoulder and slope as indicated on the plans.

Upon completion of surfacing and lining operation, the track shall have been fully tamped, lined, ballasted and dressed to adequately support and restrain the track under load. The Contractor shall ensure that all rail anchors are properly seated so as to exert anti-rail creepage force against the edge of the tie plate or into the side of the tie. Rail anchors not meeting this requirement shall be adjusted into the proper position.

647.105 Handling Ballast During Surfacing. Ballast shall be unloaded only in the amount required for the track raise and for ballast section restoration which shall include shoulder restoration.

The Contractor shall use a ballast regulator machine to distribute the stone ballast in

sufficient quantity for tamping the track and for restoring the ballast section which shall conform to the typical sections.

Ballast shall be unloaded from railroad cars or hi-rail equipped vehicles. Tractor or rubber tired vehicles are not permitted to operate over the track structure.

The Contractor shall avoid pulling sod, vegetation and other foreign matter onto the track structure or shoulders for the purpose of tamping or dressing the ballast section.

647.106 Placement of Additional Ballast at Track Terminations At locations where track is terminated at both sides of paved grade crossings and undergrade bridges, place additional ballast to cover rail ends to mitigate impact to end of rails from snow mobiles.

METHOD OF MEASUREMENT

647.11 Method of Measurement. Track construction will be measured by the linear foot along the centerline of track complete in place and accepted. Where different track construction meets with staggered joints, the linear measurement will be to mid point of the stagger.

Ballast will not be separately measured, but considered incidental to track work items.

Specified survey and determination of horizontal alignment and top of rail profile will not be separately measured, but considered incidental to the track work items.

Grading of roadbed surface to achieve a uniform ballast depth based on design profile will not be separately measured, but considered incidental to the track work items.

Removing the 12 inch cast iron pipe at station 314+76 in Westbrook will not be separately measured. Excavation to remove the pipe will be measured by cubic yard of the minimum trench cross section required to remove pipe. Furnishing and placing granular borrow for backfilling the excavation will be measured by the cubic yard as specified in Section 203.

Demolition and removal of old concrete railroad structures will be measured by the cubic yard as specified in Section 202.

Excavation of track bed required to lower profile grade at roadway approaches or to remove unsuitable material will be measured by the cubic yard as specified in Section 203.

Furnishing, placing and compacting granular borrow will be measured by the cubic yard as specified in Section 203.

Surfacing and lining of track as required during track construction will not be separately measured, but will be considered incidental to the track work items.

Reinforcement geotextile fabric will be measured by the square yard as specified in Subsection 620.07

BASIS OF PAYMENT

647.12 Basis of Payment. The accepted quantities of track will be paid for at the contract unit price per linear foot for each kind and type of track construction specified, complete in place. Included in each type of construction are the following:

Payment for Item 647.01 - New 115 RE Timber & Ballasted Track Cons. shall include complete installation of track structure on graded and compacted subggrade using 115 RE CWR strings furnished by MaineDOT with all other material furnished by the Contractor. Included in that item are all labor, material and equipment to move the rail strings from the active rail line in Westbrook to the project location. Survey, setting horizontal alignment, profile and subgrade preparation shall also be included.

Payment for Item 647.02 - New 115 RE Timb. & Ball. Track Const. shall include complete installation of track structure on graded and compacted subgrade using new 115 RE rail in 78 foot or 80 lengths furnished by the Contractor. Survey, setting horizontal alignment, profile and subgrade preparation shall also be included. The quantity of this item may be adjusted up or down based on the total value of the bid versus the available funding.

Both track work items include placing and setting rail anchors and surfacing and aligning the track to the specified tolerances using specified equipment.

The accepted quantities of clearing will paid for at the contract unit price per acre.

The accepted quantities of demolition and removal of old concrete structures will be paid for at the contract unit price per cubic yard.

The accepted quantities of common excavation, rock excavation and granular borrow will be paid for at the contract unit price per cubic yard.

The accepted quantities of reinforcement geotextile fabric will be paid for at the contract unit price per square yard.

Payment will be made under:

Pay Item		Pay Unit
201.11	Clearing	Acre
202.12	Removing Existing Structural Concrete	Cubic Yard
203.20	Common Excavation	Cubic Yard
203.21	Rock Excavation	Cubic Yard
203.25	Granular Borrow	Cubic Yard
620.61	Reinforcement Geotextile	Square Yard
647.01	New 115 RE Timber & Ballasted Track Cons.	Linear Foot
647.02	New 115 RE Timb. & Ball. Track Const.	Linear Foot

END OF SECTION