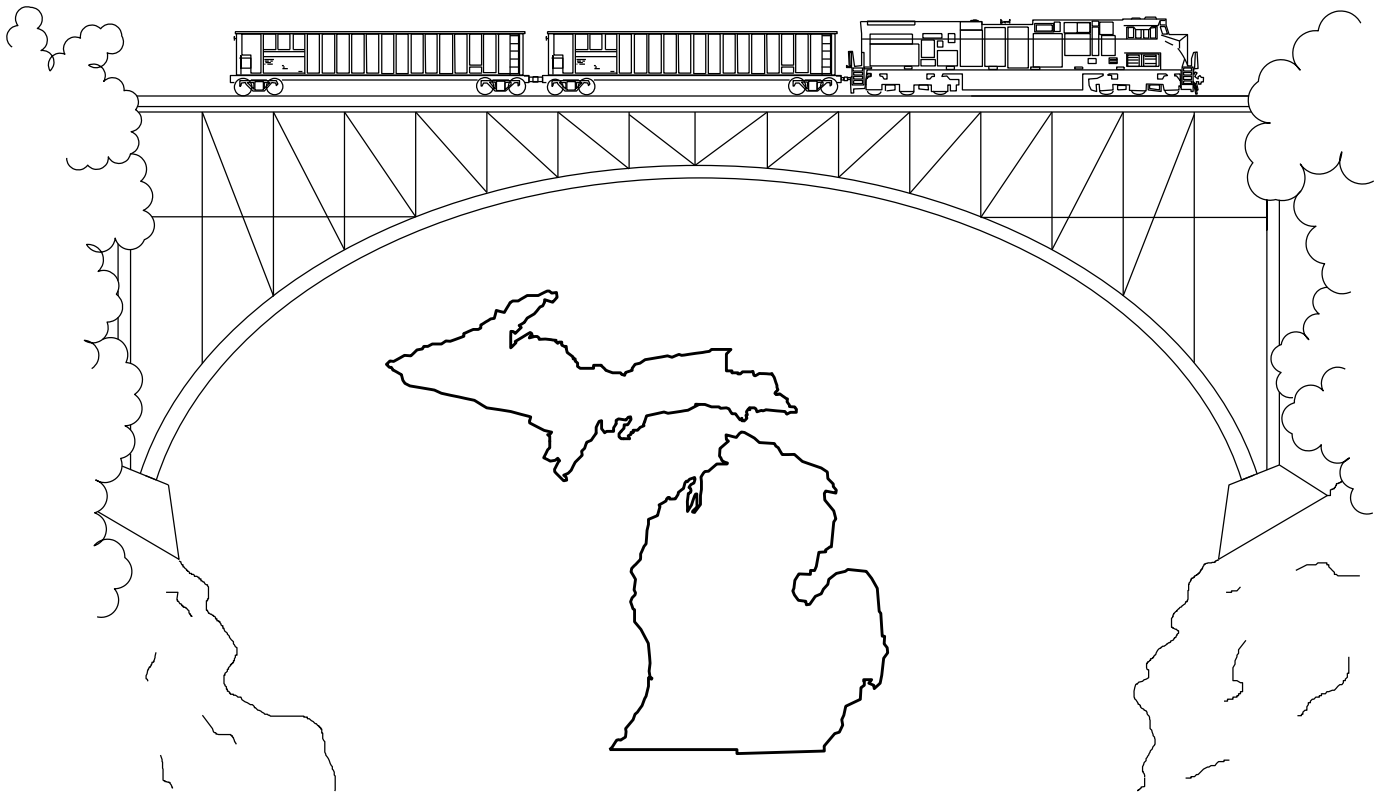




STANDARD SPECIFICATIONS  
FOR  
RAILROAD WORK  
2015



These specifications are to be used in conjunction with the Michigan Department of Transportation's standard specifications for Construction and Standard Plans. All contracted work shall conform to the administrative procedures and requirements set forth in those documents. Contractors are advised to obtain a copy and become knowledgeable of the procedures and conditions contained therein.

# TABLE OF CONTENT

## DIVISION 1: GENERAL PROVISIONS

10. Terms, Definitions, and Specifications.....	4
11. Control of Work.....	5
12. Control of Materials.....	7
13. Environmental Responsibilities.....	8
14. Work Program and Progress.....	9
15. Measurement and Payment .....	10
16. Railroad Signal Maintenance.....	10
17. Mobilization.....	11

## DIVISION 2: INCIDENTAL CONSTRUCTION

20. Ditching.....	13
21. Culverts .....	14
22. Culvert Repair.....	15
23. Reset Culvert.....	16
24. Turf Establishment.....	16
25. Retaining Wall.....	17
26. Brush Cutting and Brush Spraying.....	18
27. Geotextile Fabric.....	22
28. Earthwork .....	22
29. Erosion Control .....	23

## DIVISION 3: BALLAST

30. Ballast and Sub-Ballast.....	24
----------------------------------	----

## DIVISION 4: TIES

40. Install Ties.....	26
41. Remove Ties.....	29
42. Remove Tie Butts.....	30
43. Tie Disposal.....	30

## DIVISION 5: OTHER TRACK MATERIAL (OTM)

50. OTM.....	32
--------------	----

**DIVISION 6: TRACKWORK**

60. Surface and Align Track .....37  
61. Construct Track.....39  
62. Remove and Reinstall Track.....40  
63. Removal of Track Components.....41  
64. Rail Replacement.....42  
65. Crossing Rail Replacement.....43  
66. Welding .....45  
67. Tighten Track Bolts.....47  
68. Gauging Track .....47  
69. Benching Track.....48

**DIVISION 7: TURNOUTS**

70. Frogs ..... 49  
71. Switch Points .....49  
72. Stock Rail .....51  
73. Guardrails .....51  
74. Insulated Switch Rod and Gauge Plate .....52  
75. Construct Turnout .....53  
76. Straight Rail Turnout.....54  
77. Upgrade Turnout .....55

**DIVISION 8: GRADE CROSSINGS**

80. Rehabilitate Grade Crossings .....58  
81. Temporary Plank Crossing.....61  
82. Hardwood Plank .....63  
83. Class \_ Approaches .....64  
84. Removal of Grade Crossings .....64  
85. Traffic Control .....65  
86. PVC Signal Conduit .....66  
87. Signal Circuit Hardware .....67  
88. Grinding Wheel .....68  
89. Grade Crossing Approach .....68

**DIVISION 9: MATERIALS**

90. Timber Ties .....71  
91. Ballast .....73  
92. Sub-Ballast .....74  
93. Geotextile Fabric .....74  
94. OTM .....75  
95. Number 1 Rail .....76  
96. New Rail.....77  
97. Field Weld Kit .....77

# DIVISION 1

## GENERAL PROVISIONS

### Section 10. TERMS, DEFINITIONS, AND SPECIFICATIONS

**10.01 General.** Whenever the following abbreviations or pronouns are used in the specifications or in other contract documents they shall have the following meaning:

#### **10.02 Abbreviations.**

AAR	American Association of Railroads
AREMA	American Railway Engineering and Maintenance of Way Association
CWR	Continuous Welded Rail
DS	Double Shoulder
RSI	Rail Safety Inspector
HP	Hardwood Plank
IK	In Kind
OT	Overtime
OTM	Other Track Material
RB	Rubber
RBM	Rail Bound Manganese
RF	Rail Flangeway
SS	Single Shoulder
ST	Straight Time
TFT	Track Foot
UG	Upgrade

#### **10.02 Definitions.**

Railroad	Refers to the Operating Railroad.
Reconditioned	Used material restored to original manufacturer's specifications.
Relay	Used material that is within 1/8 inch tolerance of new material.

**10.03 Referenced Specifications.** The following specifications are included by reference:

1. 2012 Michigan Department of Transportation (MDOT) Standard Specifications for Construction
2. Current AREMA Specifications, Volumes I and II, and Portfolio of Trackwork Plans
3. AAR Scale Handbook
4. MDOT Railroad Typical Plans
5. Michigan Manual of Uniform Traffic Control Devices (MMUTCD)

## **Section 11. CONTROL OF WORK**

This section supplements Section 104 of the MDOT Standard Specifications for Construction. Particular attention is directed to 104.01.A. "The Engineer will decide questions that arise concerning the interpretation of the contract and its acceptable fulfillment. The Engineer will also decide questions regarding the quality and acceptability of materials provided, work performed, manner of performance, and rate of progress of the work. If either party discovers any errors, uncertainties, inconsistencies, omissions, or conflicts in the contract, the Engineer will clarify and determine the true intent of the contract."

**11.01 Submittals to MDOT.** All preconstruction submittals requested by the Engineer shall be delivered to the Department at the preconstruction meeting.

**11.02 Authority of the RSI.** An RSI will be assigned to assist the Engineer in the administration of the project. The RSI will document the work performed by the Contractor, inspect project materials for compliance with specifications, assess the quality of the workmanship, and communicate pertinent information to the Engineer and other Department representatives.

Inspections, of any nature, by the Department or the Railroad shall not be construed as a warranty or assumption of liability on the part of the Department or the Railroad. Any such inspections are for the sole and exclusive purposes of the Department or the Railroad.

**11.03 Personnel.** The Contractor shall designate a Project Supervisor to be on the project at all times. The Project Supervisor shall manage the project. The Engineer/RSI will determine the acceptability of the Project Supervisor and may require the Contractor to replace the Project Supervisor if deemed unacceptable.

The Contractor shall submit the name of the proposed Project Supervisor prior to the preconstruction meeting, and shall include a list of qualifications, past experience with similar work, and a minimum of three client references with addresses and phone numbers.

**11.04 Meetings.** The Project Supervisor shall be available during prescribed working hours for discussion of past or future work, the progress schedule, acceptability of materials, etc. Failure of the contractor to provide a Project Supervisor who is thoroughly familiar with the plans and specifications and in complete control of all work within the project limits shall be cause to suspend the work until such requirements are met. No additional compensation or additional contract time will be allowed due to suspension of the work, delays, or any inconvenience resulting from noncompliance with this provision.

**11.05 Safety and Health Requirements.** The Contractor and all Subcontractors shall perform the work in a safe manner conforming with all applicable federal, state, and local laws, regulations, railroad safety and/or operating rules, and Subsection 104.07.B of the Standard Specifications for Construction.

Prior to starting any project work, a safety meeting shall be held between the Project Supervisor and the Railroad. The purpose of the safety meeting is to familiarize the Contractor with the Railroad's Safety and/or Operating Rules and Regulations. It is the responsibility of the Contractor

to indoctrinate his subcontractors accordingly. The safety meeting will be called by the Contractor, and the Engineer/RSI shall be invited.

The Railroad may investigate and observe the Contractor's work for compliance with all applicable safety requirements. All work performed by the Contractor shall be designed, planned, and executed in accordance with the Railroad's Safety and Operating Rules and the movement of its trains. Violations of the Railroad's Safety and/or Operating Rules and Regulations will result in an immediate suspension of the work by the Engineer/RSI or the Railroad. Prior to resuming the work, the Contractor shall provide a written safety plan to assure that the Safety and/or Operating Rules and Regulations will be adhered to. No additional compensation or additional contract time will be allowed due to such delays.

**1. Intoxication.** No person who appears to be under the influence of alcohol or a controlled substance shall be admitted or allowed to work on the site. The Contractor shall prohibit its employees and the subcontractors from possessing and consuming alcoholic beverages, intoxicants, and controlled substances on or about railroad property.

**2. Vehicle Control.** Only authorized vehicles will be permitted to enter railroad property to transport employees and deliver materials, tools, or other essential functions in relation to the project. Vehicles shall not block roadways, fire-fighting equipment, or park in unauthorized areas.

**3. Eye Protection and Safety Hats.** Safety hats shall be worn by Contractors and their employees while working on the site. Full goggle or full face protection is required when more serious hazards exist.

**4. Ear Protection.** Ear protection shall be supplied by Contractors and worn by their employees when operating or working near equipment creating high noise levels.

**5. Housekeeping on Job Sites.** The Contractor shall keep the railroad property job site clean and free of waste machinery fluids, rubbish, and scrap during the progress of the work. All waste machinery fluids, trash, and rubbish attributable to the Contractor's operation shall be collected and legally disposed of off-site and off railroad property, at the Contractor's expense.

**6. Occupancy.** Train operations shall continue as the project progresses. Therefore, the Contractor shall diligently execute his work to keep the track safe for train operation. The Contractor shall not interfere with train operations and will notify, coordinate with, and secure approval from the Railroad before proceeding with any work.

**7. Performing Work On or Adjacent To an Operating Track.** Railroad operations will, at times, be performed on or adjacent to operating tracks. Any costs incurred by the Railroad for operating delays, resulting from the Contractor's failure to adhere to the terms and conditions of the contract documents (such as clean-up) or any other activities related to the maintenance of normal operations shall be paid to the Railroad by the Contractor.

The Contractor shall diligently execute his work to safeguard the track, embankments, structures, rolling stock, and signal systems and other equipment and appurtenances of the Railroad from being

damaged in any manner and will be held financially responsible for same.

The Contractor shall not perform any operations which might foul the railroad, or adjacent foreign railroad, until he has complied with all prerequisites for fouling as enumerated below or requested by the Railroad:

1. When an operating track of the Railroad, or adjacent other Railroad, will or may be fouled in the course of performing the work, the Contractor shall submit in writing to the Railroad, a minimum of two (2) workdays' notice before the work is to commence, a schedule of his operation so the Railroad may arrange for and furnish special supervisory and protective personnel. Furthermore, no such work shall commence until the Railroad verifies that the necessary protective personnel are stationed and that the Contractor may proceed.

2. An operating track will be considered fouled when any equipment or material is or may be brought closer than 10 feet from gauge of near rail.

3. In addition to the rules of fouling, whenever any part of the work may affect the safety of train movements, the method of doing the work shall first be submitted to the Engineer/RSI for approval, and may not be performed without such approval. The Railroad will provide, at the Contractor's expense, such additional protective personnel as is necessary. Such approval shall not release the Contractor from any obligations.

If during the progress of the work, trains, tracks, or other facilities are endangered, the Contractor shall immediately do the necessary work, as ordered by the Engineer/RSI, to restore the operation to a safe condition. Should the Contractor fail to carry out the Department's order immediately, the Railroad may take whatever steps it deems necessary to restore the tracks or other facilities to a safe condition and the Contractor shall reimburse the Railroad for such expenses.

**11.06 Federal Railroad Administration (FRA) Defect Retirements.** The Contractor shall retire all FRA cited defects which were caused by the Contractor's operation, within the time frame specified by the FRA.

**11.07 Contractor Discovered Defects.** If the Contractor discovers defects in the track which are not addressed in the work items, the Contractor shall immediately notify the Engineer/RSI.

## **Section 12. CONTROL OF MATERIALS**

This section supplements Section 105 of the MDOT Standard Specifications for Construction.

**12.01 Materials.** All materials incorporated into the work shall be new unless specifically designated as relay, reuse, or recondition,.. It is the Contractor's responsibility to demonstrate that all materials meet specifications. In the case of a discrepancy or contradiction in the specifications, the Engineer/RSI shall make the final determination on the intent of the specifications. The Source of Steel and Iron provision, subsection 105.10 of the Standard Specifications for Construction, applies for all railroad related materials such as rail, turnout components, and OTM, and the Buy American departmental policy shall be adhered to.

**12.02 Torch Cutting.** Except for an emergency condition that requires an immediate temporary repair, no rail except scrap rail or flange rails will be cut or holes made using a torch.

**12.03 Rail Painting.** Rail may be painted to identify work to be done. The Engineer/RSI will specify if and how it will be marked.

**12.04 Removals.** All removed materials shall become the property of the Contractor, unless designated otherwise, and shall be removed from the railroad right-of-way and disposed of in accordance with all local, state, federal laws. The Engineer/RSI may designate temporary stockpile locations on railroad property prior to final disposal by the Contractor. Clear vision areas at grade crossings shall not be utilized or obstructed. Fouling may not occur from temporary stockpiles.

### **Section 13. ENVIRONMENTAL RESPONSIBILITIES**

**13.01 Compliance with Environmental Laws.** The Contractor shall comply with all federal, state, and local laws when performing project work. The intent is to set forth minimum steps to avoid violating environmental laws. It remains the responsibility of the Contractor to determine whether more than these minimum steps may be required and then, at the sole expense of the Contractor, to perform all the work required, in whatever manner may be required, to comply with all applicable laws. The Contractor is liable to the Department for any fines, costs, and remediation costs incurred by the Department as a result of the Contractor's failure to comply with all federal, state, and local laws. It is the responsibility of the Contractor to examine the project and determine the types of materials to be disposed.

**13.02 Disposal of Ties and Treated Timbers.** The removal and disposal of ties and treated timbers is regulated under Part 115 of the Natural Resources and Environmental Protection Act, 1994 Act 451, (MCL 324.11501 et seq). All ties and treated timbers are to be considered scrap and shall be taken to a licensed disposal or co-generation facility.

The Contractor may sell or give away only those ties and/or treated timbers that are suitable for reuse or recycling into a commercial product. A reusable product is defined as an item that is in its original shape, solid, and that would be suitable as a landscape timber. Recycling shall be at a Michigan Department of Environmental Quality (MDEQ) approved location. The use of ties and/or treated timbers as a fuel is not considered a reusable product by this definition, except at a licensed co-generation facility. Anything that is not considered a reusable product, or is a waste product from the recycling process, is defined as scrap. The Engineer/RSI shall have final determination as to what is considered scrap. In all cases, the Contractor shall dispose scrap materials at a licensed disposal or co-generation facility.

The Contractor may chip ties and treated timber on-site prior to hauling them to a licensed facility. This includes temporarily stockpiling chips on site. The chipping site shall be restored and turf established to the satisfaction of the Engineer/RSI, at the Contractor's expense. Any off-site storage and/or chipping are permissible only with a MDEQ Intermediate Site Separation Exemption or at a licensed MDEQ facility. Adequate precautions shall be taken to protect persons,



property and the environment from water and airborne contamination.

The disposal of reusable ties and treated timber shall be documented with a dated receipt identifying the quantity, location, and party receiving the ties and/or treated timbers. Where disposal of reusable products is not at a licensed facility, documentation also must include a release from the property owner substantiating placement of a reusable product on their property with the property owner's printed name and signature and a provision signed by the Contractor that holds harmless, defends, and indemnifies MDOT against any action that may be brought arising out of the placement of a reusable product on private property.

The project shall not be considered complete until all ties and treated timbers are properly disposed, whether on-site or off-site, and proper written documentation is provided.

**13.03 Contractor's Yard.** The Contractor shall obtain permission from the Engineer/RSI/Railroad to establish a yard within the right-of-way. The Contractor shall provide a dumpster in the yard for trash disposal. The Contractor shall take all appropriate measures to prevent the discharge of polluting substances onto the ground surface or into water courses. The yard shall be vacated and the ground surface restored and turf established to the satisfaction of the Engineer/RSI within two months after project completion, unless other prior arrangements have been made with the Engineer/RSI. The restoration and turf establishment shall be at the Contractor's expense.

**13.04 On-site Fueling.** The Contractor shall obtain permission from the Engineer/RSI to establish an on-site fueling facility. Any fuel tank used for on-site fueling shall be protected by containment using dikes or curbs and shall be lined with clay and/or visqueen. The volumetric containment capacity shall exceed the greatest amount of liquid that could be released from the tank, assuming a full tank. The storage or use area shall be constructed so that no fuel can escape into any sewer system, surface water or groundwater.

**13.05 Equipment Maintenance.** The Contractor shall use all available measures to prevent a release of oil or fuel from their equipment, including containment. The Engineer/RSI may prohibit the use of a particular piece of equipment that releases oil or fuel. Such prohibition shall not constitute the basis for a claim or time extension. The Contractor shall be responsible for cleaning up and properly disposing of materials impacted as a result of a release.

## **Section 14. WORK PROGRAM AND PROGRESS**

**14.01 Proposed Work Program.** The Contractor shall submit, at least one week prior to the preconstruction meeting, a listing of all construction equipment estimated for use at the job site itemizing the manufacturer's name, model number, year built, and condition of the equipment. The Department reserves the right to determine the acceptability of this equipment and may require the Contractor to replace any equipment deemed unacceptable. The list shall state the estimated on-site dates and duration for each piece of listed equipment.

**14.02 Progress of Work.** The Contractor shall conduct all work with sufficient forces and

equipment to complete the work within the specified time. The Contractor shall have a Project Supervisor on the project site at all times with authorization to take appropriate action.

If, in the opinion of the Engineer/RSI, the Contractor falls behind the progress schedule, the Contractor shall take all necessary steps to improve his progress and to submit, for prior approval, such supplementary schedule or schedules as may be deemed necessary to demonstrate the manner in which the agreed rate of progress will be regained, all without additional cost to the Department.

**Section 15. MEASUREMENT AND PAYMENT**

**15.01 Labor, Equipment, Supervision.** The work described for each pay item shall include labor, equipment, and supervision unless specifically described otherwise.

**Section 16. RAILROAD SIGNAL MAINTENANCE**

**16.01 Description.** The work consists of making payments to the Railroad for Signal Maintenance.

The Railroad will perform any and all signal or track circuit repair required by disablement of grade crossing flasher protection and track circuits, as a result of the Contractor's work. Under no circumstance shall the Contractor gain access to or tamper with any railroad signal control mechanism.

The Contractor shall be responsible for all costs incurred by the Railroad for any damage to railroad signal equipment, except for broken rail bond wires, boot legs, and circuit wires that occur in connection with track surfacing, tie installation, and grade crossing work.

**16.02 Measurement and Payment.** Payment to be included in the unit price of other project pay items. Copies of Railroad documentation for hours worked in connection with this project will be presented to the Engineer/ for payment. The Engineer/ will determine the number of hours to be paid. The Engineer/ will submit these hours on the biweekly progress payment to the Contractor. The Contractor shall pay the Railroad the full amount (hours times the unit price) within 10 days of receiving payment from the Department. The Contractor shall not withhold any portion therefrom, even though a retainage is held from the Contractor by the Department. The Contractor shall supply the Engineer/ a copy of the check to the Railroad.

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Signal Maintainer, _____	Hours

**Signal Maintainer, \_\_\_\_\_ (ST, OT)** will be measured by the number of hours submitted by the Railroad. Contractor payment to the Railroad shall be at the unit price for each hour paid the Contractor.

**Section 17. MOBILIZATION**

**17.01 Description.** The work shall be performed as described in Section 150 of the Standard Specifications for Construction.

**17.02 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Mobilization, Max. ____.....	Lump Sum

**Mobilization, Max. \_\_\_\_** will state the maximum amount that can be bid for mobilization.

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# DIVISION 2 INCIDENTAL CONSTRUCTION

## Section 20. DITCHING

**20.01 Description.** The work consists of excavating ditches and disposing of the spoils.

**20.02 Construction.** Cut and trim the ditch to a depth of approximately 26" below the bottom of the tie. The final depth beneath the tie will be determined by the terrain and flow requirements for proper drainage to natural or man-made outlets. The ditch shall function to drain the track structure subgrade and transport water away from the track.

When roads, culverts, and natural barriers are encountered, the Contractor shall clean and trim the ditch to ensure the drainage course functions properly and to reduce erosion. Spoil at crossings shall be removed or blended into the landscape. In no case shall spoil be left as an obstruction to drainage or as a hazard to the railroad or the public.

Under normal circumstances, the railroad ditch center shall be a minimum of 11'-9" from track center line and will provide a 3 foot wide bottom as per Typical Plan RR-41. The distance from the center line may be adjusted according to field conditions. Soil removed due to the ditching operation shall be hauled away and disposed of in accordance with Subsection 205.03.P of the Standard Specifications for Construction, unless otherwise directed by the project plans or proposal.

**A. Ditching - Gradall.** The ditching shall be accomplished using an on-track Gradall or approved equal. Excavated soil shall be placed as far out from the track as possible, spread, and contoured to match the existing topography, or as directed by the Engineer/RSI.

**B. Ditching and Hauling - Gradall.** The ditching shall be accomplished using an on-track Gradall or approved equal, and hauling away and properly disposing of the spoil. Excavation of the front slope of track grade will not be allowed unless directed by the Engineer/RSI.

**C. Miscellaneous Ditching.** Excavate a ditch, typically a 3 foot round bottom ditch, at the location shown on the plans or as directed by the Engineer/RSI to perpetuate drainage.

### 20.03 Measurement and Payment.

Contract Items (Pay Items)	Pay Unit
Ditching, Gradall.....	Foot
Ditching and Hauling, Gradall .....	Foot
Ditching, Misc.....	Foot

**Ditching, Gradall** will be measured by the linear foot of ditch cut and trimmed. Ditching will be measured along the centerline of the track. Each side of the track will be measured separately.

**Ditching and Hauling, Gradall** will be measured by the linear foot of ditch cut and trimmed. Ditching will be measured along the centerline of the track. Each side of the track will be measured separately. Payment shall include hauling and proper disposal of the spoil.

**Ditching, Misc** will be measured along the centerline of the ditch by the linear foot. Payment shall include hauling and proper disposal of the spoil.

## **Section 21. CULVERTS**

**21.01 Description.** This work consists of installing galvanized corrugated metal pipe culverts at new locations or replacing existing culverts. The work shall be performed as described in Section 401 of the MDOT Standard Specifications for Construction. Removal and disposal of an existing culvert shall be considered included in the cost of installing a replacement culvert. This work shall be accomplished before placing ballast. The water level is subject to change; therefore, the contractor is responsible for determining the water levels that will exist during construction and take appropriate measures.

Culv, Cleanout, Hwy refers to culverts located in ditch lines under the roadway or railroad and are accessible from roadway. Culv, Cleanout, RR refers to culverts located under the railroad but only accessible from railroad.

### **21.01 Construction.**

Culvert installation shall be in accordance with construction procedures described in Section 401 of MDOT Standard Specifications for Construction.

Culvert cleanout work shall ensure that culverts are free of silt, debris, and other foreign matter above the existing flow line of the drainage course at the time of final acceptance. Contractor method of operations shall not damage culverts or disturb soil adjacent and around culvert. Contractor is responsible for removal and disposal of silt, debris, and other foreign matter off-site or at a location agreed to by Engineer/RSI. Any slope restoration or erosion control measures required for cleanout operation and/or disposal shall be included in the price of pay item for Culvert, Cleanout, \_.

### **21.03 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Culv, Cl , <u>(material)</u> , inch .....	Foot

**Culv, Cl \_\_, (material), \_\_ inch** will be measured and paid for on a linear foot basis for the length of culvert used.

**Culv Bedding** will be measured and paid for on a cubic yard basis.

**Culv, Cleanout, \_\_** will be measured and paid for by each culvert cleaned, regardless of length.

## **Section 22. CULVERT REPAIR**

**22.01 Description.** This work consists of excavating and removing separated and damaged end sections of existing pipe culvert, preparing the bedding, furnishing and installing replacement galvanized corrugated metal pipe culvert, and restoring the railroad slope. This work shall be accomplished before placing ballast.

**22.02 Materials.** Replacement culvert shall meet the requirements for Class A culvert. Culvert bedding shall meet the requirements of Subsection 401.03.A. Grout-Type II shall meet the requirements of Section 702 of the MDOT Standard Specifications for Construction. Embankment shall be a suitable material approved by the Engineer/RSI.

**22.03 Construction.** Remove a portion of the existing culvert as specified on the plans/proposal. The Contractor shall take any and all precautions to protect the railroad embankment while exposing and removing the ends of the existing culvert. The water level is subject to change; therefore, the contractor is responsible for making his own determination of water levels that will exist during construction.

Furnish and install suitable bedding material where directed by the Engineer/RSI. Shape in bedding material. Bedding material will be paid for separately.

Furnish and install the pipe of the diameter and length specified on the plans/proposal, grout, and restore the grade.

### **22.03 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Culv End Replacement .....	Foot
Culv Extension.....	Foot

**Culv End Replacement** and **Culv Extension** will be measured and paid for on a linear foot basis for the length of pipe used.

## **Section 23. RESET CULVERT**

**23.01 Description.** This work consists of excavating, removing and reinstalling separated sections of existing pipe culvert and backfilling. This work shall be accomplished before placing ballast.

**23.02 Materials.** The materials shall meet the following requirements of the MDOT Standard Specifications for Construction:

- Granular Material Class II, III, of IIIA.....Section 902
- Geosynthetics.....Section 910

**23.03 Construction.** Remove the existing track section, excavate, remove and salvage sections of separated pipe as specified in the plans. The water level is subject to change; therefore, the Contractor is responsible for making his own determination of water levels that will exist during construction.

Shape and compact the existing bedding material. Any existing unsuitable bedding material shall be removed and replaced with Granular Material Class IIIA as directed by the Engineer/RSI. Reinstall the existing pipe sections and wrap joints with a non-woven geotextile fabric. The fabric shall have a minimum width of three feet and shall be centered on each joint.

Backfill with Granular Backfill Material Class II, III, or IIIA, according to Section 401 of the MDOT Standard Specifications for Construction, to meet existing slopes. Existing excavated material may be used when approved by the Engineer/RSI. Reinstall track section and establish turf.

**23.04 Measurement and Payment.** The completed work for Culvert, Reset will be paid for at the unit prices for the following pay items:

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Culv, Reset .....	Foot

**Culv, Reset** shall be measured by the linear foot of existing pipe removed and reinstalled. Payment includes the costs of excavating the material down to grade or to the culvert bedding bottom; disposing of excess material; reinstalling the separated portions of pipe culvert; geotextile fabric wrap; and furnishing, placing, and compacting the backfill. Track removal, culvert bedding, and turf establishment shall be paid for separately.

## **Section 24. TURF ESTABLISHMENT**

**24.01 Description.** The work consists of placing topsoil, seed, fertilizer, mulch anchoring, and mulching materials for seeding at specified locations.

**24.02 Materials.** The materials shall be in conformance with Section 917 of the MDOT Standard Specifications for Construction.

**24.03 Construction.** The Contractor shall furnish the materials and restore all identified areas with methods described in Section 816 of the MDOT Standard Specifications for Construction. Items may be hand applied where permitted by the Engineer/RSI. Materials shall be placed at the following rates of application:



1. Topsoil: 3" minimum depth.
2. Seed: TDS (Turf Dry Sand) at 220 lbs/acre.
3. Fertilizer: 228 lbs/acre of nutrient. (Class A)
4. Mulch: 2 tons/acre, anchored as specified.

The TDS seed mixture shall be prepared in the following ratios:

<b>Mix Proportion Kind</b>	<b>Purity</b>	<b>Germination</b>	<b>By Weight</b>
Kentucky Blue Grass	98%	85%	5%
Perennial Rye Grass	96%	85%	25%
Hard Fescue	97%	85%	25%
Creeping Red Fescue	97%	85%	45%

The Contractor shall be responsible for all temporary erosion control measures until permanent turf establishment measures are in place. Permanent turf establishment measures shall be completed within five calendar days after final grading of the disturbed areas (vegetative cover is removed or destroyed).

The work of installing anchoring mulch, mulch blankets or mulch netting shall be as specified in Section 816 of the MDOT Standard Specifications for Construction.

**24.03 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Turf Establishment .....	Square Yard

**Turf Establishment** will be measured by the square yard and shall include furnishing and installing topsoil, seed mixture, chemical fertilizer, mulch, and mulch anchoring.

**Section 25. RETAINING WALL**

**25.01 Description.** The work consists of erecting a timber retaining wall.

**25.02 Materials.** The materials shall meet the following specifications:

**A. Timber.** Timber used for retaining wall construction shall be new or relay ties that meet the material specifications of Section 90.

**B. Posts.** Posts shall be cut from selected lengths of scrap rail, 85# minimum.

**C. Hardware.** Drift pins shall be wrought iron, ASTM A 207, or rolled steel, ASTM A 36.

**25.03 Construction.** Furnish and erect the materials as follows:

1. Construct retaining wall using ties and scrap rail. Materials shall be inspected and approved by the Engineer/RSI prior to installation.
2. Posts may be driven or placed in holes. If holes are used, they shall be backfilled, tamping the entire depth of the hole. The minimum depth of post embedment shall be 1½ times the height of wall, and the top of posts shall be flush with the top of wall.
3. Posts shall be equally spaced and the maximum spacing of posts shall be 6'-0" on center. Locate end posts 1'-0" from each end of wall.
4. Excavation and backfill shall be done as necessary to install the retaining wall. Existing material and ballast may be used as backfill. Backfill shall be placed in 9" maximum layers and tamped by manual or mechanical means to the satisfaction of the Engineer/RSI.
5. Walls shall be installed with a batter of approximately one ½" horizontal to 12" vertical towards the fill. Timbers shall bear against the base side of all posts. The retaining wall timber shall extend a minimum of two rows below the finished grade. The vertical joints between timbers shall be staggered. Each end of each timber shall be fastened to the lower timber with ¾" diameter drift pins, extending into the lower timber a minimum 5". Stagger pins as needed to clear lower pin.

**25.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Retaining Wall .....	Square Foot

**Retaining Wall** will be measured by the square foot of wall surface properly constructed. Payment includes hardware, excavation, and backfill.

**Section 26. BRUSH CUTTING and BRUSH SPRAY**

**26.01 Description.** The work consists of cutting and chipping all brush at designated locations.

**26.02 Construction.** Cut all brush from the center line of track out to a minimum distance of 22.5 feet on both sides of the track or as called for on plans/proposal, except when the distance to the right-of-way line is less than distance called for, then cut up to the right-of-way line. Cut the brush to within 12" of the ground to provide a clear right-of-way for railroad operations. The cleared areas shall extend 23 feet above the top of the rails for a minimum width of 15 feet left and right of the track center line or to the right-of-way line when the distance is less than 15 feet. The Contractor shall furnish, maintain, and operate standard industry on-track brush cutting equipment to perform the brush cutting without damage to the railroad facility. The Contractor shall have enough satisfactory equipment and personnel to complete the project in the time specified under normal seasonal weather conditions. On-track brush cutting units, as approved by Engineer/RSI, are acceptable.

Brush that is cut and hinders vision at roads or impedes drainage of ditches shall be removed and hauled to an off-site location or disposed of by chipping. When a chipper is used, the chipping shall be accomplished with a mechanical chipper that produces acceptable results. Chips may be spread out on the railroad right-of-way outside the ditch line. Tree trunks that hinder vision or drainage shall be cut into 4 foot lengths and neatly stacked behind ditch back slopes. The cost of chipping or hauling brush off-site shall be considered part of this work.

The finished product shall have a neat and clean appearance. The existing terrain shall not be disturbed so as to allow erosion to occur. All debris must be removed immediately from the track ballasted area, public roads and private property.

Brush Spray and Brush Spray Follow-up will be applied to the areas that received brush cutting, as called for on plans/proposal, or as directed by Engineer/RSI. Hand applications may be required at locations around signal equipment, sign posts, markers, bridges, and culverts.

It will be the Contractor's responsibility to secure their supply of water.

All herbicides used in the treatment shall be registered for use on railroad rights-of-way by the Michigan Department of Agriculture and the United States Environmental Protection Agency (EPA). No restricted use herbicides shall be used on this contract. No combinations of chemicals that are "contact kill only" are allowed, except for re-treatment late in the season.

The contractor shall apply all of the chemicals as designated on the material labels and in accordance with manufacturer's recommendation. Samples of the products used may be taken at the discretion of the Department.

The Contractor, once started, shall continue the application of chemicals until finished on each railroad before moving to the next railroad.

The railroad operators will work with the Contractor and provide necessary personnel to access the property. The Contractor will be responsible for any railroad pilot/personnel costs and to be included in pay item Brush Spray or Brush Spray Follow-up.

**26.03 General Requirements**

The following requirements apply to performing the work:

**A. Compliance with Laws.** The contractor shall comply with all federal, state, and local laws or ordinances applicable to the work described in this proposal. The contractor shall, at his own expense, secure all required permits and licenses.

**B. Chemical Application.** The contractor shall specifically use caution when applying herbicides adjacent to or when crossing water courses so that no chemicals are applied into the surface water. Application shall be delayed during periods of adverse weather. Work shall also be suspended when wind velocity is high enough to carry the chemicals outside of the target areas. Application periods may be adjusted or delayed due to drought conditions.

The contractor is responsible for knowing the right-of-way width restrictions so as not to harm adjacent property owners' vegetation or person either by direct application or by wind drift. The contractor shall be responsible for all claims from adjacent property owners that are a result of the application.

**C. Equipment.** The contractor shall furnish, maintain, and operate suitable equipment necessary to perform the application operation without damage to the railroad facility. The application unit(s) shall be equipped with hydraulically actuated Hy-Rail gear of adequate size to safely carry the weight of the equipment fully loaded. Self loading equipment shall have an anti-siphoning device to prevent water from the tank from flowing back into the water course.

All contractor equipment and materials not in use shall be parked or stored off the railroad right-of-way.

**D. Packaging and Delivery.** Temporary storage will not be allowed on MDOT property. Each container of material shall be labeled to indicate the following:

1. The lot number
2. The chemical material which constitutes the active agent
3. Concentration of the active agent
4. Precautions necessary in handling the material
5. Volume of container

**E. Safety.** The Contractor's employees shall be trained in On Track Safety Procedures prior to working within the railroad right-of-way. The Contractor is responsible for furnishing and using all safeguards, safety devices, and protective equipment as is reasonably necessary to protect persons and property during the performance of the project.

**F. Vehicles.** Vehicles shall be equipped with a commercial-type rotating beacon, or strobe light plainly visible from all directions. Beacon or strobe lights shall be amber in color and have a minimum of 32 candle power output and flash 50 to 60 times per minute. Each vehicle shall be equipped with a cellular phone for safety and railroad communications.

**G. Environmental Response.** Contractor will initiate immediate appropriate response action to correct situations where unlawful applications or spills occur. A detailed accounting of the location of occurrence, quantities involved, and response action taken shall be submitted to the Project Engineer within 24 hours of the event. The contractor shall be responsible of all remediation costs.

**H. Movement and Flagging.** The railroad may accompany the application equipment and control the movement of the equipment under rail traffic conditions. The railroad may furnish flagging service which is necessary to protect the application operations under train and vehicular traffic conditions. Daily completion of work planned for a segment of track may require operations to take place on the weekend and/or beyond normal business hours. These services will be available at no cost to the Contractor.

**I. Protected Areas.** The contractor shall only make the ballast treatment in the Protected Areas. There is only one known Protected Area located on the GLC. This area is between Mile Post 66.87 (Brighton Road) and Mile Post 67.73 (Coon Lake Road) just south of Howell.

**J. Contract Inspection.** Spot inspections will be conducted to determine the effectiveness of the treatment. A project inspector may be present during application and loading operations. Daily application reports will be completed by the contractor.

**K. Coordination with Railroad.** The chemical application shall not interfere with the normal use and operation of the railroad. The railroads will cooperate insofar as possible to allow continuous operation and to move railroad equipment and cars in yards and on sidings. The contractor must receive prior approval from both the operating railroad and the Project Engineer, a minimum of 48 hours in advance, to work on weekends and holidays.

**L. Insurance.** The Contractor shall provide the amount and types of insurance as per Section 107.10 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. The insurance shall cover working on or about railroads and environmental spills.

**26.04 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Brush Cutting, Track.....	Mile
Brush Spray.....	Mile
Brush Spray Follow-up.....	Mile

**Brush Cutting, Track** will be measured by the linear mile, and fraction thereof, for cutting and chipping all brush on both sides of the trackage.

**Brush Spray and Brush Spray, Follow-up** will be measured by the linear mile, and fraction thereof, for brush spray on both sides of the trackage are paid for once. Partial payment of 50% of the treated mileage will be made after the initial application and there is evidence the chemicals are taking effect. The remaining payment will be made after the targeted degree of control of 85% of all brush, within the length of time following treatment to determine its effectiveness, will be based on the Manufacturer’s recommendations. The Department will notify the Contractor of the date, time, and location of the inspections and the Contactor shall attend the inspections.

**Section 27. GEOTEXTILE FABRIC**

**27.01 Description.** The work consists of installing geotextile fabric as specified.

**27.02 Materials.** The materials shall meet the following specifications.

Geotextile Fabric.....	Section 93.
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**27.03 Construction.** Furnish and install specified geotextile fabric. Geotextile fabric shall be packaged and delivered to the site in ultraviolet resistant wrapping, and shall be stored and handled carefully, in accordance with the manufacturer's recommendations. Torn, deteriorated, or punctured geotextile fabric shall not be used, unless repaired to the satisfaction of the Engineer/RSI. Care shall be taken to keep wrinkles to a minimum. Geotextile fabric damaged during installations shall be replaced or repaired by the Contractor at the Contractor's expense. Longitudinal and transverse fabric joints shall overlap a minimum of 2 feet or shall be sewn. When geotextile is used under the track, transverse laps shall be in the direction of ballast placement. When geotextile is used under track, the initial 3 inches of ballast lift shall be made without using the tamping machines' tamping tools to prevent damage to the geotextile fabric. In subsequent lifts, care shall be taken to prevent damage to the geotextile fabric.

**27.04 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Geotextile Fabric.....	Square Yard

**Geotextile Fabric** will be measured by the square yard in place (without credit for laps, tucks, or wrinkles). Payment for geotextile fabric will include: anchoring the fabric; any handwork necessary to establish grades; and repairing holes, rips and tears.

**Section 28. EARTHWORK**

**28.01 Description.** This work consists of making specified earth changes. The work shall be performed as described in Section 205 of the MDOT Standard Specifications for Construction.

**28.02 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Excavation, Earth.....	Cubic Yard
Embankment, LM .....	Cubic Yard
Embankment, CIP .....	Cubic Yard

**Excavation, Earth and Embankment, LM and CIP** will be measured by the cubic yard.

**Section 29. EROSION CONTROL**

**29.01 Description.** This work consists of furnishing and placing specified riprap and silt fence. The work of placing silt fence shall be performed as described in Section 208 of the Standard Specifications for Construction. The work of placing riprap shall be performed as described in Section 813 of the MDOT Standard Specifications for Construction.

**29.02 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Riprap, Plain .....	Square Yard
Riprap, Heavy .....	Square Yard
Erosion Control, Silt Fence.....	Foot

**Riprap, Plain** and **Riprap, Heavy** will be measured by the square yard.

**Erosion Control, Silt Fence** will be measured by the linear foot.

# DIVISION 3

## BALLAST

### Section 30. BALLAST AND SUB-BALLAST

**30.01 Description.** This work consists of furnishing and placing ballast or sub-ballast at specified locations and rates as may be amended by the Engineer/RSI.

**30.02 Materials.** The materials shall meet the following specifications:

Ballast .....Section 91.  
Sub-ballast.....Section 92.

**30.03 Construction.** The subgrade shall be prepared according to Subsection 205.03.F of the Standard Specifications for Construction. Sub-ballast shall be laid in layers not greater than 6" deep. Water shall be added to facilitate compaction when material is too dry. Rolling may be by pneumatic-tired equipment heavily loaded or by vibratory roller. Small vibrator or pneumatic tampers shall be used where larger rollers cannot work. All compaction shall be uniformly distributed so all layers are compacted to 95 percent density by control density method.

Ballast shall be distributed using a 3/4 ton (minimum) come-along to achieve the rates specified. Additional lengths of 1/4" chain shall be available and used where necessary to control the distribution rate. The method of distribution shall be approved by the Engineer/RSI prior to unloading. Ballast shall be placed on mainline track and yards by work train, except at grade crossings and point specific locations where a hi-rail dump truck may be used.

Each delivered load shall be accurately weighed and accompanied by a certified scale ticket showing gross, tare, and net weights. This requirement may be waived by the Engineer/RSI when scales are not readily accessible. In that case, a unit train would be run over a scale and the average unit weight per car would be the base. Weights shall be recorded to the nearest 100 pounds. Scales shall comply with Subsection 109.01.B.6 of the Standard Specifications for Construction when loads are delivered by truck. Railroad car scales shall meet the requirements of Section 1.0 of the current AAR Scale Handbook. The Contractor shall provide documentation to prove that all AAR requirements are met.

**30.04 Inspection.** If the Department elects to inspect ballast at the point of production, its representatives shall have access to the plants and quarries while ballast is being prepared or loaded from storage piles. The material shall be placed into stockpiles and removed from stockpiles by methods that provide aggregate of uniform grading. If inspection reveals that material loaded or stockpiled does not conform to these specifications, the producer will be so notified and production stopped.

Ballast shall meet specifications in its final resting place. The Contractor will be responsible for removal of all material that fails to meet specifications.



**30.05 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Ballast, Sub .....	Cubic Yard
Ballast #__ .....	Ton

**Ballast, Sub** will be measured for each cubic yard of sub-ballast compacted in place.

**Ballast #\_\_ (4A, 4, 5)** will be measured for each ton of ballast placed. Payment includes producing, delivering, and distributing the ballast.

# DIVISION 4

## TIES

### Section 40. INSTALL TIES

**40.01 Description.** This work consists of removing anchors, tie plates, bridge guardrails, turnout components from the tie to be replaced, replacing the tie, and reinstalling the materials.

**40.02 Materials.** The materials shall meet the following specifications:

Timber Ties.....Section 90.  
OTM.....Section 94.

**40.03 Construction.** Remove all anchors, tie plates, bridge guardrails, and turnout components from ties marked for replacement and replace the ties. The ties shall be inserted with a minimum of track disturbance, and the existing gauge shall be verified and maintained before spiking. Where tie plate cut conditions exist in the ties, the Contractor shall demonstrate to the satisfaction of the Engineer/RSI that the extraction of a whole tie will not cause damage to the track or cause severe vertical or horizontal track misalignment.

Prior to disturbing the track, the Contractor shall be responsible for verifying the existing gauge and demonstrating to the Engineer/RSI where the gauge exceeds the 57" on tangent and 57¼" on curves.

Where the Engineer/RSI determines the track needs to be re-gauged, the contractor shall re-gauge the track, as per Section 68, as follows:

Tangent	56 ½"
Curves	56 ½" to 56 ¾"

The Contractor shall maintain gauge during the spiking process. The cost associated with verifying, demonstrating, and maintaining gauge is considered included as part of installing ties. Re-gauging the track, where instructed before tie installation, will be paid for as Track, Gauging.

All ties shall be spaced uniformly with adjacent ties. The smoothing and cross-level pass shall occur as soon as ballast is regulated with a mechanical tamper. All new and existing ties in the tie replacement area must be tamped. The Contractor shall have equipment capable of keeping pace with the tie inserter. Gauging and rail replacement shall precede tie replacement.

Reinstall reusable tie plates and anchors. Install spikes, anchors, and relay tie plates where required. Running rail shall be spiked according to Typical Plan RR-40. Turnout component work shall be done in conjunction with switch tie installation.

Whenever a Contractor must respike a new tie as a correction to the Contractor's work or as a result of not performing the work in a manner which would have precluded respiking, 10 percent of the unit cost of the new tie will be deducted for each time a tie is respiked. In every tie respiked, the original spike hole shall be plugged with a tie plug. The cost of plugging a new tie shall be at the Contractor's expense.

**A. Bolted Rail Section.** Remove all specified anchors, sort out all reusable anchors, and stockpile for reinstallation. The time the track is left unanchored must be kept to a maximum of two weeks, unless otherwise approved by the Engineer/RSI. Turnouts may be handled separately but must be fully anchored immediately following any rehabilitation of the turnout. If there is an established anchor pattern, remove only those anchors where the tie is being replaced.

Space and straighten specified ties using a mechanical tie spacer. (This is not required for sidings.) Any tie that is 4" or more from perpendicular to the tangent of the track shall be straightened, after removing the spikes, using an approved on-track tie straightening machine. These ties shall be plugged and respiked, unless marked for replacement, and shall be considered part of the work of installing ties.

Remove and replace only those ties marked for replacement by the Engineer/RSI as follows:

1. No more than 3 consecutive ties, nor more than 8 ties per 39 track feet, may be renewed in any one pass. Each subsequent pass shall follow the previous pass as soon as possible.
2. Ties identified for replacement either may be removed whole by an on-track tie extracting machine or cut into pieces by an on-track tie shear or tie saw machine.
3. Prior to inserting ties on main line trackage, the track bed must be scarified by an on-track mechanical scarifying machine. Scarification is not required for sidings.
4. Ties shall be inserted perpendicular to the tangent point of the track with the ends lined at 18 ½ inches from the base of the rail, on the line side.
5. All new and existing ties shall be spaced at 18 to 23 inches on center and square to the line of rail with a mechanical tie spacer to permit proper tamping.
6. A mechanical tamper will be used to tamp all new and existing ties in the tie replacement area prior to spiking.
7. Reinstall reusable tie plates and/or install relay tie plates to replace broken, missing, or defective tie plates, as required.
8. Install spikes per spiking pattern on Typical Plan RR-40.
9. Reinstall reusable anchors and/or install new anchors as required. Anchors shall be applied tight against sound ties and at regularly-spaced intervals per Typical Plan RR-42. New and reused anchors shall not be mixed on the same tie.

10. Immediately following anchoring, regulate the existing ballast section with a ballast regulator.
11. Immediately after the ballast regulating operation, make a smoothing and cross-level lift with a mechanical production tamper that surfaces and lines track. The Engineer/RSI shall have the final determination if smoothing and cross level lift is required prior to train passage. This smoothing and cross-level lift is not to be considered part of Section 60, Surface and Align.

When installing switch ties, rail braces with round holes shall be secured with properly sized cone neck drive spikes.

**B. Continuously Welded Rail (CWR) Section.** Installing ties on CWR track is prohibited at rail temperatures greater than 95°F and less than 45°F. A standard rail thermometer shall be used to measure the rail temperature. It will be placed on the rail base away from direct sunlight to accurately determine the rail temperature.

The following apply to installing ties in CWR:

1. A detailed work plan that describes the proposed sequence of operations and equipment for performing the specified work, shall be submitted to the Department for review no later than one week prior to the scheduled preconstruction meeting.
2. No more than 3 consecutive ties and no more than 8 ties per 39 track feet may be renewed in any one pass. A minimum of two trains must pass over the tie replacement area prior to initiating the next pass. Each subsequent pass shall follow the previous pass as soon as possible. Any changes to this procedure must be approved by the Engineer/RSI.
3. Remove all anchors on only those ties being replaced in each pass. Sort out all reusable anchors and stockpile for reinstallation.
4. For each pass, remove and replace only those ties marked for replacement by the Engineer/RSI. No other ties may be removed and replaced without prior written approval. Install ties per Subsection 40.03.A.,(2) through (8).
5. Reinstall reusable anchors and/or install new anchors immediately. When 400 feet or more of rail is welded together, it is considered to be CWR and shall be anchored according to the Railroad's CWR standard. All anchors removed from a track section must be reapplied before that track section is put back into service. New and reused anchors shall not be mixed on the same tie.
6. Each section of retied track must immediately have the existing ballast regulated. The Engineer/RSI shall determine if a smoothing and cross level lift is required, prior to train passage, using a mechanical production tamper for surfacing and lining track. This smoothing and cross-level lift is not part of Section 60.
7. Immediately following the final tie renewal pass, install sufficient new ballast per

Division 3. A typical track section is shown on Typical Plan RR-41.

8. Immediately following the placement of new ballast, mechanically tamp all ties per Section 60, to the satisfaction of the Engineer/RSI.

**40.04 Measurement and Payment.** Payment includes furnishing and installing the ties.

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Tie, __ .....	Each
Tie, 10' .....	Each
Tie, Switch .....	Mbm
Tie, Install .....	Each
Tie, Install Switch .....	Each

**Tie, \_\_ (6", 7")** will be measured for each crosstie of a specified size furnished for installation.

**Tie, 10'** will be measured for each 10' crosstie furnished for installation. Tie shall be 7" thick.

**Tie, Switch** will be measured by the thousand board feet (Mbm), or fraction thereof, for switch ties of the specified size furnished for installation. The length of the switch ties shall coordinate with turnout requirements.

$$\text{Mbm} = \text{length (feet)} \times \text{width (inches)} \times \text{height (inches)} \text{ divided by } 12,000$$

**Tie, Install** will be measured for each tie distributed and installed as specified, except where it is already included as part of another pay item (such as Construct Track or Remove and Reinstall Track). Payment includes furnishing and installing spikes.

**Tie, Install Switch** will be measured for each switch tie installed as specified. Payment includes furnishing and installing specified fasteners.

**Section 41. REMOVE TIES**

**41.01 Description.** This work consists of removing the tie, spikes, tie plates, and anchors from the track; salvaging reusable tie plates and anchors for reinstallation elsewhere; respacing adjacent specified ties; and cleaning up all miscellaneous debris. Shoulders must be properly dressed and contoured to match existing shoulders.

**41.02 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Tie Removal.....	Each

**Tie Removal** will be measured for each tie removed. Tie disposal will be paid for separately.

**Section 42. REMOVE TIE BUTTS**

**42.01 Description.** This work consists of removing all tie butts from the right-of-way within the project limits. Tie butts are those ties and pieces of ties left on the property from previous projects. All tie butts removed are the property of the Contractor and shall be properly disposed.

**42.02 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Tie Butt Removal.....	Lump Sum

**Tie Butt Removal** will be measured by lump sum, or fraction thereof. Payment shall include the complete removal and proper disposal of all tie butts from both sides of the track within the right of way.

**Section 43. TIE DISPOSAL**

**43.01 Description.** This work consists of removing and disposing the ties from the right of way in accordance with Section 13.

**43.02 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Tie Disposal .....	Lump Sum

**Tie Disposal** will be measured by lump sum, or fraction thereof. Payment shall include the removal and proper disposal of all ties.

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# DIVISION 5

## OTHER TRACK MATERIAL (OTM)

### Section 50. OTM

**50.01 Description.** This work consists of furnishing and installing OTM as specified.

**50.02 Materials.** The materials shall meet the following specifications:

OTM.....Section 94.

**50.03 Construction.** Contractor furnished OTM shall be installed to fit the rail with a tight interface. OTM shall be of the proper design and appropriate dimensions for the rail to which it is applied. All removed materials shall become the property of the Contractor and shall be removed from the railroad right-of-way and properly disposed. The Engineer/RSI may designate temporary stockpile locations on railroad property prior to final disposal by the Contractor. Clear vision areas at grade crossings shall not be utilized or obstructed. Fouling shall not occur from the temporary stockpiles.

**A. Tie Plate.** Tie plates shall be new unless demonstrated that new tie plates are not available and as approved by the Engineer/RSI. All tie plates shall be centered on the tie. Only tie plates used for flange rails can be relay. The work includes removing spikes; furnishing and installing tie plugs and track spikes; and gauging.

**B. Tie Plate, Insulated.** Insulated tie plates shall be new and installed wherever a steel tie plate will cause a short between rail sections. They are to be spiked in a normal fashion, except spikes shall be inserted with the small head toward the insulated joint. The work includes: removing spikes; furnishing and installing tie plugs and track spikes; and gauging.

**C. Tie Plug.** Tie plugs shall be driven to refusal in all former spike holes, and the excess removed flush with the tie surface. Wherever a tie plug is required, the cost of furnishing and installing it shall be considered included in the associated item of work and shall not be paid for separately.

**D. Track Bolt Unit.** Track bolt unit shall be new and consists of a track bolt, washer and nut. The work includes: removal of defective track bolts, nuts and washers; bolt tightening using a power track wrench with torque adjustment according to Section 67; and drilling new bolt holes where needed.

**E. Track Spike.** Track spikes shall be new and installed according to Typical Plan RR-40. Track spikes shall be considered included with associated work and shall not be paid for separately. Track spikes shall be of the appropriate size for the intended use.



**F. Joint, Insulated.** Insulated joint bars shall be new. Where an insulated joint is installed and the steel tie plate causes two rail ends to short, an insulated tie plate shall be used. It shall be installed per manufacturer's specifications and spiked with small head of spike towards the insulated joint. Insulated joints shall receive the full complement of properly dimensioned new bolt units for the size of bars specified. The work includes: removing the existing joint; cutting and drilling rail; grinding smooth rail ends to eliminate any contact between rail ends; furnishing and installing insulated joint; insulation; and furnishing and installing tie plugs and track spikes.

All insulated joints installed will be inspected by the Engineer/RSI and may be tested by an authorized employee of the Railroad for proper electrical insulation. If insulated joint bars are damaged by Contractor, or if they are inoperable, the Contractor shall replace them at his cost.

**G. Joint Bar.** The joint bars shall be new unless demonstrated that new joint bars are not available and as approved by the Engineer/RSI. Joint bars shall be fully oiled before installation. They shall not be slot spiked. The work includes: removing the existing joint bars; cutting and drilling rail; furnishing and installing tie plugs, spikes, and a full complement of new bolts, nuts and washers.

**H. Joint Bar, Compromise.** Compromise joint bar pairs shall be new and matched (i.e., LH/RH or Inside/Outside or 1R/2R or 3L/4L, etc.) and must be of the proper design and dimension for the rail to which they are applied. Type shall be approved by the Engineer/RSI. The work includes: removing the existing compromise bars and spikes; cutting and drilling rail; furnishing and installing tie plugs, track spikes, and compromise bars with full compliments of new bolts, nuts and washers. Compromise bars shall be fully oiled. Removed bars are to be stockpiled by the Contractor at a location determined by the Engineer/RSI for future use by the Department.

**I. Joint Insulation.** Rail ends shall be ground smooth to eliminate any contact between rail ends. The work includes: removing the existing insulation; and furnishing and installing new joint insulation, tie plugs, bolt units, and track spikes.

**J. Rail Anchor.** Where reusable rail anchors are not available, the rail anchors shall be new; shall be applied as soon as possible following any tie and/or rail work; and shall be installed before expansion shims are removed. New and reused anchors shall not be applied on the same tie. Ties shall be set perpendicular to the track and properly spaced before the anchors are applied.

Anchors shall be applied at regularly spaced intervals per Typical Plan RR 42, uniformly along the rail length against the tie and against the same tie on the opposite rail. Rail anchors may not be applied against the sides of any joint ties, open deck bridge or trestle ties, or within the limits of grade crossings.

**K. Washer Head Timber Drive Spike.** The drive spike shall be of sufficient length to penetrate a minimum of 5" into the tie as shown in the Typical Plan RR-11. The drive spike, however, shall not penetrate further than within 1 inch of the bottom of the tie. The Contractor shall select the proper length of drive spike according to field conditions.

Drive spikes shall be inserted into drilled holes of a diameter that will preclude splitting and other damage to the timber. The drive spike shall be tightened so that the members fastened will be snug, but neither the wood nor the spike shall be stripped during tightening.

**L. Crossing Drive Spike.** Drive spikes shall be installed per Typical Plan RR-10. They shall be inserted into a ½" pre-drilled hole. The spike shall be rotated as it advances during installation. The spike shall be advanced until the members are sufficiently fastened, but so as not to strip the wood during tightening.

**M. Switch Drive Spike.** Switch drive spikes shall be of sufficient diameter to fully occupy the hole for their intended application. They shall be inserted into a pre-drilled hole that is 1/8" smaller than the diameter of the drive spike (ex. 7/8" hole for a 1" diameter drive spike). The spike shall be advanced until the members are sufficiently fastened, but so as not to strip the wood during tightening.

**N. Bonded Insulated Jt.** Rail ends shall be ground smooth to eliminate any contact between rail ends. Center of insulated joint shall be installed over center of crib of track. The work includes: removing the existing insulation; rail cutting, spike, rail anchor, tie plate and rail removal, tie plugs, new tie plates, track spikes, and welds. Removed bars are to be stockpiled by the Contractor at a location determined by the Engineer/RSI for future use by the Department.

**50.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Tie Plate, __ .....	Each
Tie Plate, Insulated.....	Each
Track Bolt Unit .....	Unit
Joint, Insulated, __ .....	Set
Joint Bar, __ .....	Set
Joint Bar, Compromise .....	Set
Joint Insulation __ .....	Set
Rail Anchor, __ .....	Each

Spike, Washer Head.....Each  
 Bonded Insulated Jt, \_ .....Each

**Tie Plate, \_\_ (SS, DS)** will be measured for each tie plate furnished and installed. Payment includes removing spikes; furnishing and installing tie plugs and track spikes; and gauging.

**Tie Plate, Insulated** will be measured for each insulated tie plate furnished and installed. Payment includes: removing spikes; furnishing and installing tie plugs and track spikes; and gauging.

**Track Bolt Unit** will be measured for each track bolt unit furnished and installed. Payment includes: removal of defective track bolts, nuts and washers; bolt tightening using a power track wrench with torque adjustment; and drilling new bolt holes where needed.

**Joint, Insulated, \_\_ (Wt.)** will be measured for each set of insulated joint bars furnished and installed. Payment includes: removing the existing joint; cutting and drilling rail; grinding smooth rail ends to eliminate any contact between rail ends; and furnishing and installing insulated joint, insulation, tie plugs and track spikes.

**Joint Bar, \_\_ (Wt.)** will be measured for each set of joint bars furnished and installed. Payment includes: removing the existing joint bars; cutting and drilling rail; furnishing and installing tie plugs, spikes, and a full complement of bolts, nuts and washers.

**Joint Bar, Compromise** will be measured for each set of compromise joint bars furnished and installed. Payment includes: removing the existing compromise bars and spikes; cutting and drilling rail; furnishing and installing tie plugs, track spikes, and compromise bars with a full complement of new bolts, nuts and washers. Compromise bars shall be fully oiled. Removed bars are to be stock piled by the Contractor at a location determined by the Engineer/RSI.

**Joint Insulation, \_\_ (Wt.)** will be measured for each complete joint insulation set furnished and installed. Payment includes: removing the existing insulation and installing new material; furnishing and installing tie plugs, new bolt units, and track spikes.

**Rail Anchor, \_\_ (Wt.)** will be measured for each rail anchor furnished and installed.

**Spike, Washer Head** will be measured for each drive spike furnished and correctly installed.

**Bonded Insulated Jt., \_\_ (Wt.)** will be measured for each joint installed. Payment includes: removing existing insulation, rail cutting, rail, spike, rail anchor, tie plate, and rail removal, furnishing new insulated tie plates, spikes, anchors, and welds.

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# DIVISION 6

## TRACKWORK

### Section 60. SURFACE AND ALIGN TRACK

**60.01 Description.** The work consists of raising, aligning, regulating, and tamping the track as specified in the plans/proposal by means of a mechanical production tamper equipped with automatic lifting and aligning capabilities; an automatic laser device for tangent track, and automatic alignment control for curves. A mechanical ballast regulator shall be used to dress the track.

**60.02 Construction.** The work includes:

**A. Grade Crossings.** Renewed and rebuilt crossings on the main line shall be final surfaced and aligned in conjunction with the main line surfacing operation. The final surface and align track operation through the crossing shall be with the same equipment and provide for the proper alignment, elevation, superelevation, and transitions relative to the final surfacing and alignment of the approach track.

**B. Curves.** All curves shall be surfaced to the specified design super elevation. Adjustments to curve lengths and spirals due to change in existing superelevation shall be in accordance with AREMA specifications. Ballast shoulders shall be 9" outside the ends of ties for jointed rail and 15" for welded rail on the high side of curves 3° and sharper whenever possible.

Superelevation transitions from zero crosslevel to full design superelevation shall occur between the tangent to spiral (TS) and the spiral to curve (SC). Superelevation transitions from full superelevation to tangent shall occur between the curve to spiral (CS) and the spiral to tangent (ST).

The minimum length of spiral shall be the larger of the two computed Ls, as determined by the formulas:

$L=1.22EV$  where:

L=Length of spiral in feet

E=Design elevation in inches

V=Design train speed in m.p.h.

or

$L=62E$  where:

L=Length of spiral in feet

E=Design elevation in inches

Where compound curves are encountered, the transition distance between each curve shall be determined using the same formulas except the difference in the design elevation will be substituted for E as follows:

$E = (E1 - E2)$

E1 = Design elevation in inches of first curve

E2 = Design elevation in inches of next curve

The Contractor shall be responsible for staking the alignment and the location of the TS, SC, CS, and ST where needed. On rehabilitation, the Contractor shall plot each curve with on-board automatic alignment control equipment, as specified in the project plans/proposal. If the desired curve parameters cannot be met, the Contractor shall meet with the Engineer/RSI to discuss an acceptable alternative.

**C. Tangent Track.** Mainline tangent track cross level shall be zero inches (0"). Exceptions to this requirement will be determined by the Engineer/RSI.

1. All anchors that are not in contact with ties shall be reset prior to surfacing.
2. All signal wires damaged while performing the surfacing operation shall be repaired.
3. Track shall be broomed and shoulders shaped. Ballast shoulders on tangent track, as much as possible, shall extend level from top of crosstie to 6" outside the ends of ties for jointed rail and 12" for welded rail. After ballast is dressed, remaining ballast must be cleaned from switch point pockets, switch rods, guard rails, frogs, etc.
4. The installation of missing spikes, respiking deadheads (spikes with broken off heads), replacing missing tie plates, driving down high spikes and raising down crossties shall be required as part of the work. Ballast between the base of the rail and tie plate shall be removed prior to raising down crossties. The track shall be raised, tamped, and respiked.
5. The surfacing and alignment of track shall result in a smooth surface with appropriate transitions in the final lift. It may take more than one pass to achieve this quality. Extra passes to achieve this quality are included in surface and align track. In the case where only one lift is required on the plans, it shall be considered the final lift.

**D. Turnouts.** Turnouts within the project area shall be tamped in the rail areas and shall include surfacing of the diverging track to a point 100 feet past the last long tie. A secondary jack (track jack) shall be used when tamping the diverging track, within the limits of the long ties. Tie replacement and ballast within this 100 feet section will be paid for separately. The requirements of Section 60.02.C apply.

A lift is defined as the track being raised 3" or less. Where raising the track 3" or less is specified, this shall be considered one lift. Where a raise of over 3" is specified, the number of lifts required shall be the proposed raise divided by three plus one for the remaining number of inches.

**60.03 Measurement and Payment**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Surface and Align .....	Track Foot

**Track, Surface and Align** will be measured by the linear track foot for each lift. Only the difference in elevation between the original track elevation and the proposed track elevation will be considered for calculating the track feet units payable, regardless of the number of passes that eventually may be needed to achieve the desired results. It can be assumed that, in most cases, several passes will be required to achieve a smooth surface with appropriate transitions. Surface and Align Track includes surfacing, tamping, and dressing 100 feet past the last long tie of the diverging track of the switch. The ties and ballast will be paid for separately. Contractor is to broom the track surface and re-establish the table track speed prior to ending work during the winter months.

**Section 61. CONSTRUCT TRACK**

**61.01 Description** Work consists of constructing the complete assembly of track to standard gauge (curves less than 10 degrees) as specified.

**61.02 Materials.** Materials shall meet the following specifications:

Timber Ties .....	Section 90.
Ballast .....	Section 91.
Sub-ballast.....	Section 92.
OTM.....	Section 94.
No.1 Rail .....	Section 95.
New Rail.....	Section 96.

**61.03 Construction.** The work includes furnishing and installing rail, ties, ballast and OTM. Earth excavation, embankment, and sub-ballast will be paid for separately.

**A. Joints.** Joints shall be located, as nearly as possible, to the middle of the opposite rail, and shall not vary more than 36" in either direction from the center of the opposite rail except through turnouts and grade crossing approaches. Track shall be laid with staggered joints and care taken to secure maximum stagger when approaching switches, crossings, etc. Joints shall be fully bolted and bolts tightened before surfacing.

Rails shall be properly matched for acceptable joints. Acceptable joints are those joints having no more than 1/8" variance from the tread and gauge surfaces of adjacent rails after the bars and bolts have been installed complete. No joints are allowed on or within 30 feet of a bridge or crossing. Unacceptable joints shall be repaired as specified under Subsection 66.03.B to the satisfaction of the Engineer/RSI, or the rail replaced. The cost of repair or replacement shall be borne by the Contractor.

**B. Rail.** Rails shall be laid one at a time with the rail ends brought squarely together against expansion shims, and shall be bolted before spiking. Rail expansion shims shall be placed vertically between the ends of the adjacent rails to ensure proper space allowance for expansion required by rail temperatures in the table on the following page, and may be left in place.

A saw shall be used to cut rails. Holes for bolting cut rails shall be drilled by an approved type of rail drill. The bottom of the rail, the tie plate, and the bearing surface of the tie shall be clean and free of dirt and other foreign substances when the rail is laid. The outer shoulder of each tie plate shall have full bearing against the base of the rail. When laying the opposite rail, the rail shall, as a minimum, be spiked to gauge every fourth tie.

<b>39' Rail Rail Temperature <u>Degree F</u></b>	<b>33' Rail Rail Temperature <u>Degree F</u></b>	<b>Expansion Shim Required <u>Inches</u></b>
Over 85	Over 85	None
66 to 85	60 to 85	1/16
46 to 65	35 to 59	1/8
26 to 45	15 to 34	3/16
6 to 25	-10 to 14	1/4
Below 6	Below -10	5/16

**C. Ties.** Ties shall be installed with a center-to-center spacing of 21" for mainline track, 24" for side tracks, or as otherwise specified.

**D. Track Bolts.** All track bolts shall be tightened per Subsection 50.03.D.

**E. Cleanup.** The Contractor shall cleanup the project site to the satisfaction of the Engineer/RSI.

**61.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Construct.....	Track Foot

**Track, Construct** will be measured by the linear track foot for constructed track.

**Section 62. REMOVE AND REINSTALL TRACK**

**62.01 Description.** Work consists of removing the track and reinstalling it as specified.

**62.02 Materials.** Materials shall meet the following specifications:

OTM.....Section 94.

**62.03 Construction.** Work includes:



**A. Coordination with Operating Railroad.** No work shall be permitted that will take the line out of operation without expressed advanced permission from the Railroad. The Contractor shall contact the Railroad 48 hours prior to needing track time. The Contractor shall not foul the track until Road Worker Protection is in place and the track is released to him. When the work is completed, the Contractor shall immediately return the track to the Railroad.

**B. Track Removal.** Remove the rails to the first joint past the designated track removal limit and remove the ties and OTM within the track removal limits. Track components not believed to be suitable for reinstallation shall be shown to the Engineer/RSI for final determination. Track components damaged by the Contractor due to negligence while conducting the work shall be replaced by the Contractor, at the Contractor's expense. Any material determined to be scrap by the Engineer/RSI becomes the property of the Contractor and shall be removed from the railroad right-of-way and properly disposed. Ballast shall not be reused as track ballast.

**C. Track Reinstallation.** Upon completion of designated items, level the grade as required for the reinstallation of the track. Install ballast, crossties, rail, and OTM using new spikes, treated tie plugs, and new bolt units. Surface track to adjacent track profile, dress track, and shape ballast section. Any new material ordered by the Engineer/RSI will be paid for under separate pay items. Surfacing and aligning track and ballast shall be paid for separately.

**D. Bolts.** All track bolts shall be tightened per Subsection 50.03.D.

**62.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Rem and Reinstall.....	Track Foot

**Track, Rem and Reinstall** will be measured by the linear track foot for completed work measured along the centerline of the designated removal area. Payment includes removing and reinstalling rail to the nearest joint.

**Section 63. REMOVAL OF TRACK COMPONENTS**

**63.01 Description.** This work consists of removing specified track components. All material shall become the property of the Contractor. The Contractor shall clean the work zone of debris and level it to the satisfaction of the Engineer/RSI.

**63.02 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Rem.....	Track Foot
Turnout, Rem .....	Each
Railroad Diamond, Rem .....	Each

**Track, Rem** will be measured by the linear track foot. Payment includes complete removal of the track structure, including ties, rails, and fasteners. Tie disposal will be paid for separately.

**Turnout, Rem** will be measured for each turnout completely removed. Payment includes the complete removal of the track materials within the limits of the switch ties. Tie disposal will be paid for separately.

**Railroad Diamond, Rem** will be measured for each railroad diamond completely removed. Payment includes the complete removal of track materials within the limits of the supporting ties. Tie disposal will be paid for separately.

## **Section 64. RAIL REPLACEMENT**

**64.01 Description.** Rail replacement is described as follows:

**A. Rail Replacement, In Kind.** Work consists of removing the existing rail and OTM and furnishing and installing specified rail and OTM. Furnishing and installing tie plugs and OTM are considered included in the work. The removed rail and non-salvageable OTM shall become the property of the Contractor.

**B. Rail Replacement, Upgrade.** The work consists of removing the existing rail and OTM, and furnishing and installing the upgrade rail and OTM. Buffer rail, where required, shall be considered part of Rail Replacement, Upgrade. The removed rail and OTM shall become the property of the Contractor.

**C. Rail, Relay.** The work consists of furnishing and distributing specified rail at designated locations.

**64.02 Materials.** Materials shall meet the following specifications:

Timber Ties .....	Section 90.
OTM.....	Section 94.
No. 1 Rail .....	Section 95.
New Rail.....	Section 96

**64.03 Construction.** The Engineer/RSI will mark the rails for replacement and advise the Contractor of their location. Relay rail shall have the same section and drilling pattern for each rail weight accepted for installation. Any rail cutting and/or cropping shall be accomplished by saw cut, and new bolt holes, by drilling. The use of a torch is strictly prohibited for cutting finished rail lengths and bolt holes.

Scrap rail and OTM shall become the property of the Contractor and shall be removed from the railroad right-of-way and properly disposed of by the Contractor. Removed material will be cleared off the right-of-way as soon as possible.

**A. Rail.** Rail shall be installed according to Subsection 61.03. Rail shall be laid with the best side to the inside (or gauge side) unless otherwise directed by the Engineer/RSI. The minimum length of rail shall be 33 feet, unless otherwise approved in advance by the Engineer/RSI. Rail ends, of both the replacement rail and the adjacent existing rails, shall be restored as described by

Subsection 66.03.B, and shall be considered as part of the work of rail replacement.

**B. Ties.** Ties shall be adzed as required. All ties shall be tamped with a mechanical tamper prior to spiking. All new and existing ties shall be spiked according to Typical Plan RR-40.

**C. Tie Plates.** Tie plates installed under rail replacement shall conform to Subsection 50.03.A.

**D. Joint Bars.** Joint bars installed under Rail Replacement shall include a full compliment of new bolt units and conform to Subsection 50.03.G. The joint bar shall be fully oiled before installation.

**64.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Rail Replacement, __, IK.....	Foot
Rail Replacement, __, UG.....	Foot
Rail, __ .....	Ton

**Rail Replacement, \_\_ (Wt.), IK** will be measured by the linear foot for specified rail installed. Replacement tie plates, rail anchors and joint bars will be paid for separately.

**Rail Replacement, \_\_ (Wt.), UG** will be measured by the linear foot for specified rail installed.

**Rail, \_\_ (Wt.)** will be measured by the ton for specified rail delivered to the work site and distributed.

**Section 65. CROSSING RAIL REPLACEMENT**

**65.01 Description.** Work consists of removing the existing crossing and approach rail and replacing it with welded rail as specified.

**A. Crossing Rail Replacement, In Kind.** Work consists of removing the existing crossing and furnishing and installing tie plates and specified rail. Replacement joint bars will be paid for separately. Furnishing and installing tie plugs, track spikes, tie plates, and track bolt units are considered included in the work. The removed rail and non-salvageable OTM shall become the property of the Contractor.

**B. Crossing Rail Replacement, Upgrade.** The work consists of removing the existing crossing and OTM, and furnishing and installing the specified rail and OTM. Replacement rail should have a different section than the existing rail; therefore, all tie plates within the rail replacement limits shall be replaced. All OTM and buffer rail, where required, shall be considered included in the work. The removed rail and OTM shall become the property of the Contractor.

**65.02 Materials.** Materials shall meet the following specifications:

Timber Ties .....	Section 90.
OTM.....	Section 94.
No. 1 Rail .....	Section 95.
Field Weld Kit.....	Section 97.
Compromise Weld Kit .....	Section 97.

**65.03 Construction** Remove the existing crossing. Furnish and install rail and OTM as specified. This work includes all rail cropping, bolt hole drilling, oiling, and restoring rail ends per Subsection 66.03.B, and shall be considered as part of the work of rail replacement. Track bolt units shall be installed at each bolted connection, the cost of which is also included in this work.

Scrap rail and OTM shall become the property of the Contractor and shall be removed from the railroad right-of-way and properly disposed of by the Contractor. Removed material will be cleared off the right-of-way as soon as possible.

**A. Welding.** Replacement running rail through designated crossings shall be welded into continuous strings so there are no bolted connections within 30 feet from proposed ends of crossings. In general, estimates for crossing rail replacement quantities are based on the minimum amount of rail necessary to replace crossing rail by cutting into existing approach rail (if next existing joint is at least 30 feet from end of proposed crossing) and welding. All field welds connecting rail shall conform to Subsection 66.03.A. Welded rail strings shall be visually inspected and approved by the Engineer/RSI prior to installation into a crossing. Welding is included in the work item of Crossing Rail Replacement.

**B. Rail.** The minimum length of rail to be used in a welded crossing rail string shall be no less than 18 feet, unless otherwise approved in advance by the Engineer/RSI. Rail shall be laid with the best side to the inside or gauge side. Rails to be welded in track shall have no more than one bolt hole per rail end. The bolt hole shall be no closer than the outermost hole of the temporary joint bar. Any rail cutting or cropping of holes shall be accomplished by saw cut, and any new bolt holes shall be drilled. The use of a torch is strictly prohibited for cutting finished rail lengths and bolt holes. Compromise welding is allowed in lieu of compromise joint bars, unless otherwise noted.

**C. Ties.** Ties shall be adzed and plugged as required. All ties shall be tamped.

**D. Tie Plates.** Tie plates will be double shouldered, except for those rail sections where double shouldered plates are not available.

**65.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Rail Replacement, Crossing, __, IK.....	Foot
Rail Replacement, Crossing, __, UG.....	Foot

**Rail Replacement, Crossing, \_\_ (Wt.), IK** will be measured by linear foot for the specified rail installed.

**Rail, Replacement, Crossing, \_\_ (Wt.), UG** will be measured by linear foot for the specified rail installed.

### **Section 66. WELDING**

**66.01 Description.** Work consists of connecting lengths of rail by welding and restoring the rail ends by welding.

**66.02 Material.** Materials shall meet the following specifications:

Field Weld Kit.....Section 97.  
Compromise Weld Kit .....Section 97.

**66.03 Construction.** The work is described as follows:

**A. Field Welding.** Lengths of rail shall be connected by use of a field weld kit following the manufacturer's specifications. Ends of rails shall be saw cut and cleaned prior to welding. No bolt holes shall be allowed within welded rail. After the weld is cast, it shall be ground to the proper contour. In the web zone, 1/8" will be left after grinding. All other areas will be ground smooth to match the surface of both rails.

To avoid catastrophic explosion due to contact with moisture or dimensional changes in the rail or weld, the following safety provisions must be strictly adhered to while preparing for and performing welds:

1. Welding is not allowed during rain or snow. Preparations for welding shall be avoided when precipitation is imminent.
2. Wet ballast shall be removed from below a proposed weld and a minimum of 4 inches of dry sand shall be placed to allow a minimum of 4" of space from top of sand to bottom of weld kit. The horizontal area of sand below the proposed weld shall be of adequate dimension to catch any leakage from a weld kit.
3. Safety glasses and protective clothing shall be worn by those performing a field weld.
4. Field welds shall not be performed when ambient temperatures are below 32°F.
5. Rail pullers shall be applied to adjacent rails to ensure no movement occurs in the rails when ambient temperatures are between 32°F and 50°F.
6. Field welds shall not be performed when rail temperatures exceed 95°F.

**B. Restoring Rail Ends.** Remove the unacceptable portions of the rail end by grinding or arc air as designated. Build up that area by an acceptable welding process, such as an electric wire welder. Any other process must be approved in advance by the Engineer/RSI. All welding shall be done by an experienced welder.

The objective of this operation is to provide a wheel bearing surface at the joint that provides a ride quality as near as possible to a new rail. To accomplish this, the Contractor shall use an 18" straight edge to determine the height of the weld. The weld shall not be longer than 8" on either side of the joint. All rail ends shall be slot ground after they are welded.

Rail end welding shall be done immediately following any tie renewal and/or surfacing work. Welding shall not take place when the rail temperature is below 32°F. Temperature of the rail shall be taken on the shaded side of the rail base with an appropriate thermometer.

Where there is a mismatch in the rail ends when replacing rail, rail ends shall be restored prior to placing the track back in service, unless waived by the Engineer/RSI.

Welds that fail during the term of the contract shall be re-welded by the Contractor at the Contractor's expense.

**C. Restoring Frog by Welding.** Remove the unacceptable portions of the frog, build up those areas by an acceptable welding process, and grind. The Engineer/RSI will indicate those portions of the frogs that require welding and grinding. All turnout frogs and diamond frogs that are to be welded shall be welded by the electric arc welding process. Restore frog by welding will be done immediately following any tie renewal and/or surfacing work or if ordered at some other time by the Engineer/RSI.

Welding shall be done by an experienced welder trained in welding frogs. The welds shall be smooth and follow the contour of the existing frog lines and surface so they will produce a good running surface and meet all standard dimensions for gauge of 56-1/2", flangeway width, and flangeway depth of 1-7/8". Welds that fail during the contract period must be rewelded by the Contractor at the Contractor's expense. Frogs damaged beyond repair during the welding process will be replaced at the Contractor's expense.

The following process shall be used to restore a frog by welding:

1. The removal of all defective metals from the weld area by grinding, cutting electrodes or arc air torch. If the cutting electrode or arc air torch method is used, then the heat affected metal area shall be removed by grinding only. Caution must be taken to prevent overheating of the casting.
2. After removal of all defective materials and before welding, the frog shall be cleaned and inspected by the welder to determine if it can be adequately field welded. If it cannot be welded, the Engineer/RSI shall be notified.
3. The weld shall be applied at alternate locations or in short arcs not to exceed 600°F to

avoid overheating, causing the frog to become brittle, warp or break. The bead of weld shall not exceed 1/2" to 5/8" wide and 4" in length. Each bead must be peened with a peening hammer to remove excess slag before a new bead can be started. Each layer shall be cross welded where multiple layers are required.

4. Sufficient weld material must be placed before grinding so the completed weld will be free of voids.

**D. Restore Switch Point by Welding.** Remove the unacceptable portion of the switch point and stock rail, build up portions by an acceptable welding process, and grind so the work is accepted by the Engineer/RSI. The Engineer/RSI will indicate those portions of the switch point and stock rail that require welding and grinding. Welds that fail during the contract period shall be rewelded by the Contractor, at the Contractor's expense. Switch points that warp during the contract period shall be corrected or replaced by the Contractor at the Contractor's expense.

Restoring the switch point consists of using the oxy-acetylene process or other approved process. All welding shall be done by an experienced welder trained in restoring switch points. The following process shall be used to restore a switch point by welding:

1. Grind off all overflow on the point side of the stock rail and the back side of the switch point to provide for proper fitting of the switch point.
2. Preheat the point for about 6 inches and inspect for cracks. If cracks are deemed too wide or too deep and cannot be welded sufficiently, then the Engineer/RSI must be notified.
3. Build up the point area to the desired height in bead lengths equal to the length of preheating. Each bead shall be peened with a peening hammer to remove the excess slag before a new bead can be started.
4. Contraction of the weld may cause the point to warp. This can be controlled by applying heat to the base of the point after each weld pass until a dull cherry red color appears before welding is continued.
5. There shall be sufficient weld material placed before grinding so the completed weld is free of voids. Grind off all overflow weld material that will interfere with closing the point. The finished weld should be ground to a taper of approximately 1/8" at the top of the switch point.

**66.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Field Weld Kit.....	Each
Rail, Restoring End.....	Each
Frog, Restore.....	Each
Switch Point, Restore.....	Each
Compromise Weld Kit.....	Each

**Field Weld Kit** will be measured for each field weld kit furnished and properly used.

**Rail, Restoring End** shall be measured for each rail end built up by an approved method.

**Frog, Restore** will be measured by each frog restored by welding.

**Switch Point, Restore** will be measured by each switch point restored by welding.

**Compromise Weld Kit** will be measured for each compromise weld kit furnished and properly used.

**Section 67. TIGHTEN TRACK BOLTS**

**67.01 Description.** Work consists of tightening an existing track bolt as specified.

**67.02 Construction.** Track bolt units (track bolts, nuts, and washers) shall be tightened to a tension of 25,000 to 30,000 psi. The bolt tightening shall occur only after final surfacing. The contractor shall provide information to the Engineer/RSI that the calibration of the bolt tightening machine is achieving the desired results. Final bolt tightening shall occur after final surfacing. The contractor shall provide information to the Engineer/RSI that the calibration of the bolt tightening machine is achieving the desired results. Bolts shall extend a minimum of one thread beyond the nut after installation. Nuts shall be applied with the tapered side away from the washer. Work shall include heading down spikes for torque wrench check when required by the Engineer/RSI. Whenever a track bolt cannot be tightened as specified, it shall be removed and replaced.

**67.03 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track Bolts, Tighten .....	Lump Sum

**Track Bolts, Tighten** will be measured by lump sum for tightening all track bolt units within the project limits, including side tracks. Replacement track bolt units will be paid for separately.

**Section 68. GAUGING TRACK**

**68.01 Description.** Work consists of regauging the track at specified locations.

**68.02 Materials.** Materials shall meet the following specifications:

OTM.....	Section 94.
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**68.03 Construction.** The rail showing the more uniform line will be used as the line rail, and the other rail will be gauged to it. In curves, the high side rail is to be used as the line rail.

Spikes shall be removed on the non-line rail. Furnish and install tie plugs as required. Adze ties as necessary to properly position the rail. Reposition the rail to standard gauge. Furnish and install track spikes per the spiking pattern shown on Typical Plan RR40.

**68.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Gauging .....	Track Foot

**Track, Gauging** will be measured by each track foot of track properly gauged.

**Section 69. BENCHING TRACK**

**69.01 Description.** Work consists of removing material adjacent to the track to create a bench, at designated locations.

**69.02 Construction.** Remove material adjacent to the track tie ends to a depth of 10" below the top of tie to form a level horizontal plane, or (bench). The removed material may be wasted on the front slope. Benching shall occur prior to dumping new ballast.

**69.03 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Track, Benching .....	Foot

**Track, Benching** will be measured along the centerline of the track by each linear foot completed. Where benching is required on both sides of the track, each side will be measured separately.

# DIVISION 7 TURNOUTS

## Section 70. FROGS

**70.01 Description.** The work consists of removing the existing frog and furnishing and installing a replacement frog as specified.

**70.02 Materials.** The replacement frog shall be reconditioned. If a new frog is supplied, the Buy American departmental policy shall be adhered to. The other materials shall meet the following specifications:

OTM..... Section 94.

**70.03 Construction.** The Contractor shall remove the existing frog, prepare the ties, and install the replacement frog, complete with hook twin tie plates, spikes and bolt units. The length and type shall be approved by the Engineer/RSI prior to installation. The work includes everything necessary to properly install the frog and make it operational.

### 70.04 Measurement and Payment.

Contract Item (Pay Item)	Pay Unit
Frog, RBM, __, __ .....	Each

Frog, RBM, \_\_, \_\_ (Size - Wt.) will be measured by each frog furnished and installed.

## Section 71. SWITCH POINTS

**71.01 Description.** The work consists of removing the existing switch point and furnishing and installing a replacement switch point as specified.

**71.02 Materials.** The switch points shall be reconditioned, unless otherwise specified in the plans/proposal. The other materials shall meet the following specifications:

OTM..... Section 94.

**71.03 Construction.** The Contractor shall remove the existing switch point and install the replacement switch point, complete with new heel casting, casting bolts, clips, adjustable rods, and cotter pins. The switch point shall be approved by the Engineer/RSI prior to installation. The work includes everything necessary to properly install the switch point and make it operational.

**71.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Switch Point, Rt Hand, .....	Each
Switch Point, Lt Hand, .....	Each

**Switch Point, Rt Hand, \_\_ (Wt.)** will be measured by each right hand switch point furnished and installed.

**Switch Point, Lt Hand, \_\_ (Wt.)** will be measured by each left hand switch point furnished and installed.

**Section 72. STOCK RAIL**

**72.01 Description.** The work consists of removing the existing stock rail and furnishing and installing replacement stock rail as specified.

**72.02 Materials.** The stock rail shall be No. 1 rail, unless otherwise specified in the plans/proposal. Other materials shall meet the following specifications:

OTM.....Section 94.

**72.03 Construction.** The Contractor shall remove the designated stock rail and install the replacement stock rail, complete with tie plugs, track bolt units, and spikes. The work includes cutting, drilling or bending as necessary to make the turnout operational.

**72.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Rail, Stock, .....	Foot

**Rail, Stock, \_\_ (Wt.)** will be measured by the linear foot of stock rail furnished and installed.

**Section 73. GUARDRAILS**

**73.01 Description.** The work consists of removing existing guardrail and plates and furnishing and installing replacement guardrail and plates as specified.

**73.02 Materials.** The replacement guardrails (9' minimum) and plates shall be reconditioned and of the type and size specified. Other materials shall meet the following specifications:

OTM.....Section 94.

**73.03 Construction.** The Contractor shall remove the designated guardrail and install the replacement guardrail and plates, complete with fasteners, tie plugs, bolts, and spikes.

**73.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Guardrail, __, __ .....	Pair

**Guardrail, \_\_, \_\_ (Type, Wt.)** will be measured by pair for furnishing and installing guardrails and plates.

**Section 74. INSULATED SWITCH ROD AND GAUGE PLATE**

**74.01 Description.** The work consists of replacing insulated switch rods and gauge plates in turnouts.

**74.02 Materials.** Insulation material shall match the insulating material used by the Railroad.

**74.03 Construction.** Remove the existing materials, and furnish and install the insulation material, insulated switch rods, and gauge plates as specified.

**A. Insulated Switch Rods** shall be reconditioned and shall match the switch. New adjustable connecting rod with new clips shall be included, as well as new nuts, bolt units, and cotter pins. Dimensions of the switch rod insulation are shown in Typical Plan RR-90. The Contractor shall determine the type and size of the bars to be ordered for each set, as well as the exact dimensions of the insulation required for a proper fit. The switch shall be adjusted after installation of the new insulation.

**B. Insulated Gauge Plate** shall be reconditioned and shall match the switch. Existing rail braces may be reused. The Contractor shall determine the exact style and size of gauge plate to install for approval by the Engineer/RSI prior to installation. The work includes: furnishing and installing new insulation, strap washers (angles), and hardware; and installation and adjustment of the switch. Insulation for AREMA standard 8" wide gauge plates is detailed in Typical Plan RR-91. The insulation shall fit the gauge plate to be insulated.

**74.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Gauge Plate, Insulated .....	Each
Gauge Plate, Insulation .....	Each
Switch Rod, Insulated .....	Each
Switch Rod, Insulation.....	Each

**Gauge Plate, Insulated** will be measured by each insulated gauge plate furnished and installed.

**Gauge Plate, Insulation** will be measured by each gauge plate re-insulated.

**Switch Rod, Insulated** will be measured by each insulated switch rod set furnished and installed

**Switch Rod, Insulation** will be measured by each switch rod re-insulated.

## **Section 75. CONSTRUCT TURNOUT**

**75.01 Description.** The work shall consist of installing a turnout or replacing turnout components.

**75.02 Materials.** All turnout components shall be new, unless otherwise specified in the plans/proposal. See MDOT typical turnout detail for turnout component specifications. The switch stand shall be of the type specified by the Railroad. The materials shall meet the following specifications:

Timber Ties .....	Section 90.
Ballast .....	Section 91.
OTM.....	Section 94.

**75.03 Construction.** The completed turnout shall be fully operational when completed. A fully operational turnout includes proper switch lubrication and gauge, oiled joint bars, cotter keys, testing of the switch, and all necessary adjustments.

**A. Construct Turnout.** Remove the existing track material down to the sub-ballast, prepare the grade, install ballast, furnish and install ties, and a complete fully operational turnout as specified. Unless noted on the plans, all material removed from the track shall become the property of the Contractor and shall be removed from the property and disposed.

The construction required for a complete and fully operational turnout consists of furnishing and placing 8 inches of #4 ballast under the ties, ties, all turnout components and switch stand. The work also includes any earth excavation, embankment, and/or turf establishment; and surfacing 100 feet in either direction of the turnout and the turnout itself. Compromise joint bars, joint bars, and buffer rails, where required, are considered part of the work of Construct Turnout. Any welding shall be in accordance with Section 66.03.

**B. Turnout Components.** Remove the existing turnout components and furnish and install matched turnout components as specified. The turnout components shall match the appropriate turnout identified. Braces, clips, and rods shall be approved by the Engineer/RSI prior to installation. The work also includes furnishing and installing switch stand, tie plugs, all required fasteners, and spikes.

**C. Insulated Turnout.** Insulated turnout includes all the work described in Subsection 75.03.A, and furnishing and installing insulated joint bars, insulated rods, insulated gauge plates, and insulated tie plates.

**75.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Turnout, Construct, __, __ .....	Each
Turnout Components .....	Lump Sum
Turnout, Insulated .....	Each

**Turnout, Construct, \_\_, \_\_ (Size, Wt.)** will be measured for each operational turnout furnished and installed. Tie disposal and ballast will be paid for separately.

**Turnout Components** will be measured by lump sum for furnishing and installing turnout components as specified.

**Turnout, Insulated** will be measured for each operational turnout furnished and installed.

**Section 76. STRAIGHT RAIL TURNOUT**

**76.01 Description.** The work consists of removing and replacing the existing turnout with rail.

**76.02 Materials.** Materials shall meet the following specifications:

Timber Ties .....	Section 90.
Ballast .....	Section 91.
OTM.....	Section 94.
No. 1 Rail .....	Section 95.

**76.03 Construction.** Remove the existing turnout as specified, including: all switch ties; grading and leveling of the work area. Furnish and install ties, No.1 rail and OTM. The work also includes aligning, surfacing, and dressing the track through the construction area.

The rail replacement shall be No.1 rail and shall match the existing rail on both sides of the turnout. Where rail will be upgraded, the upgraded rail shall be installed with temporary compromise bars. Use of temporary joint bars is the Contractor’s determination, at the Contractor’s expense.

Ties shall be the same size used for main line replacement ties. Tie plates and joint bars shall match the rail used.

The track shall be completely restored. All designated salvageable material shall be separated and stored neatly by the Contractor as directed by the Engineer/RSI. All remaining material shall become the property of the Contractor and shall be removed from the railroad right of way and properly disposed.

**76.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Turnout, Straight Rail .....	Each

**Turnout, Straight Rail** will be measured by each for each turnout completely removed and the track restored. Tie disposal and ballast will be paid for separately.

**Section 77. UPGRADE TURNOUT**

**77.01 Description.** The work consists of removing part or all of the existing turnout and constructing a turnout of the size and at the location specified on the plans. The work is all inclusive to connect up with the existing rail and put the line back in service.

**77.02 Materials.** All turnout components shall be new, unless otherwise specified in the plans/proposal. See MDOT typical turnout detail for turnout component specifications. The switch stand shall be of the type specified in the plans. The materials shall meet the following specifications:

Timber Ties .....	Section 90.
Ballast .....	Section 91.
Sub-ballast.....	Section 92.
OTM.....	Section 94.
No. 1 Rail.....	Section 95.

Insulation material shall be new and shall match the insulating material used by the Railroad.

**77.03 Construction.** The completed turnout shall be fully operational when completed. A fully operational turnout includes proper switch lubrication and gauge, oiled joint bars, cotter keys, testing of the switch, and all necessary adjustments.

**A. Upgrade Turnout.** Remove the existing turnout down to the sub-ballast, prepare the grade, install ballast, furnish and install ties, and complete a fully operational turnout as specified. Unless noted on the plans, all material removed from the track shall become the property of the Contractor and shall be removed from the property and disposed.

The construction required for a complete and fully operational turnout consists of furnishing and placing 8 inches of #4 ballast under the ties, ties, all turnout components and switch stand. The work also includes surfacing 100 feet in either direction of the turnout and the turnout itself.

Compromise joint bars, joint bars, and buffer rails, where required, are considered part of the work of Upgrade Turnout. Any welding shall be in accordance with Section 66.03.

**B. Upgrade Turnout - Insulated.** The work is the same as described in Subsection 77.03.A, except furnishing and installing insulated switch rod and insulated gauge plate units shall be included in the work.

**C. Upgrade Turnout - Steel.** The existing steel turnout components and additional rail, where required, shall be removed. The existing switch ties shall be left in place. Furnish and install the turnout components as specified, including all switch components, switch stand, rail, frog, compromise joint bars, joint bars, buffer rail, spikes, bolt units, and anchors.

**77.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Turnout, UG, __, __ .....	Each
Turnout, UG, Insul, , .....	Each
Turnout, UG, Steel, , .....	Each

**Turnout, UG, \_\_, \_\_ (Size, Wt.)** will be measured by each for each turnout upgraded. Tie disposal and ballast will be paid for separately.

**Turnout, UG, Insul, \_\_, \_\_ (Size, Wt.)** will be measured by each for each insulated turnout upgraded. Tie disposal and ballast will be paid for separately.

**Turnout, UG, Steel, \_\_, \_\_ (Size, Wt.)** will be measured by each for each turnout upgraded as specified in the project plans/proposal.



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# DIVISION 8 GRADE CROSSINGS

## Section 80. REHABILITATE GRADE CROSSINGS

**80.01 Description.** This work consists of removing the existing crossing or a section of track and constructing a grade crossing using rail flangeways, crosstie flangeways, or hardwood planks. The crossing improvements are categorized as follows:

**A. Construct Grade Crossing** consists of removing a section of track and constructing a new grade crossing.

**B. Rebuild Grade Crossing** consists of removing the existing grade crossing, along with four adjacent approach ties on each side of the crossing, and constructing a new grade crossing.

**C. Renew Grade Crossing** consists of removing the existing grade crossing surface and constructing a new grade crossing surface.

The following typical plans shall be used for grade crossings:

Rail Flangeway - HMA Grade Crossing.....	Typical Plan RR-10
Crosstie Flangeway - HMA Hardwood Plank - HMA Gravel.....	Typical Plan RR-11
Grade Crossing Approaches .....	Typical Plan RR-20
Rail Anchoring.....	Typical Plan RR-42

**80.02 Materials.** Materials shall meet the following specifications:

Timber Ties .....	Section 90.
Ballast .....	Section 91.
Geotextile Fabric.....	Section 93.
OTM.....	Section 94.
No. 1 Rail.....	Section 95.

**80.03 Construction.** The work consists of removing existing materials to construct or rebuild a crossing as specified. Spike the crossing as per Typical Plan RR-10. Any proposed crossing work using materials and methods not shown in this specification shall require advance written approval from the Engineer/RSI of Contractor provided plans, specifications, and construction methods associated with the crossing.

Ties, rail and OTM shall be salvaged as designated in the plans/proposal. Existing running rail shall be reinstalled in the crossing unless specified for replacement. All non-salvageable materials shall become the property of the Contractor and shall be removed from the railroad

right-of-way and properly disposed. The Engineer/RSI may designate temporary stockpile locations on railroad property prior to final disposal by the Contractor. Contractor shall not obstruct the clear vision areas at grade crossings or foul the tracks.

**A. Construct Grade Crossing:**

1. Remove track to a length of 5 feet beyond the proposed crossing limits. Excavate all material to a maximum depth of 24" below proposed roadway surface elevation. Items to be salvaged shall be stockpiled as directed by the Engineer/RSI.
2. Furnish and install geotextile fabric for entire length of the excavated area. Geotextile fabric is included as part of Construct Grade Crossing.
3. Furnish and install conduit and edge drain where designated in the project plans/proposal. Conduit and edge drains are separate pay items.
4. Furnish and install ballast, 7" ties at 19" on center, flangeway material, and all necessary OTM. Reinstall existing running rail unless replacement rail is specified. When replacement running rail is specified, the rail shall be No. 1 and shall be welded in accordance with Subsection 66.03.A. See Typical Plans RR-10, 11, 20 and 42 for details.

Tamp the full length of each tie within the limits of the crossing. The flangeway rails shall be No. 1 rail, continuous with no bolted joints through the crossing. The installed height between running rail and flangeway rails shall not be more than 1/4" in height. Ballast, tie disposal, running rail replacement, surfacing and aligning the track, and crossing surface are separate pay items.

**B. Rebuild Grade Crossing:**

1. Remove the existing crossing to a length of 5 feet beyond the crossing limits. Excavate all material to a minimum depth of 4 inches below the tie. Where there is a paved roadway, saw cut the road approaches perpendicular to the roadway, as detailed on Typical Plan RR-20, prior to removal of crossing surface material. Items to be salvaged shall be stockpiled as directed by the Engineer/RSI.
2. Furnish and install geotextile fabric for entire length of the excavated area. Geotextile fabric is included as part of Rebuild Grade Crossing.
3. Furnish and install conduit and edge drain where designated in the project plans/proposal. Conduit and edge drains are separate pay items.
4. Furnish and install ballast, 7" ties at 19" on center, flangeway material, and all necessary OTM. Reinstall existing running rail unless replacement rail is specified. When replacement running rail is specified, the rail shall be No. 1 and shall be welded in accordance with Subsection 66.03.A. See Typical Plans RR-10, 11, 20 and 42 for details.

Tamp the full length of each tie within the limits of the crossing. The flangeway rails shall be No. 1 rail, continuous with no bolted joints through the crossing. The installed height between running rail and flangeway rails shall not be more than 1/4" in height. Ballast, tie disposal, running rail replacement, surfacing and aligning the track, and crossing surface are separate pay items.

### **C. Renew Grade Crossing Surface:**

1. Remove the existing grade crossing surface and flangeway material down to the ties. All paved roadway surfaces shall be saw cut perpendicular to the roadway as detailed on Typical Plans RR-20 prior to removal of crossing surface. Items to be salvaged shall be stockpiled as directed by the Engineer/RSI.
2. Furnish and install flangeway materials, install 7" ties when required, and all necessary OTM. When the running rail is specified for replacement in the crossing, the rail shall be No. 1 and shall be welded in accordance with Section 66.03.A. See Typical Plans RR-10, 11, 20 and 42 for details. The flangeway rails shall be No. 1 rail, continuous with no bolted joints through the crossing. The installed height between running rail and flangeway rails shall not be more than 1/4" in height. Ties, tie disposal, ballast, running rail replacement, surfacing, conduit, edge drain, aligning the track, and crossing surface are separate pay items.

The following apply to constructing, rebuilding and renewing grade crossings:

- a. Spike the crossing according to Typical Plan RR-10. Surface and align the crossing, and raise the track as specified. During the final surface and alignment operation, tamp each tie within the crossing on both sides of tie for its entire length with a production tamper, as described in Section 60. The ballast on the run-offs shall be tamped and surfaced to provide a smooth transition between the track elevation and road elevation.
- b. Furnish and install crossing surface material as detailed in the typical plans for the type of crossing specified. Place #5 ballast, or an otherwise approved material, as a temporary crossing surface material. Crosstie flangeway and hardwood plank approach ends will be neatly bevel cut at a 45 degree angle to 3/4 the depth of the plank or crosstie. Flange rails shall be one continuous piece.
- c. Grade and install road approaches. The road approaches shall be tapered to the length and type shown in Typical Plan RR-20. Furnishing and installing the road surfacing materials are separate pay items.
- d. Grade all railroad and roadway shoulders to allow drainage into existing drainage courses and to prevent a low shoulder condition.
- e. Underdrains (edge drains) shall be installed according to Section 404 of the Standard Specifications for Construction.

**80.04 Measurement and Payment.** The pay limits of all crossings shall be measured along the center line of track from the median beginning of the crossing material to the median end of the crossing material.

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Grade Crossing, Construct, ____ .....	Track Foot
Grade Crossing, Rebuild, ____ .....	Track Foot
Grade Crossing, Renew, ____ .....	Track Foot
Grade Crossing, Tie .....	Each
Underdrain, Subbase, __ inch .....	Foot
Underdrain, Outlet Ending, __ inch .....	Each

**Grade Crossing, Construct, \_\_ (RF, HP, RB)** will be measured for each completed track foot of crossing. Tie disposal will be paid for separately.

**Grade Crossing, Rebuild, \_\_ (RF, HP, RB)** will be measured for each completed track foot of crossing. Tie disposal will be paid for separately.

**Grade Crossing, Renew, \_\_ (RF, HP, RB)** will be measured for each completed track foot of crossing. Tie disposal will be paid for separately.

**Grade Crossing, Tie** will be measured for each tie furnished and installed. Payment shall include removal and replacement of designated ties from under the rail in the crossing area, furnishing and installing new ties and spikes, reinstalling salvaged or new plates, and tamping each tie through the crossing. Tie disposal will be paid for separately.

**Underdrain, Subbase, \_\_ inch** will be measured by the linear foot.

**Underdrain, Outlet Ending, \_\_ inch** will be paid for each unit installed.

### **Section 81. TEMPORARY PLANK CROSSING**

**81.01 Description.** This work consists of constructing plank crossings for use as a temporary bypass when rebuilding crossings on construction projects to facilitate the crossing of vehicles and equipment.

**81.02 Materials.** Materials shall meet the following specifications:

Ballast .....	Section 91.
OTM.....	Section 94.

Planks used for temporary plank crossings shall be adequately sound and reasonably free of

defects such that the completely installed plank will fasten to the ties with a snug, tight connection and remain tightly connected throughout the duration of its use. Planks may be hardwood or softwood and of sufficient quality to provide good surface and protection to the rail and ties. Temporary planks shall be 10" wide, a minimum of 8' long, and a height that is within ½" of the top of rail.

Ballast used between the plank crossing and roadway shall match the ballast used for main line surfacing.

**81.03 Construction.** The Contractor shall construct a temporary plank crossing as specified in the plans/proposal according to Typical Plan RR-12. The depth of the plank will depend on the rail height. The Contractor has the option of ordering a depth of plank sufficient to match the rail section at the crossing or to shim the plank. The top surface of installed planks shall have the same elevation as the top of rails, plus or minus 0.25". When shims are used, they shall be included in the unit price. Any cutting and trimming of plank necessary to fit the plank over the tie plates, base of rail, and spike heads shall be considered included as part of the work.

The Contractor shall install a sufficient number of spikes to securely hold the planks in place. Planks shall be counter bored to receive the spike heads. The ends of planks shall be squared to facilitate butting with other planks. Those planks adjacent to the flange side of the rail shall be spaced 2.5" from the rail. The Contractor shall be responsible for maintaining the temporary crossing as long as it is in use.

Upon completion, temporary plank crossing materials shall become the property of the Contractor and shall be removed from the railroad right-of-way. Temporary plank may be reused if in good condition. All holes in ties left by drive spikes upon plank removal will be plugged with treated tie plugs. The track ballast shall be reshaped with the approach ballast, removed or spread on the track shoulders. Fouled ballast shall not be used on the track ballast section. The project area shall be cleared of all debris. All roadway shoulders shall be contoured and trimmed to allow drainage into existing drainage courses. The finished product shall have a neat and clean appearance.

**81.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Plank Crossing, Temp.....	Track Foot

**Plank Crossing, Temp** will be measured for each track foot of temporary plank crossing furnished, installed, and removed.

**Section 82. HARDWOOD PLANK**

**82.01 Description.** The work consists of installing hardwood planks in crossings.

**82.02 Materials.** Materials shall meet the following specifications:

OTM..... Section 94.

**82.03 Construction.** Furnish and install hardwood planks as specified. Hardwood plank shall be treated oak, ash or beech, a minimum of 10" in width. The depth of the plank will be a minimum of 5", and will depend on the rail section the plank will be guarding as shown in Typical Plan RR-11. The Contractor has the option of ordering a depth of plank sufficient to match the rail section at the crossing or to shim the plank. When shims are required, they shall be included in the unit price.

The length of planks shall be 8 feet or 10 feet as required by the crossing length. Eight foot planks shall be installed with a minimum of three washer head drive spikes. Ten foot planks shall be installed with a minimum of four washer head drive spikes. Washer head drive spikes will be staggered on the plank and centered on the tie, but will be located no closer than 2" from the edge of the plank nor closer than 6" from the end of the plank.

Butting ends shall be square trimmed to facilitate even butting with adjacent hardwood planks. Approach ends will be neatly bevel cut at a 45 degree angle to 3/4 the depth of the plank.

Hardwood plank and shims shall be pressure-treated creosote as outlined in AREMA Specifications - Chapter 3, Sections 7.1 and 9.2.1. Quality of hardwood planks shall be in accordance with Section 90. All cuts and borings made after treatment shall be treated with an approved field applied wood preservative.

**82.04 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Hardwood Plank.....	Foot

**Hardwood Plank** will be measured by the linear foot of plank furnished and installed. Payment shall include shimming and trimming to proper length and fit.

**Section 83. CLASS \_ APPROACHES**

**83.01 Description.** This work consists of furnishing, hauling, placing, and compacting aggregate between the inside flangeways and on roadway approaches to both sides of a track crossing at the specified location.

**83.02 Materials.** Materials shall meet the following specifications:

Aggregate 23A ..... Section 902 of the MDOT Standard Specifications for Construction

Any aggregate made to the 23A specification shall be a minimum of 95% crushed limestone.

**83.03 Construction.** Aggregate 23A shall be placed on the prepared grade to such a depth that the compacted layer will not exceed 6" in thickness nor be less than 3" in thickness. Aggregate 23A shall be placed and compacted by approved methods to provide smooth grade transitions across the track and adequate roadway width to match the existing roadway width and topography. Care shall be taken to avoid obstructing culverts under drive approaches. When culverts become obstructed, they shall be cleared and the surrounding earth shall be shaped to maintain unimpeded drainage.

**83.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Approaches, Cl _ .....	Each

Approaches, Cl \_ will be measured for each roadway crossing completed.

**Section 84. REMOVAL OF GRADE CROSSINGS**

**84.01 Description.** This work consists of removing a grade crossing and the constructing a pavement.

**84.02 Materials.** Materials shall meet the following specifications:

Aggregate 23A ..... Section 902 of the MDOT Standard Specifications for Construction  
Hot Mix Asphalt ..... Division 5 of the MDOT Standard Specifications for Construction

**84.03 Construction.** Remove grade crossing as specified, which includes removing the rail to the first joint beyond the crossing limits, ties, crossing surface materials, ballast, and all other material to the bottom of the ties and on the roadway approaches as specified, or as directed by the Engineer/RSI. All removed material becomes the property of the Contractor.

All paved roadway surfaces shall be saw cut prior to removal of crossing surface material. The excavated area within the roadway limits shall be filled in with MDOT 23A aggregate to match the adjacent road profile and compacted to 98 percent maximum density. A minimum thickness



of 2- 1/2 inches of surface course HMA shall be placed flush with the existing roadway surface.

On gravel roadways, fill the excavated area level with 23A aggregate and compact to 98 percent maximum density.

Roadway shoulders shall be shaped to match existing adjacent shoulders and to allow drainage into existing drainage courses.

**84.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Grade Crossing, Rem .....	Track Foot

**Grade Crossing, Rem** will be measured by the linear track foot along the center line of track from end of crossing to end of crossing. The removal location will be shown on project plans and the final determination of removal length will be made by the Engineer/RSI. The unit price includes furnishing, placing, and compacting the 23A aggregate. Tie disposal and HMA material will be paid for separately.

**Section 85. TRAFFIC CONTROL**

**85.01 Description.** With the written approval of the local road authority, the work consists of furnishing, installing, and maintaining traffic control at designated locations according to the local road authority's traffic control plan, project design plans, or approved Typical Plan RR-30.

**85.02 Materials.** Materials shall meet the following specifications and per Section 922 of the MDOT Standard Specifications for Construction:

Traffic Signs.....	MMUTCD
Barricades, Type III, Lighted.....	MMUTCD
Arrow Board.....	MMUTCD
Channelizing Devices.....	MMUTCD

**85.03 Construction.** The Contractor shall obtain written approval to implement his traffic control plan from the local road authority and submit a copy to the Engineer/RSI prior to any road closure.

Traffic control devices shall be supplied, maintained and operated in accordance with Section 812 of the MDOT Standard Specifications for Construction. Traffic control devices must be installed prior to beginning work where vehicle travel will be impacted, and the devices must be continuously maintained once they are in place. Should the devices be damaged or disrupted, or should the lights fail to operate, the Contractor shall make immediate corrections. The Contractor shall designate an individual to be on call at all times to respond to these situations. The Engineer/RSI shall be given the individual's name and phone number prior to implementing the traffic control plan.

Where a dead end street is closed and there is a need to provide access for local residents, a temporary crossing shall be constructed to allow reasonable passage of vehicles. The temporary crossing shall meet the approval of the Engineer/RSI.

**85.04 Measurement and Payment.**

<b>Contract Item (Pay Item)</b>	<b>Pay Unit</b>
Minor Traf Devices .....	Lump Sum
Traffic Regulator Control.....	Lump Sum
Sign, Type _ , Temp, Prismatic, Furn.....	Square Foot
Sign, Type _ , Temp, Prismatic, Oper.....	Square Foot
Sign Cover.....	Each
Lighted Arrow, Type, Furn.....	Each
Lighted Arrow, Type, Oper.....	Each
Sign, Portable, Changeable Message, Furn.....	Each
Sign, Portable, Changeable Message, Oper.....	Each
Plastic Drum, High Intensity, Furn.....	Each
Plastic Drum, High Intensity, Oper.....	Each
Plastic Drum, High Intensity, Lighted, Furn.....	Each
Plastic Drum, High Intensity, Lighted, Oper.....	Each
Channelizing Device, 42 inch, Furn.....	Each
Channelizing Device, 42 inch, Oper.....	Each
Barricade, Type III, High Intensity, Furn.....	Each
Barricade, Type III, High Intensity, Oper.....	Each
Barricade, Type III, High Intensity, Lighted, Furn.....	Each
Barricade, Type III, High Intensity, Lighted, Oper.....	Each

Measurement and payment for traffic control devices shall be in accordance with Section 812 of the MDOT Standard Specifications for Construction.

**Section 86. PVC SIGNAL CONDUIT**

**86.01 Description.** The work consists of installing a 4" signal conduit in a crossing.

**86.02 Material.** The signal conduit shall be 4" PVC schedule 40 electrical conduit.

**86.03 Construction.** Furnish and install signal conduit in the crossing where specified. The signal conduit shall be installed as shown on Typical Plans RR-10 and RR-11. Joints will be provided as needed, and the pipe joints will be properly cleaned and glued.

**86.04 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Signal Conduit .....	Foot

**Signal Conduit** will be measured by the linear foot of pipe furnished and installed.

**Section 87. SIGNAL CIRCUIT HARDWARE**

**87.01 Description.** The work consists of furnishing designated signal circuit hardware items for installation by the Railroad.

**87.02 Materials.**

- A. Bond Strand.** Materials shall be a cadweld bond strand with 3/16" diameter cable and PVC or neoprene insulation with a minimum wall thickness of 1/16".
- B. Rail Bond.** Materials shall be a cadweld TAB style cable with 3/16" diameter and 6½" length; rail weld material.
- C. Splicing Sleeve.** Material shall be a compression type crimp splicing sleeve.

**87.03 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Bond Strand .....	Foot
Rail Bond .....	Each
Splicing Sleeve.....	Each

**Bond Strand** will be paid for each linear foot of insulated bond strand cable delivered to the project site and installed by the Railroad.

**Rail Bond** will be paid for each rail bond cable delivered to the project site and installed by the Railroad. Payment shall include the cost of materials to weld the bond cable to the rails.

**Splicing Sleeve** will be paid for each splicing sleeve delivered to the project site and installed by the Railroad.

**Section 88. GRINDING WHEEL**

**88.01 Description.** The work consists of pre- and post-welding surface conditioning for rail bond wire installation.

**88.02 Material.** The grinding wheel shall be made of a vitrified material with a 3/4" width and 6" diameter.

**88.03 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Grinding Wheel.....	Each

**Grinding Wheel** will be paid for each vitrified type grinding wheel delivered to the project site and used by the Railroad.

**Section 89. GRADE CROSSING APPROACH**

**89.01 Description.** The work consists of furnishing and placing designated materials on the road approaches, as approved by the local road authority, as follows:

- A. Aggregate 22A as base under hot mix asphalt pavement (Aggregate Base).
- B. Aggregate 23A for shoulders (Shoulder, Cl II) and approaches (Approaches, Cl II).
- C. Hot Mix Asphalt (HMA) for asphalt pavement.

**89.02 Materials.** Materials shall meet the following specifications:

Aggregate..... Section 902 of the MDOT Standard Specifications for Construction  
HMA ..... Section 902 & 904 of the MDOT Standard Specifications for Construction

**89.03 Construction.** The Contractor shall obtain written permission from the local road authority, and copy the Engineer/RSI, to place the following materials at the roadway:

- A. Aggregate 22A shall be placed and compacted as per Typical Plan RR-20 in accordance with Section 302 of the MDOT Standard Specifications for Construction.
- B. Aggregate 23A shall be placed and compacted on the shoulders and approaches in accordance with Section 307 of the MDOT Standard Specifications for Construction.
- C. HMA shall be placed and compacted as directed by the local road authority, otherwise per Typical Plans RR-13 and RR-20, and in accordance with Section 501.03 of the MDOT Standard Specifications for Construction.

**89.04 Measurement and Payment.**

<b>Contract Items (Pay Items)</b>	<b>Pay Unit</b>
Aggregate Base, LM .....	Cubic Yard
Approach, CI II, LM .....	Cubic Yard
Shoulder, CI II, LM.....	Cubic Yard
HMA, ___ .....	Ton

**Aggregate Base, LM** will be measured by the cubic yard on a loose measure basis.

**Approaches, CI II, LM** will be measured by the cubic yard on a loose measure basis.

**Shoulder, CI II, LM** will be measured by the cubic yard on a loose measure basis.

**HMA, \_\_\_** will be paid for by the ton, up to plan quantity, for HMA placed at each individual location. Where changes are ordered, plan quantity will be adjusted per re-computed volumes. Plan quantity will be adjusted only if the Contractor demonstrates differing site conditions to the satisfaction of the Engineer/RSI. The thickness of the HMA shall be the depths indicated on Typical Plans RR-13 and RR-20 or as specified. Any additional aggregate needed to bring the grade up to the desired cross section shall be paid for separately.

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# DIVISION 9

## MATERIALS

### Section 90. TIMBER TIES

**90.01 Description.** Timber used to manufacture ties shall be properly seasoned, dimensionally correct, thoroughly treated, and of the following species: Ash, Beech, Elm, Hickory, Hard Maple, Red Oak, or White Oak.

**90.02 Shape.** All ties shall be straight, well sawn, with parallel surfaces, cut square on the ends, bark completely removed, and incised.

**A. Straight.** A tie is considered straight when it has no more than 1" deviation from a true or plane surface. This includes bow, crook, cup and twist or any combination thereof.

**B. Well Sawn.** A tie is considered well sawn when its surfaces are not cut into with score marks more than ½" deep or when surfaces are even.

**C. Parallel Surfaces.** The surfaces of a tie are considered parallel if the difference in the thickness at the top, bottom, sides, and ends does not exceed ½".

**D. Cut Square at the Ends.** A tie is considered cut square when the intersection of the top, bottom, and sides with the end are at 90 degrees.

**90.03 Defects.** All ties shall be free from defects that may impair their strength or durability. The following criteria will be used to judge acceptability of ties.

**A. Decay.** Ties with any sign of decay will be rejected.

**B. Holes.** Large holes will not be permitted within the rail bearing areas. A large hole in this area is one having a diameter more than ½" or more than 3" deep. Large holes will not be permitted outside the rail bearing areas. A large hole outside the rail bearing area is one having a diameter greater than one-fourth the width of the surface on which it appears and more than 3" deep. A tie with numerous small holes will not be permitted.

**C. Shake.** A shake is a separation along the grain, most of which occurs between the rings of annual growth. Shake is allowable provided the length is not greater than 1/3 the width of the tie and provided it does not extend nearer than 1" to any surface of a tie.

**D. Slanting Grain.** Except in woods with interlocking grain, a slant in grain in excess of one in fifteen will be rejected.

**E. Splits.** A split is a separation of the wood extending from one surface to an opposite surface or adjacent surface. A seasoned tie with a split ½" or less in width and not more than 8" in

length is acceptable. A split exceeding this limit is acceptable only if the split does not penetrate the rail bearing area and if anti-splitting devices are properly applied to bring the tie back to its original sawn dimensions.

**F. Season Checks.** A check is the separation of the wood normally occurring across or through the rings of annual growth and usually as a result of seasoning. Ties with checks over 1/2" in width on any face, or with checks of any width on any face that are longer than 2/3 of the tie length, will be rejected.

**G. Knots.** A knot is a portion of a branch that has become incorporated in a piece of lumber. Large knots are not allowed. A large knot is a knot having a diameter equal to or greater than 1/3 the width of the surface on which it appears. A tie with numerous small knots will not be permitted. Numerous knots are any number equaling a large knot. No knots shall be allowed within the rail bearing area.

**H. Wane.** Wane is a lack of wood from any cause. No wane will be allowed on the bottom surface of ties. A maximum of 1" accumulative wane in the rail bearing areas, and a maximum of 1-1/2" accumulative wane outside the rail bearing areas, will be allowed.

**90.04 Anti-splitting Devices.** Anti-splitting devices shall be placed on both ends of every tie. The device shall be a nail plate as described in AREMA Specifications - Chapter 3 Section 1.9.

**90.05 Pretreatment Preparation.** All mixed hardwood ties will be air-seasoned as outlined in AREMA Specifications - Chapter 3, Section 6.3.1 Boulton drying or vapor drying process is an acceptable alternative to air seasoning.

**90.06 Preservative Treatment.** Ties shall be pressure-treated creosote as outlined in AREMA Specifications - Chapter 3, Sections 7.1 and 9.2.1. Retention shall be 7-lb. creosote per cu. ft. of wood, except for White Oak ties, which will be pressure treated to refusal.

**90.07 Dimensions.** Timber crossties shall be a standard length of 8'-6" or 10'-0". The length of timber switch ties will be determined by turnout requirements.

The 7-inch and the 6-inch crosstie shall have a standard cross section of 7" x 9" and 6" x 8", respectively, and the overall dimensions may vary as follows:

Length:	plus 1", minus 1"
Thickness:	plus 1", minus 1/4"
Width:	plus 1", minus 1/4"

The cross section of the timber switch ties shall be 7" x 9", and the overall dimensions may vary as follows:

Length:	plus 4", no undersize length accepted
Thickness:	plus 1/4", minus 1/4"
Width:	plus 1/4", minus 1/4"



## Section 91. BALLAST

**91.01 General Requirements.** The Contractor shall arrange for all ballast testing. Ballast shall be tested by or under the direct supervision of a Certified Aggregate Technician. Prior to placing the ballast, the Contractor shall provide the Engineer/RSI with certified test results showing conformance with the specification requirements.

**91.02 Testing Requirements.** Ballast shall be 100 percent crushed material prepared from stone or steel furnace slag (SF slag) and composed of hard, strong, and durable particles, free from excess deleterious substances. The processed material shall have an angular structure with all faces fractured, providing sharp corners with a minimum of flat and elongated pieces.

Ballast shall meet the following requirements:

**A. Grading** – Gradation testing shall be performed using ASTM Test Method C136. Crushed stone and crushed slag for processed ballast shall conform to these grading requirements for the Size Number specified in the plans/proposal.

Size	Amount Finer Than Each Sieve Percent by Weight								
	No.	2½"	2"	1½"	1"	¾"	½"	⅜"	#4
4A	100	90-100	60-90	10-35	0-10	--	0-3	-	-
4	--	100	90-100	20-55	0-15	--	0-5	-	-
5	--	100	100	90-100	40-75	15-35	0-15	0-5	-

**B. Soft Particles** – Deleterious particle testing shall be performed using Michigan Test Method 110. Soft particles include: shale, siltstone, friable sandstone, ochre, coal, and particles that are structurally weak (particles can be broken or crumbled by the fingers of one hand). Soft particles shall not exceed 5 percent.

**C. Loss by Washing** – Loss by wash testing shall be performed using ASTM Test Method C117, Procedure A. Loss by washing shall not exceed 2 percent.

**D. Abrasion Resistance** – Abrasion resistance testing shall be performed using ASTM Test Method C131. Prepared ballast shall have a loss not greater than 40 percent.

**E. Soundness** – Soundness testing shall be performed according to ASTM Test Method C88, using either magnesium sulfate or sodium sulfate. When subjected to five cycles of the soundness test, the ballast shall have a weighed loss of not more than 12 percent when sodium sulfate is used or not more than 18 percent when magnesium sulfate is used.

Procedure A of AASHTO T103 - 9I is also an acceptable method for testing ballast for

soundness. When performing the AASHTO T103 - 9I test, the sample shall be completely frozen at a temperature not higher than -15°F, and completely thawed to constitute a cycle. The duration of the freezing and thawing periods shall be reported along with the test results. Prepared ballast, when subjected to 50 freeze/thaw cycles using the AASHTO T103 - 9I test, shall have a weight loss of not more than 5% on any screen.

**F. Unit Weight** – Unit weight testing shall be performed using ASTM Test Method C29, Rodding Procedure, using the ballast grade specified.

**G. Flat or Elongated Particles** – Particle testing shall be performed using ASTM Test Method D4791, using a ratio of 5:1 to determine flat or elongated particles. The portion of the prepared ballast retained on the 3/8” sieve shall not contain more than five percent flat or elongated particles, or both.

**91.03 Testing Frequency.** Testing shall be done at a minimum frequency of one test per 5,000 tons of ballast furnished for gradation, loss by washing, soft particles, unit weight, and flat or elongated particles. Abrasion resistance and soundness shall be tested at least once per project per source. Additional tests shall be performed, if the character of the aggregate changes. The Engineer/RSI may require additional testing or may collect samples for testing to confirm certification results. The Engineer/RSI has the discretion to visually inspect the ballast where, in the opinion of the Engineer/RSI, the quantities involved do not warrant formal testing procedures.

**91.04 Production and Handling.** When crushed stone or crushed slag does not become clean without washing, a suitable arrangement shall be provided at the quarry or crusher for that purpose. Crushed stone and slag for ballast shall be handled in such a manner that is kept clean and free from dirt and debris.

## **Section 92. SUB-BALLAST**

**92.01 Requirements.** Materials intended for use as sub-ballast shall conform to current ASTM designation D 1241 for quality and MDOT Michigan series 22A for size requirements, as per Section 902.05 of the MDOT Standard Specifications for Construction.

## **Section 93. GEOTEXTILE FABRIC**

**93.01 Requirements.** Geotextile fabric shall be Supac 10 NP, American Engineering Fabrics AEF 1080 (GTN-1OR), or approved equal, for all grade crossings. For construction other than grade crossings, geotextile shall meet the requirements of Section 910 of the MDOT Standards Specifications for Construction.

## Section 94. OTM

**94.01 Requirements.** All OTM shall be of the proper design and dimension for the rail to which it is applied, and shall be new, except for tie plates used with flangeway rails. The following specifications apply:

**A. Tie Plate.** Tie plates to be used with 90# rail and smaller shall conform to AREMA Plan No. 1, shall be non-ribbed, have 10" x 7 ½" minimum dimensions, and have four rail holding spike holes ¾" square and two anchor spike holes which shall not exceed 11/16" square. Tie plates to be used with 100# rail and larger shall conform to AREMA Plan No. 4, shall be non-ribbed, have 11" x 7-¾" minimum dimensions, be double shouldered, have four rail holding spike holes ¾" square and two anchor spike holes which shall not exceed 11/16" square. Only on curves and crossings are eight hole tie plates required. Tie plates for running rail shall be new and, unless noted otherwise in the plans, the plate seat shall be canted with a slope of 1 to 40.

Tie plates used for flangeway rails can be relay or new. Tie plates shall be of number one quality and shall not be deformed or have lost more than 5 percent of any feature due to wear. Unless noted otherwise in the plans, the plate seat shall be canted with a slope of 1 to 40. Tie plates shall be new or relay.

**B. Tie Plate, Insulated.** All insulated tie plates shall be new. The insulation material shall be the type specified on the plans/proposal.

**C. Tie Plugs.** Tie plugs shall be creosote treated wood tie plugs of the proper size to conform to AREMA Specifications.

**D. Track Bolt Unit.** Track bolts and nuts shall be new and shall conform to AREMA Specifications. Bolts shall extend a minimum of one thread beyond the nut after installation. Spring washers for the supplied bolts shall be 3/8" heavy-duty carbon steel and shall conform to AREMA Specifications.

**E. Track Spike.** Track spikes shall be new and in conformance with current AREMA Specifications.

**F. Washer Head Timber Drive Spike.** Drive spikes shall be new and high strength. (Lewis Bolt - Washer Head Timber Drive Spike or an approved equal.)

**G. Crossing Drive Spike.** Drive spikes shall be new, high strength, and bevel-headed. Drive spikes shall be 11/16" in diameter with 6" threaded length. (Lewis Bolt - Permagrip Spike or an approved equal.)

**H. Switch Drive Spike.** Drive spikes shall be new, high strength, cone-necked, and properly sized for the intended application with 6" threaded length. (Lewis Bolt - 1M Drive Spike or an approved equal.)

**I. Joint, Insulated.** All insulated joints shall be new. The joint insulation material shall be the type specified by the Railroad.

**J. Joint Bar.** Joint bars shall be new. All joint bars, except those for 85# rail, shall be the short toe (skirtless) type. Joint bars shall not be casted. Six bolt joint bars shall be used where new rail is installed.

**K. Joint Bar, Compromise.** Compromise joint bars shall be new and made of forged heat-treated high carbon steel. Compromise joint bars shall not be casted.

**L. Joint Insulation.** Joint insulation shall be new. The joint insulation material shall be the type specified on the plans/proposal.

**M. Rail Anchor.** Rail Anchors shall be new and the drive on type. All anchors shall meet the design strength and test requirements contained in the AREMA Specifications.

**N. Bonded Insulated Joint.** All bonded insulated joints shall be new and as specified on the plans/proposal.

## **Section 95. NUMBER 1 RAIL**

**95.01 Requirements.** Number 1 rail shall conform to the following specifications (new industrial rail, 80 feet lengths, is an acceptable alternate for Number 1 rail):

**A. Top Wear.** Wear on the top of the head shall not exceed 3/16" for all rail sections. Only 1/16" additional wear is permissible within 6 inches of the end of the rail. Rail ends which are built up 1/4" or less, measured at the rail end, are acceptable. Welding and repairs to rail ends shall be completed before the rail is installed. Rail ends shall be square. No flat spots on the rail head are permissible.

**B. Side Wear.** Wear shall be on one side only and a maximum of 1/8", measured 1/2" below the original top of rail for all rail sections.

**C. Sideflow.** The overflow of material shall be a maximum of 1/16" for rail sections up to 90# and 1/8" for sections 100# and greater.

**D. Endflow.** Endflow is not acceptable.

**E. End Chipping.** End chipping is not acceptable.

**F. Wheel Burns.** No more than three wheel burns, which are 1/2" or less in any diameter, shall be allowed in any 39 feet of installed rail(s). Rail with wheel burns greater than 1/2" in any diameter will not be accepted.

**G. Curves and Bends.** Rails shall be straight for line and surface and free of kinks or bends and sweeps, except that a back sweep of 1" for 33-foot rails, 1-1/8" for 36-foot rails, and 1-1/2"

for 39-foot rails is acceptable, provided the back sweep is uniform and has no short kinks or bends.

**H. Bases.** The rail base shall be solid and free from visual defects. Spike notching and pitting is not acceptable.

**I. Webs.** Rail webs shall be free of defects. Pitting is not acceptable.

**J. Bolt Hole Pattern.** The rail shall have the same bolt hole pattern throughout the project. The bolt hole pattern shall coordinate with the joint bars. For example, when a six bolt hole joint bar is being used, the rail end shall have three matching bolt holes. Rail with different drilling patterns shall be cropped-off 6" beyond the existing bolt holes and redrilled with the correct bolt hole pattern. The bolt hole pattern, or drilling pattern, shall meet the approval of the Engineer/RSI.

**K. Other Defects.** Rail shall be free from obvious defects and clean in appearance. Chisel cut or torch cut rail will not be accepted. Rail with split head, broken or cracked base, scale, grooves under the rail head from joint bar wear, defect detector markings from Sperry testing, pitting, holes drilled in the web, cracked web, head and web separations, bolt hole cracks, corrugations, engine burn fractures, or field welds will not be accepted.

**L. Curve Wear.** No curve worn rail is acceptable.

## **Section 96. NEW RAIL**

**96.01 Requirements.** New rail shall conform to current AREMA specifications for rail weight listed. Rail shall be free from obvious defects and clean in appearance. Rail shall meet the provisions listed in Section 105 of the MDOT Standard Specifications for Construction.

## **Section 97. FIELD WELD KIT**

**97.01 Requirements.** The welding kit shall be Calorite, Orgotherm, or Boutet.