

SECTION 02854 - RAILROAD TRACK CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Track Construction includes the unloading, stockpiling, transporting and inventory of material, distributing and placing of ties, tie plates, all other track material (OTM), fittings and fastenings. Track Construction shall also include the laying, bolting, gauging and spiking of rail and all thermal corrections, welding and adjustments of rail, the placing and tamping of ballast, the installing of bumping posts, derails, frogs, switches, guardrails, switch stands, road crossings and the placing of ballast, lining, surfacing and finishing of tracks, on previously prepared sub-grade or sub-ballast.
- B. RELATED WORK - Documents affecting work of this section include, but are not limited to, the General Requirements, Section 01000 – Division I, General Conditions, and any Special Conditions required for this work.

1.2 TRACK STANDARD REFERENCES

Current versions of the following rules, standards, specifications, and references shall apply to all track work:

- A. Union Pacific Railroad Safety Rules
- B. Union Pacific Railroad Maintenance of Way Rules
- C. Union Pacific Railroad Engineering Standards
- D. Union Pacific Railroad Chief Engineer's Bulletins
- E. Union Pacific Railroad Engineering Track Maintenance Field Manual
- F. Union Pacific Railroad Form 7913 – Instructions Governing the Inspection, Welding, Grinding and Heat Treating of Track Components
- G. AREMA: Manual for Railway Engineering
- H. Track Safety Standards of the Federal Railroad Administration

1.3 QUALITY ASSURANCE

- A. CONSTRUCTION SUPERVISION - The track construction shall be progressed with skilled supervision and labor and the Contractor shall assemble the track material in such a manner as may be required by the Engineer. Any supervisor or laborer not satisfactory to the Company shall be removed from the project on request of the Engineer.
- B. INSPECTION OF SUBGRADE - Shall be made just prior to track laying. Track construction shall not commence until the subgrade has been approved by the Engineer.
- C. DAMAGE AND RESTORATION - The Contractor shall perform hauling, loading and unloading operations as well as track construction in such a manner as to cause no damage to the roadbed, ditches, shoulders, slopes, drainage pipes, risers, drop inlets, roads and any other facilities. Any damage to the foregoing shall be repaired or replaced, where necessary, in a manner satisfactory to the Engineer and at the expense of the Contractor. In making repairs and replacements, equivalent materials shall be used and the method of placement shall be as directed by the Engineer.

## PART 2 – TRACK MATERIAL

### 2.1 SUMMARY

- A. Track material for the project, if provided by the Railroad, will be delivered to the closest available siding or nearest available location at no cost to the Contractor. All material furnished by the Railroad, including that which will be installed by the Railroad, shall be unloaded by the Contractor and carefully handled to avoid damage when unloading, hauling, stockpiling, and installing. The Contractor shall also be responsible for unloading rail from the rail train. All track material shall be provided loose and transported in railroad cars or other means of transportation. The Contractor shall supply a waterproof container or trailer for storage of weld kits, supplies, and any other material that requires protection from the weather. Storage and security of all track material shall be at the expense of the Contractor and will be incidental to the appropriate pay item.
- C. When handling track material, the Contractor must abide by Union Pacific Railroad Engineering Track Maintenance Field Manual and Maintenance of Way Rules.

2.2 CWR, continuous welded strings of rail, and stick rail shall be handled in accordance with Engineering Track Maintenance Field Manual, using special equipment provided for that purpose. With the exception of bonded joint plugs, rail less than 15' shall not be installed in the track without the engineer's approval. Bonded joint plugs shall be paid for as part of track construction and welds shall be paid for per each successfully installed weld. The temporary joint bars and bolts will be the responsibility of the contractor and incidental to the track construction.

2.3 Ballast, if provided by the Railroad, will be delivered to the job site in ballast cars, unless otherwise stated. The contractor shall unload and place or stockpile the ballast; clean, close and lock the doors and release the cars to the engineer within 2 working days after delivery to the job site. The Contractor shall be required to stockpile the ballast if it cannot be dumped directly on the track. Ballast shall be uniformly distributed and the track raised, lined, surfaced and tamped, with the finished surface of the ballast dressed in accordance with the Engineering Track Maintenance Field Manual, standard drawings and plan drawings.

2.4 All material delivered will be counted and recorded as it is unloaded by the Contractor and quantities checked against the waybill. Any discrepancies are to be reported immediately to the Engineer. If the quantities check, the Contractor or his Superintendent will sign for the material, and the Contractor is then responsible for the material. A copy of the inventory sheets showing the car number, date received, material inventoried from the car or truck, and storage location, if stored, shall be furnished the Engineer. Any shortage or overage of materials shall be immediately reported to the Engineer. At the end of the project, the contractor shall load all excess material in rail cars and/or stockpile at a designated location as directed by the Engineer.

## PART 3 – EXECUTION

3.1 All horizontal and vertical field track survey layout required, for both Contractor and Railroad work, shall be by the Contractor and included in the unit track price. The Company will furnish horizontal and vertical control points and track layout plans or coordinate files. The final track surface, cross level and line shall not deviate from the plans more than limits defined in the

Engineering Track Maintenance Field Manual for the specified class of track.

- 3.12 All track construction will conform to the Engineering Track Maintenance Field Manual with the following modifications:
- A. New treated ties shall not be adzed without authority from the Engineer. If adzing is authorized, an approved preservative shall be applied to the adzed surface.
  - B. Insulated joints shall be installed as indicated on the plans. If not indicated on the plans, insulated joints may be required at locations as directed by the Engineer.
  - C. Tie plugs, where required, shall fill holes from which spikes are drawn. The plugs shall conform to the current AREMA Specifications for tie plugs. All spike holes must be filled with standard wooden tie plugs or another suitable plugging material as approved by the Chief Engineer, before re-spiking.
  - D. Rail anchors shall be installed after the ballast operation and the track is raised, lined and distressed. Anchors shall be installed on the same side(s) of the tie on both rails. Anchors must not be applied to one rail only, but must be applied to both rails in a uniform pattern.
  - E. When using sledge to remove rail anchors, the foot must be placed on top of the rail anchor in such a manner to prevent the anchor from flying and causing injuries. Spike mauls must not be used in lieu of sledges for applying and removing rail anchors.
  - F. Track panels may be utilized in track construction when approved by the Engineer. Care shall be taken in unloading or moving the panel sections so as not to skew or bend the section.
  - G. Rails shall not be moved into position with a hammer, maul, or similar tool, but shall be moved with rail tongs, rail forks, or lining bars.
  - H. Laying of continuous welded rail in track using a track-laying machine is acceptable.
  - I. Where track panels have been utilized in track construction and are to be relayed with CWR, the provisions governing CWR and thermal correction shall apply. All spikes removed shall have the holes plugged with approved tie plugs. Anchors shall be applied per these specifications. All jointed rail and OTM shall be loaded in rail cars or stock piled as directed by the Engineer.
  - J. When rail is released from track, it shall be promptly classified by the Engineer in accordance with Chief Engineer's instructions.
  - K. Welding shall be performed under the direct supervision of an experienced and certified welding foreman or supervisor. All welds given fault indication by ultrasonic inspection, magnetic particle inspection, or visible inspection, shall be replaced at no expense to the Company, including the addition of the rail plug and additional welds as required. All initial testing shall be performed as directed by the Engineer. If a defective weld is found, it shall be cut out and replaced with a section of rail not less than 15 feet long.

The Contractor shall inform the Engineer of the location of completed welds in order for the Engineer to arrange testing, if required. A record shall be kept by the Contractor for each completed weld. All welds shall be marked on the rail per requirements of Form 7913.

K.1. The Contractor shall perform the following incidental work to complete rail welds:

1. Re-space cross ties as necessary to prevent a weld from sitting on a tie.
2. Tamp and dress the track as necessary to provide firm support at the weld.
3. Plug ties and re-spike as necessary.
4. Reapply and adjust anchors as necessary to conform to the anchor pattern.
5. Clean up all waste from the welding process and dispose of superfluous materials.

The cost incurred by the Contractor for this work shall be included in the bid price of the weld.

K.2. Ultrasonic Testing of Rail Welds

All thermite rail welds installed as part of the project shall be hand tested ultrasonically for defects or inclusions before track is placed into service. Prior to ultrasonic inspection, each weld will be ground to a finish that eliminates grooves, heavy facets, or debris that could interfere with hand test operation. All test surfaces will be free of debris, scale, grease and heavy rust, which may inhibit inspection.

The operator in charge of the testing crew shall have a minimum of American Society of Nondestructive Testing (ASNT) Level II training and experience. Documentation of each qualified operator's certification and a proposed written procedure for testing will be provided to Railroad for approval. The written procedure shall be prepared and the approved testing program shall be administered by a certified ASNT Level III or comparable individual. The written procedure shall describe the program for the control and administration of the testing personnel training, examination and certification. Qualifications shall be specific to the equipment and method used. The Railroad reserves the right to disqualify an operator from testing on Railroad property because of previous experience with operator's performance or operator's ability without further explanation. Any exceptions to these rail testing qualifications shall be pre-approved in writing by the Railroad.

Functionality of the UT hand testing instrumentation shall be checked, and the equipment shall be calibrated and normalized by use of a calibration standard at the beginning and end of the daily testing operation, after inactivity or delay if practical, and any time when a malfunction is suspected. If any malfunction is discovered, all material shall be reexamined to the previous valid calibration and normalization.

Each weld will be hand tested with each of the following transducer angles: 70 degree, 37.5 or 45 degree, and 0 degree.

1. The 70 degree (+/-) sound envelope hand test transducer, full railhead coverage (gage, center and field) shall be capable of detecting transverse flaws, with calibration and detection minimums of a 1/32 inch flat bottom hole.
2. The 37.5 (+/-) degree or 45 (+/-) degree transducer will inspect fillet, web and base of rail with calibration and detection minimums of a 1/32-inch flat bottom hole.
3. The 0 degree transducer will inspect the head, web and base. Detection

capabilities for web, head web flaw minimums 1/32 inch. In addition to detection of transverse or horizontal flaws from top of rail, the 0 degree transducer will be employed to inspect the head from side of the rail, at 90 degrees to vertical, for vertical split head separations. 0-degree detection minimums shall be 1/32-inch flat bottom hole.

All testing shall be performed by personnel qualified and certified in accord with the approved written procedure. The testing operator will locate and mark defects found according to Railroad specifications and accuracy requirements. Each defective weld shall be marked with a highly visible marking on both sides of the rail web and base. The Railroad also reserves the right to independently re-test suspect welds at the Contractor's expense.

Welds with single 1/16 inch or greater reflective surface shall be rejected. Welds with three or more 1/32 inch reflective surfaces within range of transducer scan shall be rejected also. Defective welds will be reported and subsequently repaired at Railroad's direction.

The Railroad will be provided all test records following the UT inspection. The Contractor shall certify all test records and maintain a copy of all test records for a minimum of four years following the test.

- L. At the end of the project, UPRR will perform Verse testing for destressing rail, which the contractor must support with appropriate labor. **When the contractor is supporting the VERSE testing, he shall be responsible for any damaged clips or inserts. Anticipate testing to occur every 500 to 1000 feet. If the any of the VERSE tests fails, the Contractor shall be responsible for any remediation necessary to pass the test.**

### 3.15 TURNOUTS

- A. TURNOUTS - Shall be constructed in strict conformity with the Engineering Track Standard plans. The switch stands shall be fastened securely to headblocks and shall be square with the track. The targets shall be lined parallel with the rails of the major track when the switch is lined for the major track. All switch ties shall be fully tie plated. All frogs, with the exception of self-guarded frogs, shall be protected by guardrails installed in accordance with the standard plans before any train is allowed to pass over them. Turnouts shall also include switchman walkways.
- B. PANEL TURNOUTS - Shall be constructed in strict conformity with the standard plans and these specifications. Care shall be taken in unloading or moving the panel sections so as not to skew or bend the sections or cause damage to the prepared subgrade. The Contractor shall adjust anchors, ties, spikes, switch plates, braces, etc., as necessary to conform to the standard plan.

### 3.16 DERAILS & BUMPERS –

- A. Where required, derails and bumpers shall be installed in conformity with standard plans and/or instructions, and shall be inspected and approved by the Engineer before final acceptance and operation over the track.
- B. It is the Contractor's responsibility to install temporary derails as necessary to protect the main track or any track in that may be in operation.

### 3.17 BALLASTING AND SURFACING

- A. SURFACING - The track shall be laid and connected before ballast is spread and track raised. Immediately prior to unloading ballast for the final raise of not more than four (4) inches, the track shall be lined as close as practical to the stakes and all ties straightened and re-spaced as necessary. Ballast shall then be spread evenly and leveled to the required section, taking care to assure that subgrade material is not intermixed with the ballast. Ballast shall be spread and the track raised in a series of lifts to the approved elevation. No single lift shall be higher than 4 inches. In raising track, the operation shall be so regulated as to avoid the bending of angle bars or straining of joints. Care shall be taken to avoid sharp breaks or bends in the rail when the track is raised. Both rails shall be raised simultaneously and to proper cross-level. Ballast shall be tamped with an approved tamping machine (Jackson 6700 or equivalent) and/or tamping tools in good condition with less than twenty (20) percent surface area missing. The number of insertions by the tamper on each lift should be monitored to ensure adequate and even ballast compaction, yet prevention of center bound track must also be considered.
- B. If track is raised above the designed and staked grade, the cost to lower the track shall be born by the Contractor.
- C. Turnouts shall be tamped using a switch/production tamper designed to tamp turnouts. Tamping may also be done, in areas where a production tamper cannot be utilized, with tamping bars, "jitter bugs" or by machines approved by the Engineer in a manner that will produce uniform compaction. Locations in turnouts, which can not be mechanically tamped (example, heel blocks or frogs), shall be thoroughly hand tamped under the rail seat areas. Switchman walkways shall be constructed as required using walkway or Class 2 ballast.
- D. Tamping must not disturb subgrade/sub-ballast. Dressing of the ballast by placing earth higher than the toe of ballast, thus preventing proper drainage, will not be permitted.
- E. Thorough tamping under the rail seat is required, and joint ties shall be tamped especially firm. Tamping will not be permitted at the middle of a tie where ballast is to be left to settle on its own accord. Both ends of a tie, inside and outside of the rail, shall be tamped simultaneously. All ties that are pulled loose or skewed in the track raising operation shall be placed in their proper position and properly tie-plated, plugged and fully spiked before tamping, insuring all set areas are clean and free of dirt and ballast. Any anchors, bolts, braces or switch material which has been damaged, loosened or does not comply with these specifications shall be adjusted accordingly. The track shall be true to line, grade and cross level as designed and staked.
- F. During each track raise, the track is to be tamped in such a manner that it will be uniform. During the raising and tamping operations, approved track level boards or other approved measuring devices shall be constantly used to ensure the correct surface and cross level in the track after tamping work is completed. After ballasting is completed and the track is in correct gauge, surfaced and lined according to the stakes, the ballast shall be neatly trimmed or regulated to the section shown on the drawings, and any surplus material shall be spread evenly along the slopes of the ballast section.
- G. Unless specified otherwise, construct yard tracks with 8" ballast under the ties, and main tracks and siding tracks with 12 inches of ballast under the ties. Some areas may vary slightly. In all cases it is necessary that the top of rail elevations be followed as indicated.

PART 4 - PAYMENT AND MEASUREMENT

4.1 MEASUREMENT

- A. Track construction shall be measured by the track foot as measured in feet along the centerline of track, excluding turnouts and switch point derails. The unit price for track construction shall include surfacing and lining as required to achieve proposed top of rail elevation. For the purpose of determining the proportionate value of completed track each month, the following criterion shall be used:

All track material unloaded	10%
All ties placed, OTM distributed and ready for rail placement	30%
Track structure completely built and ready for ballast placement	60%
Ballast unloaded and first raise is complete	80%
Track structure completed (as per these specifications and contract documents)	100%

Testing support will be incidental to track construction.

- B. TURNOUTS - Shall be measured per each completed. A turnout is considered both the straight side and diverging side. Turnout lengths will be based on the following chart:

TURNOUT SIZE	WOOD LENGTH	CONCRETE LENGTH
No.9	107	107
No.11	125	125
No.15	180	169
No.20	249	235
No.24	281	267

- C. SWITCHMAN WALKWAYS - Shall be included in the unit price of the turnout and/or track, unless otherwise specified.
- D. PREFABRICATED ROAD CROSSINGS - Shall be measured in track feet along the centerline of track.
- E. RELAY TRACK - Shall include surface and line track and relay jointed rail with CWR and shall be measured by the track foot as measured in feet along the center line of track. This shall include bringing the track to surface, line and grade, dumping ballast as needed, adjusting tie spacing, relaying the jointed rail with CWR and all other items to bring the track to completion per these specifications. It shall also include the stockpiling or loading of rail and OTM as directed by the Engineer.
- F. THERMITE WELDS – Welds in track and turnouts shall be measured per each weld successfully completed. The number of welds required for each turnout are provided on the following chart:

TURNOUT SIZE	Number of Welds
No.9	18
No.11	18
No.15	18
No.20	22
No.24	26

- G. INSULATED JOINTS - Shall be measured per each joint installed. Insulated joints shall be installed per the manufacturer's recommendations. Insulated joints installed at existing joint locations shall be considered incidental to track or turnout construction. Insulated joints installed at other locations requiring rail cuts and drilling shall be paid for at the contract unit price. "I" bonds or prefabricated insulated joints, which are welded into the track, shall be paid for under the track construction and thermite welds sections.
  - H. OTHER ITEMS - Shall be measured and paid for at the contract unit price bid for that item.
- 4.2 PAYMENT - Shall be made at the contract unit price per unit acceptably built. This price shall be full compensation for all labor, equipment, tools, and incidentals necessary to unload, handle, stockpile, transport, prepare and install materials as per Contract and these specifications.

**END OF SECTION**