



MARYLAND TRANSIT ADMINISTRATION

MARYLAND DEPARTMENT OF TRANSPORTATION

Martin O'Malley, Governor • Anthony G. Brown, Lt. Governor
James T. Smith, Jr., Secretary • Robert L. Smith, Administrator

TO: All Planholders

FROM: Maryland Transit Administration

SUBJECT: **ADDENDUM NO. 2**
Contract No.: T-1048-0840
North Avenue Grade Crossing Replacement
CANCELLATION

DATE: December 10, 2013

Enclosed and effective this date is Addendum No. 2 to the subject Contract. This change **CANCELS** the solicitation for Contract No.T-1048-0840, North Avenue Grade crossing Replacement.

This solicitation will be re-advertised at a later date.

Sincerely,

Joseph B Johnson

Joseph B Johnson, Procurement Officer
Construction/Installation Services Section
Procurement Division

Acknowledgement of receipt of ADDENDUM # 0 to Solicitation #T-1048-0840

Vendor Name: _____

Authorized Representative's Signature

Date



MARYLAND TRANSIT ADMINISTRATION

MARYLAND DEPARTMENT OF TRANSPORTATION

Martin O'Malley, Governor • Anthony G. Brown, Lt. Governor
James T. Smith, Jr., Secretary • Robert L. Smith, Administrator

TO: All Planholders
FROM: Maryland Transit Administration
SUBJECT: **ADDENDUM NO. 1**
Contract No.: T-1048-0840
Light Rail-North Avenue Yard Grade Crossing Replacement

DATE: December 4, 2013

Enclosed and effective this date is Addendum No. 1 to the subject Contract. This change does not delay the Bid Opening Date December 11, 2013.

A conformed copy of the revised specification sections is attached. A list of the changes made to this contract is attached to this Addendum. Also attached are answers to contractors' questions, if any.

The Bidder shall acknowledge receipt of this Addendum by completing and returning this form with the bid package.

All other terms and conditions remain unchanged.

Sincerely,


Joseph B. Johnson, Procurement Officer
Construction/Installation Services
Procurement Division

Acknowledgement of receipt of ADDENDUM # 1 to Solicitation #T-1048-0840

Vendor Name: _____

Authorized Representative's Signature

Date

ADDENDUM NO.: 1
DATE: 12/04/13
CONTRACT NO.: T-1048-0840

The following additions, deletions, and modifications are hereby made a part of the Contract Documents of LIGHT RAIL- NORTH AVNEUE YARD GRADE CROSSING REPLACEMENT, Contract No.: T-1048-0840.

Item No.	Page	Modification
I. QUESTIONS & ANSWERS		
	Page 1 of 2	SEE ATTACHMENT
II. CONTRACT SPECIAL PROVISIONS		
1	Special Provisions 01110, Page No. SP-1 to SP-8	Contract Special Provisions have been attached to this addendum
2	Special Provisions 05690, Page No. SP-305 to SP-308	Contract Special Provisions have been attached to this addendum
3	Special Provisions 17300, Page No. SP-373 to SP-379	Contract Special Provisions have been attached to this addendum

Also attached are the answers to contractors' questions, if any.

**LIGHT RAIL-NORTH AVENUE YARD GRADE CROSSING REPLACEMENT
CONTRACT NO. T-1048-0840**

3-Dec-13

#	Ref.	QUESTIONS	RESPONSES
1	Unit Price Schedule	<p>Items 3, 4, and 5 of the Unit price Schedule provide specific dollar allowances which total \$95,000.00. Will that \$95,000.00 be subtracted from the total amount of a bid before the 27% DBE requirement is applied to determine compliance with the requirement?</p>	<p>Yes.</p>
2	General	<p>Given that this project involves work that is typically exclusively performed by a track contractor, how is a track contractor that is not itself a DBE employ DBE subcontractors and still perform the required 50% of the total work as the prime contractor given the project estimate range.?</p>	<p>If the contractor wants to give more work out after meeting the DBE % then he shall be able to do it.</p> <p>Since there is a variety of work involved, MTA permits to reduce the % of work done by the contractor be no less than 25% .</p>
3	02725- ASPHALT TREATED PERMEABLE BASE COURSE	<p>The issue of the Permeable Base Course material was addressed at the pre-bid. We felt then that this material was no longer being produced, to some extent because of the lime; regardless, we have now determined that it is not available. We are not even able to get a price for this material so it is very difficult to bid. (See Sheet 6 Of 43, Precast Concrete Grade Crossing calls for Permeable Base Course, Spec Section, 0725.)</p> <p>We understand that one of the reasons that it was specified was due to the drainage being in the center of the crossing.</p> <p>One solution would be to use crusher run with one inch of sand on top which has been used in other locations. See attached drawings. Another drawing, from Star Track, is available on there are web site.</p> <p>Another solution would be to relocate the drain. Please advise.</p>	<p>The question came after the deadline , will not be answered.</p>
4	CD	<p>Thank you for your prompt response to our request for the CD of drawings for the above referenced project. We received the CD in the mail this morning, we when I put it my computer and open the file, I am getting the following error " An error exists on this page. Acrobat may not display the page correctly. Please contact the person who created the PDF document to correct the problem." On several of the pages it is only showing part of the drawings. Can you please send me another CD?</p>	<p>I will forward you another CD asap. Also, there have not been any other reports from potential vendors that there were problems with the CD, but that doesn't mean it's not bad.</p>

SECTION 01110**SUMMARY OF WORK****PART 1: GENERAL****1.01 GENERAL**

- A. The Contractor's operations shall conform to all applicable State and Local regulations.
- B. Wherever these Special Provisions refer to the Administration, they shall be understood to mean the Maryland Transit Administration (MTA). Whenever reference is made to Engineer, it shall mean the Administration representative for the contract.
- C. Submittals shall be made in accordance with SECTION01300 Submittals.

1.02 CONTRACT DOCUMENTS: The work shall be performed in accordance with the following documents:

- A. The General Provisions for Construction Contracts dated October 2001, issued by the Maryland Department of Transportation; and the Supplemental General Provisions issued by the Maryland Transit Administration; both contained in the Contract Specifications Book.
- B. The Special Provisions, Divisions 1 through 18; the Notice to Contractors; the List of Contract Drawings; and the various forms and exhibits; all contained in the Contract Specifications Book.
- C. The Liability Insurance Requirements; and the MTA Project Safety Plan; all issued by the Maryland Transit Administration of the State of Maryland Department of Transportation and contained in the Contract Specifications Book.
- D. The Contract Drawings, Standard Plates and Reference Drawings, contained in the Contract Specifications Book or bound separately in the Contract Drawings Books.
- E. All applicable codes, standards, and ordinances of Baltimore City.

1. Applicable sections of the Special Provisions contain references to Baltimore City Standard Specifications. The Contractor is responsible for obtaining current copies of each referenced Standard prior to commencement of work.

1.03 CONTRACT DESCRIPTION:

- A. This Contract includes the construction of precast concrete grade crossing to replace the existing timber crossing at the entrance to the MTA Maintenance Facility along Road A.
- B. The work includes, but is not limited to, the following:
 1. Installation and maintenance of Maintenance of Traffic measures for duration of construction.
 2. Installation, maintenance during construction, and removal of erosion and sediment control measures in accordance with MDE and Baltimore City requirements.
 3. Removal and disposal of existing timber grade crossing segments, timber ties, rails, and track appurtenances within the designated limits at the crossing.
 4. Removal and disposal of sections of existing ballasted track.
 5. Construction of precast concrete grade crossing section with rubber rail boot, and ballasted track section.
 6. Furnishing and installing new 115 RE high strength running rails and fasteners within the designated limits of the grade crossing and ballasted track designated on the drawings.
 7. Construction of new underdrain system.
 8. Restoration of pavement at roadway approaches to grade crossing.
 9. Base widening construction on the northwest side of Road A, as shown on the construction drawings.
 10. Removal of existing curb and sidewalk and shown on the drawings.
 11. Removal of existing trees. Installation of new trees as shown on the drawings.

12. Relocation of existing street light as shown on the drawings.
13. Installation of traffic signals at proposed grade crossing as shown on the drawings.
14. Track to earth resistance testing of track after completion of grade crossing construction.
15. Rail-to-rail resistance testing in accordance with Section 17251 Signals Tests and Inspections to restore existing signal system for train operation.

B. Materials:

1. The Contractor shall furnish all materials required to complete the work as shown on the Contract Drawings and specified in these Special Provisions.
2. The Contractor shall locate a laydown and storage area for delivery and storage of construction materials and salvaged track components.
3. The Contractor shall transport salvaged materials selected by the Engineer to remain the property of the Administration to the MTA Charles Street compound located at 1298 Bellona Avenue, Lutherville, Maryland 21093.

1.04 COMPLETION TIME AND LIQUIDATED DAMAGES:

- A. Pursuant to General Provisions Articles GP-8.02 and GP-8.03, commence work on or before the date specified in the Notice to Proceed (NTP) and complete the specified portions of the work within the time specified in the table below.
- B. In the event that the Contractor fails to complete the specified work within the specified number of days after Notice to Proceed, with the exception of extensions granted by change order, liquidated damages in the amount of will be assessed pursuant to General Provisions Article GP-8.09 for each calendar day the completion of the specified work is delayed. The Contractor shall pay to the Administration the applicable amount specified and pursuant to General Provisions Article GP-8.09 as liquidated damages for every additional calendar day in excess of the number of days prescribed. The Administration may deduct the sum of liquidated damages from any monies due or that may become due the Contractor under the Contract, or if such monies are insufficient, the Contractor or sureties

thereof shall pay to the Administration any deficiency within 30 calendar days

MILESTONE	WORK ITEM	NUMBER OF CALENDAR DAYS	LIQUIDATED DAMAGES PER CALENDAR DAY
1	Completion of All Contract Work	120 days	\$1,240.00

1.05 COMPLETION TIME AND OTHER SCHEDULE REQUIREMENTS:

- A. Pursuant to Article GP-8.03 of the General Provisions, commence work on or before the date stipulated in the Notice to Proceed (NTP) and complete the entire work within the number of calendar days specified in 1.04 above.
- B. The Administration has scheduled a Light Rail 86 hour shutdown period, beginning at 2:00 a.m. Saturday night and ending at 4:00 p.m. Tuesday afternoon, to facilitate construction during the designated time period. The Contractor shall complete certain minimum items during the 86 hours shutdown period and may complete other items as time permits and with the concurrence of the Engineer. Refer to the Staging Plans in the Contract Drawings for required items to be completed during the Light Rail shutdown.
- C. Upon confirmation of start of shutdown date, the finish date of the shutdown will be locked in. If circumstances necessitate a schedule delay of a proposed shutdown either due to Administration, Contractor, or a third party requirements, the schedule changes will be made only with the authorization of the Administration. Should the change be required due to the Contractor's lack of preparedness, and this change results in a delay to the start of or the completion of a milestone, liquidated damages will be assessed in the amount stipulated in 1.04 B of this Section, for the milestone(s) that are not achieved. Should the change be necessitated based on causes outside of the control of the Contractor, the Contractor will be responsible to develop schedule acceleration or work around schedule to minimize the impact of the change. In the case of acceleration or work around by the Contractor due to changes made by the Administration in the shutdown, such changes will be cost and schedule compensable subject to negotiations with the Administration.
- D. Other schedule requirements are given in Section 01300 Submittals.

1.06 CONTRACTOR REPRESENTATIVES:

- A. Designate in Writing within five (5) days after receiving the Notice to Proceed (NTP), the name, official mailing address and telephone number of the Contractor's representative having complete authority to represent and to act for the Contractor.

1.07 LIABILITY INSURANCE REQUIREMENTS:

- A. MTA has chosen to provide Workers' Compensation, General Liability, Excess Liability, Builders Risk, Pollution Liability and Railroad Protective coverage on behalf of contractors and subcontractors working on this project. This approach to project insurance is commonly called a wrap-up or owner controlled insurance program (OCIP). Specific information regarding Liability Insurance Requirements are contained in the Contract Specification Book. (See Table of Contents for location of this information.)
- B. Contractors and subcontractors are to **bid work for this project net of insurance (i.e. , The Cost of Workers' Compensation, General Liability, Excess Liability, Builders Risk, Pollution Liability and Railroad Protective applicable to the work site is not to be included in the bid price)**. All bidders must complete the Insurance Premium Worksheet and forward to MTA with the rest of your bid package. The Premium Worksheet is included in the bid package as form I, Exhibit A. This form should include the Contractor's work as well as the work of all subcontractors included in the initial bid. The insurance premium shown on this form, or the pro rata portion thereof, will be added to the base bid in the event you are excluded from the wrap-up program or the program is terminated mid-term.

1.08 PAYMENTS TO CONTRACTORS

By submitting a response to this solicitation, the Bidder agrees to accept payments by electronic funds transfer unless the State Comptroller's Office grants an exemption. Specific information regarding electronic funds transfer requirements and how to register for it are contained in the Contract Specification Book (See Table of Contents for location of this information.)

1.09 CONTINGENT ITEMS:

- A. Construction items for which quantities are listed in the Unit Price Schedule as "Contingent" are established for the purpose of obtaining bids on one or more pay items that may be incorporated into the project.
- B. The Engineer will have sole discretion in determining whether and to what extent these items will be incorporated into the project. The Engineer may order these items to be used at any location within the project and anytime

during the work. In most cases contingent items will not be shown on the Plans. The estimated quantities specified in the Unit Price Schedule for these items are presented solely for the purpose of obtaining a representative bid price. The total of actual quantities required for the construction may be only a fraction of, or many times the estimated quantity. The requirements of GP-4.04 (Variations in Estimated Quantities) shall apply.

1.10 WARNINGS:

- A. The Contractor is notified that the MTA Light Rail Service will be shut down during the period of construction at the crossing site.
- B. The Contractor is notified that there are overhead traction power lines that cross over proposed work areas in various locations and sensitive wayside signals equipment located in the proximity of proposed work.
- C. The Contractor is notified that there are underground power, communications, and signals ductbanks and conduits in the vicinity of the crossing. The Contractor shall locate any conflicting underground conduits and shall coordinate with Light Rail Systems Maintenance to determine required actions to relocate and or protect the conflicting utilities.
- D. Upon completion of the grade crossing replacement work, the Contractor shall coordinate with Light Rail System Maintenance to test the operation of the new traffic signals warning system and to restore Light Rail service to the satisfaction of the MTA.

1.11 STAGING AREAS:

- A. The Contractor is responsible for securing and maintaining the staging area for the duration of construction. All costs, contingencies, permits, and agreements related to the acquisition and use of proposed staging area shall be the Contractor's responsibility. Parking facilities for Contractor's personnel shall also be the Contractor's responsibility.

1.12 COORDINATION WITH OTHER CONTRACTORS:

- A. The Contractor is herein notified that no other Contracts and Contractors associated with MTA Light Rail Systems and Maintenance of Way are anticipated to be present in the project area during the construction period. However, the Engineer may request the Contractor to share access and possibly use the Contractor's mobilization areas should the situation arise. Where this coordination results in restriction to the Contractor's work site access, the Contractor shall provide for workarounds to allow the continuance of construction. These workarounds shall not constitute a basis for a

Contractor delay or extension claim or for additional cost to the Administration in any way.

1.13 ELIMINATED ITEMS:

- A. Should any Contract items contained in the Unit Price Schedule be found unnecessary for the proper completion of the work contracted, the Engineer may, upon written order to the Contractor, eliminate such Contract items from the Contract.
- B. No allowance will be made for items so eliminated in making final payment to the Contractor except for material costs incurred prior to notification of the eliminated of the items.

1.14 WORK SEQUENCE:

- A. The Contractor is responsible for the sequencing of activities as necessary to satisfactorily complete all project work within the Contract period. The Contractor's sequencing shall be presented in the baseline construction schedule as specified in Section 01300: Submittals. The Contractor is notified herein that additional work site limitations and restrictions exist. These are associated with, but not limited to, the following:
 - 1. Light Rail Operations
 - 2. Traffic and pedestrian operations at crossing site.
 - 3. Environmental Controls
 - 4. Safety and Quality Controls
 - 5. Weather

The Contractor's sequencing shall incorporate all restrictions associated with these elements. Each is more thoroughly elaborated upon in this specification.

**PART 2: PRODUCTS
NOT USED**

**PART 3: EXECUTION
NOT USED**

PART 4: MEASUREMENT AND PAYMENT**4.01 SUMMARY OF WORK:**

- A. Summary of Work will not be measured for payment.
- B. Summary of Work will not be paid for directly, but will be considered incidental to the appropriate work item.

4.02 STAGING AREAS:

- A. Staging Areas including all work and materials for preparation and restoration will not be measured for payment.
- B. Staging Areas will not be paid for directly but will be considered incidental to the mobilization work item.

END OF SECTION

SECTION 05690**115 RE RAIL****PART 1: GENERAL****1.01 DESCRIPTION:**

- A. This Section specifies furnishing all labor, materials, and equipment for the manufacture, testing, fabricating and shipping of high strength 115 RE steel running rail for installation and connection with bonded insulated joints.
- B. Related work specified elsewhere:
 - 1. Section 02806: Precast Concrete Grade Crossing System
 - 2. Section 05650: General Requirements for Track Installation
 - 3. Section 05651: Rail Welding
 - 4. Section 05671: Ballasted Track Construction
 - 5. Section 05680: Embedded Track Installation
 - 6. Section 17300: Bonded Insulated Joints

1.02 SUBMITTALS:

- A. Submit the following:
 - 1. Date schedule of rail production, inspection, shipment and final delivery.
 - 2. A detailed description of the steel metallurgy.
 - 3. A detailed description of the methods and procedures to be used to remove hydrogen in the steel.
 - 4. A description of the ultrasonic testing method and equipment.
 - 5. A description of the method and verification testing to achieve the required rail hardness.
- B. Submit the method of handling, shipping, unloading, and stacking rail for review and acceptance at least four weeks before shipping of the rail.
- C. Provide certified rail test report showing the test results for chemical composition, yield strength, tensile strength, elongation percentage, and testing date for each heat of rail.

- D. Provide rail test records, including macroetch results, hardness measurements, ultrasonic test records and all other required test documentation for formal review when submitted to the Administration upon shipment of the rail.
1. In addition, to the preceding test results, submit the following information to the Engineer upon shipment of the rail:
 2. Report of Chemical and Physical Examination of Rails.
 3. Mill certificate of inspections and Brinell hardness readings.
 4. Report of rail shipment by rail type and length.
- F. Forward all submittals to the Engineer in accordance with Section 01300: Submittals.

PART 2: PRODUCTS

2.01 RAIL:

A. General

1. Steel rail shall be 115 RE and conform to the latest requirements of the following sections of the American Railway Engineering and Maintenance of Way Association (AREMA) Manual for Railway Engineering, Chapter 4 "Rail". Part I - Design (Rail section design for 115 RE Rail) and Part 2 - Specifications (Specifications for Steel Rails).
2. All rail shall be from continuous cast blooms and shall be identified by a designation for heat number, strand number and bloom number.
3. Classifications, markings, brandings, and stampings of rail shall be in accordance with AREMA specifications for rail manufactured from continuous cast blooms process.
4. Rail shall be supplied in nominal 80-foot lengths.
5. A maximum of 10 percent of the rails of each type may be shorts. Allowable short lengths for the 39-foot tee rails are 38, 37, 36, and 33 feet. For 80-foot tee rail lengths, acceptable shorts are 77, 76, 75 and 70 feet.
6. For drilled rails, allowable tolerances for rail lengths are +/- 7/16 inch for 39-foot rail lengths and +/- 7/8 inch for 78-foot rail lengths. For undrilled rails, a variance of +/- 2 inches will be permitted

7. Ensure rail is ultrasonically tested over its full length. Test all rails 100% in-line with a fully computerized DAPCO 300 testing unit or approved equal. Testing shall conform to the requirements of Chapter 4, Part 2, Section 8 of the AREMA Manual.
8. Rails shall have a maximum allowable direct current (DC) resistance of not more than 8.68×10^{-6} ohms per foot.
9. Have the manufacturer furnish all rail inspections results.
10. Rail hardness shall conform to the requirements of AREMA Manual Chapter 4, Part 2, using the Brinell (ASTM E10) method.
11. Strength properties of the rail shall conform to the minimum criteria set in AREMA Manual Chapter 4, Part 2.
12. Chemical properties of the rail shall conform to AREMA Manual Chapter 4, Part 2.

PART 3: EXECUTION

3.01 ACCEPTANCE:

- A. The Contractor shall inspect the rails delivered to the project site by the Administration to his satisfaction that the rails delivered fulfill all of the requirements of these Specifications for high-strength 115 RE rail.
- B. The Contractor shall notify the Engineer if the delivered rails do not meet the requirements for use in trackwork.

3.02 LOADING:

- A. The Administration shall load the rails carefully to avoid damage. Sufficient blocking and dunnage shall be used to prevent damage to rail during transit.

3.03 DELIVERY AND STORAGE:

- A. Shipping and Handling
 1. All rails shall be handled carefully to avoid damage and shall be loaded head up with the branding on all rails facing in the same direction.
 2. Rails shall be loaded with head up with adequate wood strips between layers of rail to prevent damage in transit.

- B. Storage at Project Site
 - 1. Upon delivery of the rails to the project site by the Administration, and acceptance by the Contractor, the Contractor shall be responsible for storing the rails to minimize rust and corrosion. Stack for easy handling and maintain cleanliness for visual inspection.
- C. Stacking of Rail: The contractor shall be responsible for stacking the rails in such a way as to prevent sagging.
- D. Rail Protection at Storage Site
 - 1. The Contractor shall protect the rails from the elements to prevent excessive corrosion during storage and protect rail ends from physical damage.

PART 4: MEASUREMENT AND PAYMENT

4.01 115 RE RAIL

- A. All costs in connection with furnishing, delivering, and handling of rails at the project site will be paid for under the items Prefabricated Bonded Insulated Joint, 54' Long and 56' long included in Section 17300 Bonded Insulated Joints.

END OF SECTION

SECTION 17300**BONDED INSULATED JOINTS****PART 1: GENERAL****1.01 DESCRIPTION:**

- A. This Section includes specifications for furnishing, installing and testing prefabricated bonded insulated joints.

1.02 SUBMITTALS:

- A. Bonded Insulated Joints: Prior to testing, submit shop drawings and installation procedures. The installation procedure shall include the method of maintaining the specified gap in the CWR during installation of joints. Submit results of tests specified in Article 1.03.

1.03 QUALIFICATION TESTING OF BONDED INSULATED JOINTS:

- A. Bonded Insulated Joint Design Tests: Arrange for an approved, independent testing firm or individual to perform or witness and certify the tests specified herein. Test three joints as specified below. Test two joints as specified in Article 1.03.B. Test the remaining joint as specified in Articles 1.03.C and 1.03.D. The Engineer will accept Certificates of Compliance that joints of identical design have successfully completed these tests.
- B. Longitudinal Compression Test: Two bonded joints shall be completely assembled per manufacturer's recommendations on two pieces of 115 RE rail each two feet long. In the testing of bonded standard joints, establish a rail gap of $\frac{1}{4}$ inch to determine the slippage of the rail in the joint. Then saw the joint assembly in half where the rails are joined together. The sawing shall be done in a manner that will prevent overheating and damage to the bonding agent and the cut shall be perpendicular to the centerline of the top of rail with a tolerance of plus or minus one degree. Fabricate a device so that the reaction at the sawn end occurs only on the face of the joint bars when a load is applied at the centroid of the rail at the opposite end.
 - 1. Apply loads longitudinally in increments of 25,000 pounds. Maintain each load increment constant until the longitudinal deflection of the rail ceases before increasing the load to the next increment. Increase the load in these increments until a total load of 600,000 pounds is attained, or failure occurs. At each increment of loading, the load and differential movement of the rail and the joint bars, measured to 0.001 inch, shall be recorded.

2. Acceptance Criteria: At no time shall the joints show indication of slippage before a compressive load of 600,000 pounds is applied to the joint. At the completion of the test, after the load on the rail has been released, the relative position of rail and joint bar shall be within 0.010 inch of its original value. Any failure of a joint to meet the above requirements shall be reason for rejection.
- C. Electrical Resistance Test: A rail joint shall be fully assembled in accordance with manufacturer's recommendations on two lengths of 115 RE rail, one 24 inches in length, the other 42 inches in length. The rail shall be supported on non-conducting material.
1. With 500 volts dc applied to the rail on either side of the bonded insulated joint for a duration of three minutes, measure the resistance with an accuracy of plus or minus two percent. Apply a potential of 50 volts ac to the rail on either side of the joint for a duration of three minutes for each increment of measurement for frequencies from 20 hertz to 10 kilohertz in increments of 20 hertz up to 100 hertz; 200 hertz up to 1,000 hertz; and 2,000 hertz up to 10 kilohertz. The impedance after three minutes shall be measured with an accuracy of plus or minus two percent and recorded for each frequency.
 2. Acceptance Criteria: The minimum resistance for 500 volts dc shall be 10 megohms. The minimum impedance for any frequency between 20 hertz and 10 kilohertz with 50 volts ac shall be 10,000 ohms.
- D. Stroke Rolling Load Test: After being tested for electrical resistance, 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 as shown in Figure 4-3-16 of the AREMA Manual, Volume 1, Chapter 4, Section 3.8.7.4. The 44,400 pound load on the rail shall be applied for 2,000,000 cycles and the deflection of the rail at the centerline of rail shall be measured and recorded when the wheel load is over points A and B for every 500,000 cycles and recorded to the nearest 0.001 inch.
1. Other methods of testing the joint dynamically may be submitted to the Engineer for review. The moment diagram generated by other methods shall meet or exceed the moment shown in Figure 02863-2 of Section 02863.
 2. After 2,000,000 cycles, the bonded joint shall show no evidence of failure by bending. At all times during the tests, the deflection of the joints shall not exceed 0.065 inch. The electrical resistance test specified in Article 1.03.C shall then be repeated, and the test results shall be within the acceptance criteria specified. After completion of

the electrical resistance test, the joint assembly shall be subjected to the longitudinal compression test specified in Article 1.03.B. The joint shall be saw-cut to adapt the section to the requirements stated in the test and the acceptance criteria shall remain the same as stated in the test.

PART 2: PRODUCTS

2.01 GENERAL:

- A. Bonded insulated joints shall conform to the dimensional requirements for 115-pound RE rail. Rails shall be head-hardened high-strength rail conforming to AREMA Specifications for Steel Rails.

2.02 BONDED INSULATED JOINTS:

- A. Bonded insulated joints shall be in accordance with AREMA Manual, Volume 1, Chapter 4 (Rail), Section 3.8, "Specifications For Bonded Insulated Rail Joints", as modified herein.
- B. Bonded insulated joints shall be prefabricated (shop fabricated with head-hardened running rails on both sides) by an approved bonded insulated joint manufacturer. Bonded insulated joints shall be tested at the plant for electrical resistance in accordance with Paragraph 1.03.C and again by the Contractor after completion of the installation in track in accordance with Paragraph 3.01.
- C. Joint Components: Bonded insulated joints shall be furnished complete with bars, end posts, bushings, washers, lock bolts, collars, and adhesive as recommended by the manufacturer. All insulated joints shall be bonded type.
- D. Joint Bars:
 - 1. Material: Quenched carbon steel conforming to AREMA Manual, Chapter 4, or equal.
 - 2. Configuration:
 - a. Provide full-face contact conforming to the configuration of 115 RE rail. The inside face of the joint bars shall have insulating material prebonded and shall be smooth with no stamping or branding.
 - b. Joint bars shall conform to Figure 2, Bonded Insulated Joint Clearance Envelope, herein.

3. Tolerances:
 - a. Fishing Height: The fishing height of the insulated joint bar with insulation shall be controlled within plus zero inch to minus 1/32 inch of the 115 RE rail section.
 - b. Straightness: All portions of the joint bars adjacent to the rail shall be straight within a tolerance of plus or minus 1/32 inch, measured with a 36 inch straight edge.
- E. Insulating Material: All insulating materials shall be of high pressure, laminated design, impervious to oil, grease, and water, and shall have electrical resistance characteristics equal to or greater than fiber insulation meeting the requirements of the AREMA Communications and Signal Manual, Volume 2, Part 8.5.2, and the Electrical Resistance Test specified herein. End posts shall be ¼ inch thick, plus or minus 1/32 inch.
- F. Pin Bolts: Bonded insulated joints shall be fastened together with six pin bolts conforming to the chemical composition and mechanical property requirements of ASTM A325 or ASTM A490. Use one-inch diameter bolts with tension-type collars made of low carbon steel and button heads. Bolts shall be capable of being installed by a special driving tool which can partially swage the collars to allow for some adjustment during fabrication when bolting is performed; can produce the minimum clamping force recommended by the manufacturer; and can swage the collar into the annular locking grooves, forming the collar into the proper size and shape, before the bolt tail breaks. Furnish hardened steel washers for installation under bolt heads and collars. The size of bolt holes in joint bars shall be in accordance with the joint manufacturer's recommendations and the bolt hole locations shall be as specified in the AREMA Manual, Chapter 4, for a 36-inch joint bar.
- G. Adhesive: The bonding agent shall produce a minimum lap shear strength of 3500 psi at 75°F when tested in accordance with ASTM D1002 (metal-to-metal). The adhesive shall be capable of meeting the above requirements for one year from date of manufacture when stored as specified by the manufacturer.
- H. Acceptable trade-names – Bonded insulated joints shall be one of the following types or an approved equal:
 1. The “Allegheny” joint as manufactured by Allegheny Rail Products, a division of L.B. Foster Company.
 2. The “Portec-Bond” toeless joint as manufactured by Portec Rail Products, Inc.

3. Other brands will be considered as approved equal only if they successfully pass the tests specified herein.

PART 3: EXECUTION

3.01 BONDED INSULATED JOINTS:

- A. **Surface Preparation:** Clean rail surfaces within the joint bar limits to remove all oil, dirt, rust, sharp edges, burrs, and metal filings. Remove all rail branding for the length of the joint bar by grinding.
- B. **Assembly:** Assemble and install bonded insulated joints in accordance with manufacturer's recommendations and with the submitted and accepted installation procedures. Prior to installing pin bolts, calibrate the installation by testing three typical bolts in a device capable of indicating actual bolt tension.
- C. **Field Quality Assurance – Electrical Tests:**
 1. Test all bonded insulated joints as follows, including both shop-fabricated and field fabricated bonded insulated joints. Field quality assurance electrical tests shall be conducted by a certified independent testing laboratory that has been approved by the Engineer, as specified in Section 01450, Paragraph 1.11.
 2. Perform electrical tests on bonded insulated joints before installation of traction power and signaling cables to the rails. If cables have already been installed, disconnect cables attached to the rails on both sides of the joint. Reconnect cables after testing.
 3. **Test equipment:**
 - a. Analog ammeter
 - b. 6 volt Lantern Battery
 - c. File or grinder
 - d. Test lead wires

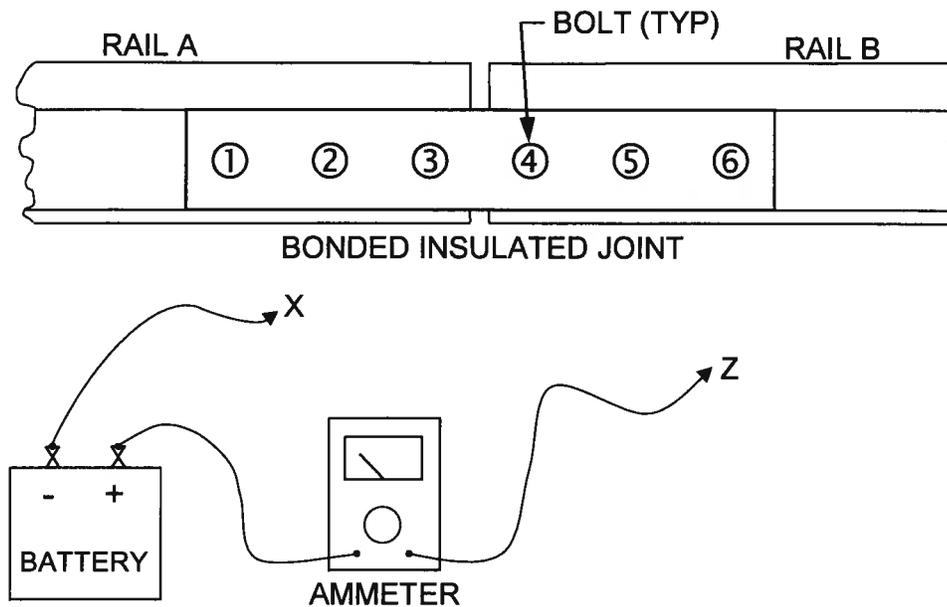


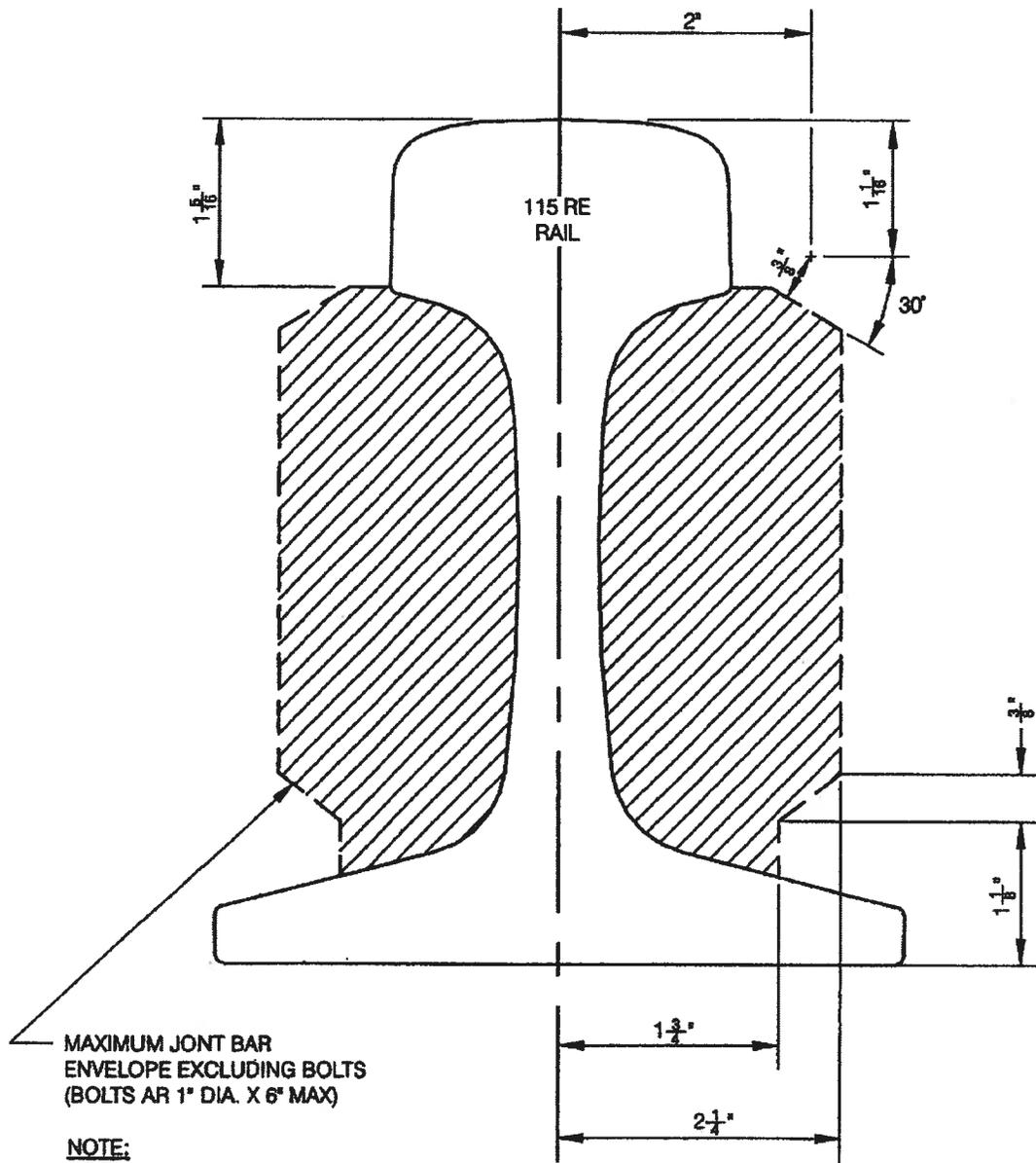
FIGURE 1
BONDED INSULATED JOINT TEST SETUP

4. Rail-to-Rail Test:
 - a. Procedure:
 - (1) Carefully file or grind clean surfaces on rails at points of contact for each test lead, only enough to provide a good electrical contact between test leads and the rail surfaces without damaging the rails.
 - (2) Place test lead "X" on rail "A", and place test lead "Z" on rail "B". Obtain a test reading.
 - b. Acceptance Criteria: Test reading shall be less than 25 mA. If reading is greater than 25 mA, re-verify that no electrical connections have been made to the test rails that will prevent reading through transformers, bonds, or other items. If this has been verified, and the reading is still peaking the amp meter, the insulated joint is considered defective and will be rejected.
5. Rail-to-Bolts Test:
 - a. Procedure:

- (1) Carefully file or grind clean surfaces on rails at points of contact for each test lead, only enough to provide a good electrical contact between test leads and the rail and bolt surfaces without damaging the rails and bolts.
 - (2) Place test lead "X" on rail "A", and place test lead "Z" on Bolt 1. Obtain a test reading.
 - (3) Place test lead "X" on rail "A", and place test lead "Z" on Bolt 2. Obtain a test reading.
 - (4) Place test lead "X" on rail "A", and place test lead "Z" on Bolt 3. Obtain a test reading.
 - (5) Place test lead "X" on rail "B", and place test lead "Z" on Bolt 4. Obtain a test reading.
 - (6) Place test lead "X" on rail "B", and place test lead "Z" on Bolt 5. Obtain a test reading.
 - (7) Place test lead "X" on rail "B", and place test lead "Z" on Bolt 6. Obtain a test reading.
- b. Acceptance Criteria: All test readings shall be less than 25 mA. If any of the readings are greater than 25 mA one or more of the insulating thimbles for the bolts are considered defective and the bonded insulated joint will be rejected.
6. Correct or replace any bonded insulated joints that fail either the Rail-to-Rail Test or Rail-to-Bolts Test.
 7. Retest each corrected bonded insulated joint after completing the corrective work.

PART 4: MEASUREMENT AND PAYMENT**4.01 PREFABRICATED BONDED INSULATED JOINTS, 54 FEET LONG AND 56 FEET LONG:**

- A. Prefabricated Bonded Insulated Joints, 54 Feet Long and 56 Feet Long, will be measured per Each.
- B. Prefabricated Bonded Insulated Joints, 54 Feet Long and 56 Feet Long, will be paid at the Contract unit price per Each and shall include removing and disposing of the existing bonded insulated joints and rails, and furnishing, installing and testing prefabricated bonded insulated joints with new high-strength rails, 54 feet long and 56 feet long, and all other materials, labor, and equipment necessary to complete the work.



MAXIMUM JOINT BAR ENVELOPE EXCLUDING BOLTS (BOLTS ARE 1" DIA. X 6" MAX)

NOTE:

NOT INTENDED TO EXCLUDE USE OF STANDARD AREMA JOINT BARS IN YARDS.

FIGURE 2
BONDED INSULATED JOINT CLEARANCE ENVELOPE

END OF SECTION