

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. The provisions and intent of the Contract, including the General Conditions and General Requirements, apply to this work as if specified in this section.

1.02 SCOPE

- A. The accompanying Drawings and Specifications show and describe the location and type of work to be performed under this project. Work is more specifically defined on the drawings listed in Section 00 01 15.
1. The Work under this contract is to provide, furnish and install all labor, materials and equipment required to complete the work, installed, tested, and ready for use, and as described in these documents.
 2. The Replacement of Railway Track and Special Trackwork at Various Locations generally consists of:
 - a. The removal and replacement of track and turnouts at the following locations
 - (a) The Transfer Yard
 - (i) Seven (7) turnouts at the north end of the Transfer Yard.
 - (ii) One (1) turnout at the south end of the Transfer Yard (the Wye turnout).
 - (b) Along the Bubble Tracks near the Port of Tacoma Road overpass
 - (i) One (1) turnout along Bubble Track 1.
 - (ii) One (1) turnout along Bubble Track 2.
 - b. The removal and replacement of the at-grade railroad crossing at the following locations:
 - (a) Along the SIM Bypass Track near the Lincoln Avenue overpass
 - (b) Along the Bubble 1 Track near the Port of Tacoma Road overpass
 - c. The removal and installation of track lubricators at various locations adjacent to the above mentioned improvements.
 - d. Surface, line, and dress of existing tracks at various locations adjacent to the above mentioned improvements.
 3. All work at the Lincoln Avenue at-grade railroad crossing and select work at the Bubble 1 Track is subject to the City of Tacoma Work Order permits which have been acquired by the Port for both locations. The work order permit drawings are included as reference drawings. The Contractor shall adhere to all restrictions of the Work Order permit as described in the Work Order drawings.

1.03 LOCATION

- A. The work is located at various locations within: Port of Tacoma, 1 Sitcum Plaza, Tacoma, Washington.

~~1.04 PORT FURNISHED MATERIALS~~

~~A. Port of Tacoma will furnish the Contractor with the following materials:~~

- ~~1. Five (5) switch point guards for use within the Contractor provided turnout assembly.~~
- ~~2. Reference Section 01 64 00 – Owner Furnished Materials for coordination.~~

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. The provisions and intent of the Contract, including the General Conditions and General Requirements, apply to this work as if specified in this section.

1.02 DESCRIPTION OF WORK

- A. This Section specifies the material requirements and performance criteria for trackwork and special trackwork to be furnished by the Contractor and installed in accordance with the Contract Drawings. See Section 34 11 23 for additional special trackwork specifications.
- B. Except as modified herein, special trackwork shall be designed, manufactured, tested, assembled, inspected, handled and shipped in accordance with the current edition of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Portfolio of Trackwork Plans, and the AREMA Manual of Railway Engineering.
- C. The extent and location of railroad work is indicated on the drawings. The work includes the requirements for providing railroad track and special trackwork complete with rail, ties and all appurtenances necessary for a complete, operable railway system.

1.03 REFERENCED STANDARDS:

- A. American Railway Engineering and Maintenance-of-Way Association - Manual for Railway Engineering (AREMA).
- B. American Railway Engineering and Maintenance-of-Way Association – Portfolio of Trackwork Plans (AREMA PORTFOLIO) 2014.
- C. Code of Federal Regulations Title 49 – Transportation, Chapter II – Federal Railroad Administration, Department of Transportation, Part 213 – Track Safety Standards.
- D. Code of Federal Regulations Title 49 – Transportation, Chapter II – Federal Railroad Administration, Department of Transportation, Part 214 – Railroad Workplace Safety.

1.04 CONTRACTOR FURNISHED MATERIAL:

- A. Contractor shall provide all materials required for completion of the Work, ~~except those materials identified on the Drawings and in the Specifications as Port Furnished Material.~~

1.05 SUBMITTALS:

- A. Rail Construction Sequencing Plans as described in Section 01 14 00, Work Restrictions
- B. Certification of Rail
 - 1. Contractor to provide Certifications of compliance from suppliers or manufacturers that Rail delivered to the site is in conformance with AREMA Specifications Chapter 4, Part 1 Design of Rail and Part 2 Manufacture of Rail.

2. The chemical analysis of the rails listed by heat number, and the specified chemical analysis elements.
 3. The Brinell hardness of the rails shipped by heat numbers.
- C. Certification of Other Track Material
1. Contractor to provide Certifications of compliance from suppliers or manufacturers that Joint Bars, Compromise Joints, Track Bolts, Nuts and Washers delivered to the site are in conformance with AREMA Specifications Chapter 4, Part 3 Joining of Rail.
- D. Certification of Tie Plates
1. Contractor to provide Certifications of compliance from suppliers or manufacturers that Tie Plates delivered to the site are in conformance with AREMA Specifications Chapter 5, Part 1 Tie Plates and these specifications.
 2. Contractor to provide shop drawing detailing all tie plates using elastic fasteners.
- E. Certification of Elastic Fasteners on Timber Ties
1. Contractor to provide Certifications of compliance from suppliers or manufacturers that Elastic Fasteners delivered to the site are in conformance with AREMA Specifications Chapter 5, Part 9, Design Qualification Specifications for Elastic Fasteners of Timber Cross Ties.
 2. Contractor to provide shop drawing detailing elastic fasteners and clamping force.
- F. Certification of Screw Spikes
1. Contractor to provide Certifications of compliance from suppliers or manufacturers that Screw Spikes delivered to the site are in conformance with AREMA Specifications Chapter 5, Part 10, Section 10.1 Steel Screw Spikes.
- G. Gage Rods: Provide catalog cut sheet.
- H. Ballast
1. The Contractor shall provide laboratory certification that the railroad ballast meets the Specifications of this Section.
 2. Offsite borrow source characterization in accordance with Section 31 00 00, Earthwork.
- I. Vertical and Horizontal Alignment Verification: Vertical and horizontal control survey of finished top of rail. Submittal to consist of a table comparing proposed top of rail elevations to as constructed top of rail elevations at 50 foot intervals along the centerline of alignment. Submittal to be reviewed and approved by Engineer. Where no proposed top of rail is given, the submittal is to consist of documented measurements of the vertical and horizontal alignment of the new trackwork to verify consistency with the FRA Safety Standards for Track Geometry Gage and Alignment for Class 3 track, except where more stringent tolerances are required as specified on the Drawings and in these Specifications.

J. Flangeway detail. Shop drawing detailing method of providing flange way block out in asphalt placed around the rail. Plan to be approved by the Engineer before paving around rail begins.

K. Manufacturer's literature on track lubricator.

1.06 QUALITY ASSURANCE:

- A. The Contractor performing railroad work shall be regularly engaged in the furnishing and installation of railroad trackwork, and shall employ at least one (1) supervisory person who is thoroughly trained and experienced in trackwork construction. The supervisor shall be completely familiar with the design and application of the work described in this Section and shall direct all work performed under this Section.
- B. The Contractor shall own a copy of the American Railway Engineering and Maintenance-of-Way Association - Manual for Railway Engineering (AREMA), Chapters 1, 4, 5, and 30.

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Furnish and install all track materials and products to complete the railroad track and special trackwork, as shown on the Drawings. Completed railroad track shall conform in all regards to the AREMA Manual of Railway Engineering.
- B. Trackwork will use a resilient fastening system, Pandrol type E, or approved equal.

2.02 RAIL:

- A. The Contractor shall provide new rail. All rail shall be 136 RE, as shown on the Drawings, meeting the requirements of AREMA Manual, Chapter 4, Part 2, Specification Section "Specifications for Steel Rails". The Contractor shall provide high strength head hardened rail. High strength head hardened rail shall have a minimum surface Brinell Hardness number of 370.
- B. The rail for this track to generally be constructed using lengths of 39 feet or 80 feet.
- C. Bolt holes within the rail are not acceptable, except at the ends of the rail at locations where joint bars are used.
- D. The rail section shall conform to the dimensions shown in AREMA Manual, Chapter 4, Part 1 for 136 RE.

2.03 RAILWAY BALLAST AND WALKWAY ROCK:

- A. Railway ballast shall conform to the material requirements and be manufactured in accordance with AREMA Chapter 1, Part 2 Ballast. Ballast shall be manufactured by mechanical crushing from ledge rock, talus, or quarry rock and 100% of the material shall have at least one fractured face and 95% of the material retained on a 3/4-inch screen shall have three (3) fractured faces.
- B. Railway Ballast material shall not contain more than a total of 1% by weight of wood wastes, clay lumps, dust, or other extraneous material. Carbonate rock and slag is prohibited for use as ballast.

C. The material from which railway ballast is manufactured shall meet the following test requirements:

1. Los Angeles, Wear, 500 Rev. 35% max.
2. Railway Ballast shall conform to AREMA No. 4 gradation requirements when sampled from stock pile to be loaded for shipment:

Table 34 05 17–A, AREMA No. 4 Gradation	
Sieve Size	Passing % by Weight
2 inch	100
1 1/2 inch	90-100
1 inch	20-55
¾ inch	0-15
½ inch	-
3/8 inch	0-5

3. Walkway rock shall be railway ballast conforming to AREMA No. 5 gradation requirements when sampled from stock pile to be loaded for shipment:

Table 34 05 17–B, AREMA No. 5 Gradation	
Sieve Size	Passing % by Weight
1 1/2 inch	100
1 inch	90-100
¾ inch	40-75
½ inch	15-35
3/8 inch	0-15
No. 4	0-5

4. Gradation test shall be determined in accordance to ASTM C-136, utilizing square opening sieves conforming to ASTM Specifications E-11.
5. Material qualities shall be as follows:

Table 34 05 17–C, Ballast Material Qualities
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Property	Minimum	Maximum	Test Method
Percent Passing No. 200 Sieve	-	1%	ASTM C117
Bulk Specific Gravity - Rock	2.6	-	ASTM C127
Absorption – Rock	-	1.3 %	ASTM C127
Clay Lumps and Friable Particles	-	0.5 %	ASTM C142
Degradation	-	35%	ASTM C535 ASTM C131
Flat and Elongated Particles	-	5%	ASTM D 4791 Test C, Length > 3 times avg thickness

2.04 JOINT BARS AND COMPROMISE JOINTS:

- A. Joint bars shall conform to the AREMA Manual, Chapter 4, Part 3 "Joining of Rail", Section 3.1 and 3.2. Joint Bars shall be 6-hole, 36 inches long, conforming to the AREMA Manual for Railway Engineering, Section 3.2 "Joint Bars and Assemblies."
- B. The bars shall be smoothly rolled, or forged, true to template and shall accurately fit the rails for which they are intended and shall provide a true alignment of the gage and running surfaces of the two rails being connected. A variation of $\pm 1/32$ inch from the specified size of holes, or $\pm 1/16$ inch from the specified location of holes, and of $\pm 1/8$ inch from the specified length of joint bar will be permitted.
- C. Where compromise joints are shown, the Contractor shall field verify the size of existing rail to select the proper compromise joint bars.
- D. Each compromise joint bar shall also have the rail sections shown at each end along with the word "Gage" or "Out" to indicate on which side of the rail the bar is to be used. (If the compromise joint bars are interchangeable, the words gage and out will be omitted.)

2.05 TIE PLATES:

- A. Tie plates shall conform to AREMA Manual Chapter 5, Part 1, "Specifications for Steel Tie Plates".
- B. Either low carbon or high carbon steel tie plates may be furnished.
- C. Tie plates shall accommodate two elastic spring clips and at least four screw spikes to secure the plates to the timber ties. Tie plates to have a minimum length of 16". Tie plates shall have minimum width of 7-3/4" and minimum thickness of 5/8" under the rail in base section.
- D. Tie plates to have 1" diameter holes to accommodate 15/16" diameter screw spikes.

E. Tie plate section to be canted 1:40,+/-5, toward the center line of track.

F. Tie plates shall have smooth flat bases with no ridges or indentations.

2.06 TRACK BOLTS, NUTS, AND SPRING WASHERS:

A. Track bolts and square nuts shall be new, conforming to the current AREMA Manual, Chapter 4, Part 3, "Specifications for Heated Treated Carbon Steel Track Bolts and Carbon Steel Nuts". Spring washers shall be new conforming to the current AREMA manual Chapter 4, Part 2, "Specification for Spring Washers". For each track bolt, provide a square nut and spring washer of proper size for each bolt.

2.07 ELASTIC RAIL CLIPS:

A. The elastic rail clips to be used shall be one piece, threadless fasteners of spring steel Pandrol e-2055 Rail or approved equal, which must meet all the following requirements:

B. An easy to install one piece elastic spring steel rail clip without threaded elements which can be easily removed from its housing without any possible damage to or the loss of the lateral support provided by the shoulder. The design and configuration of the clips, their housing and their area in contact with the rail should be such that a nominal rail seat clamping force of 2500 pounds per clip is provided and frequent rail slippage can be allowed without stressing, bending, twisting or damaging the clips or their housing.

2.08 SCREW SPIKES:

A. Screw spikes shall be new, conforming to the current AREMA Manual, Chapter 5, Part 10, Section 10.1.

B. Screw spikes used to fasten the plates to the timber ties shall be one piece with reinforced throat, 3/4" square head, 15/16-inch diameter, 6-inches long per AREMA plan 1S-12 AREMA Rectangle Head Screw Spike.

C. The head shall be concentric with and firmly joined to the body of the screw. The material shall be free from injurious defects and shall have a workmanlike finish. Screws shall be provided with plain finish.

D. Finished screws shall conform to the following minimum requirements for tensile properties:

1. High Strength

a. Tensile Strength, psi 120,000 Min

b. Yield Strength, psi 80,000 Min

c. Elongation, % 18 Min

E. Except for heat-treated screws, steel mill cert data may be used for tensile strength with approval of the Port.

F. A letter or brand indicating the manufacturer shall be located on the top of the washer of each screw.

2.09 GAGE RODS:

- A. Gage rods shall be manufactured to fit the specified rail, shall be manufactured from 1-1/4-inch diameter steel bar with double adjustable clamps at both ends to grip both sides of the rail, and shall be set for standard gage track. Gage rods to be installed on 13' centers within the curves.

2.10 TRACK LUBRICATOR:

- A. Track lubricators shall be an assembly of lubricant tank, pumping components, hoses, applicators, controls, sensors, protective mats, foundation and all associated hardware designed for the delivery of friction management lubricants to the gauge face of rail and designed for freight rail applications. Track lubricators shall be a proven effective design with a minimum of 2,500 units currently in service.
- B. Track lubricators shall deliver lubricants at a controllable rate, delivering grease at a rate of 0.75 pounds per 1000 axle passages, and deliver other lubricants at a rate of 0.5 liters per 1000 axle passages. Wheel sensors shall be non-contact and shall activate lubricant delivery upon bi-directional passage of train rolling stock.
- C. Lubricator pumps, hoses and applicators shall deliver consistent and balanced amounts of lubricant to each rail. Lubricator pump shall be gear type and shall be suitable for delivering greases and oils. Lubricant applicators shall apply lubricant to the gauge face of each rail and shall be of aluminum construction. Each applicator shall be a minimum of 48 inches in length with a minimum of 16 ports for the distribution of lubricant across the gauge face of the rail. Applicators shall be designed for installation without grinding or cutting of rail. Each track lubricator shall be furnished with ten applicators, two applicators for each rail and two spares, and lubricant hoses and fittings conforming to the manufacturer's recommendations.
- D. Lubricator shall be designed for use DC Solar power and all DC solar power components for a fully functional power system shall be furnished with each track lubricator. Solar panels shall include vandal resistant shielding and aluminum frame and support. Battery shall be non-spillable, deep cycle battery.
- E. Control systems shall be enclosed in a watertight enclosure on the exterior of the lubricant tank and shall provide fuse and surge protection, and manual test function. Controls shall be solid state and shall allow for adjustment of lubricant pump activation interval and duration.
- F. Lubricant tank shall provide capacity for 800 pounds of grease and a minimum volume of 100 gallons. Lubricant tank shall be sloped to drain to pump intake and shall have a watertight locking lid.
- G. Protective mats shall be puncture and solvent resistant fabric manufactured from recycled materials and resistant to UV deterioration. Mats shall contain dripping lubricants while allowing water to pass through. Protective mats shall cover the full width of the track ties at the lubricator installation site and shall extend a minimum of 30 feet along the track beyond each end of the applicators, a total minimum length of 60 feet.
- H. Lubricator tank, pump and controls shall be mounted on timber ties in accordance with manufacturer's recommendations.

2.11 LUBRICANT:

- A. Lubricant shall be a petroleum based, high performance grease conforming to the following characteristics:

Operating Temperature Range (°C)	-34 to 121
NLGI Grade	1
Drop Point (°C)	177
Base Oil Viscosity, cSt (@40°C)	168

2.12 SPIKES:

- A. Track spikes shall be as specified in Chapter 5, Part 2 Track Spikes of the Arema Manual. Spikes shall be new 5/8" by 6" cut track spikes.

PART 3 - EXECUTION

3.01 GENERAL:

- A. The track will be constructed using timber ties and bolted rail. In general, the track is to be constructed using 39-foot or 80-foot rail lengths. Burned or sheared rail will not be accepted. Tie spacing will be 21 inches on center for tangent track and 19-1/2 inches on center for curved track.
- B. Track construction shall be in conformance with the standards of the American Railway Engineering and Maintenance-of-Way Association and the requirements set forth below.
- C. Track construction shall be performed in conformance with CFR 49 Chapter II, Part 214.

3.02 RAILWAY BALLAST:

- A. Ballast sections shall conform to typical cross section shown in the Drawings.
- B. Ballast shall be unloaded at required locations in a manner to minimize redistribution and handling.
- C. The ballast shall be placed before the ties are laid. Raise both rails uniformly to the designed grade.
- D. Care shall be taken when distributing materials from trucks and off-track equipment to prevent forming of ruts that would impair proper drainage of subgrade surface.
- E. Ballast shall only be installed over subgrade which has been prepared in accordance with this Specification and has been approved by the Engineer.
- F. Place ballast in lifts not more than 6 inches in thickness before compaction. Layers shall extend beyond the edge of the ties as shown on the Contract Drawings before compaction. Compact ballast thoroughly to form a stable section able to support the subsequent layers and loads.

- G. Compaction of ballast shall be by means of vibratory compaction equipment or specifically manufactured for compaction purposes. Self-propelled, pneumatic-tired roller shall have a gross weight of 10 to 15 tons, and the vibratory compactor shall have a weight of not less than 10 tons and shall be capable of applying a dynamic load of not less than 18,000 pounds at 1300 to 1500 cycles per minute. Proposed compaction equipment shall be approved by Engineer.
- H. Engineer will approve the compacted ballast prior to installation of track and appurtenant work over ballast. Each lift of ballast within initial layer shall be uniformly spread and compacted with not less than four passes of either a self-propelled, pneumatic-tired roller or vibratory compactor until no waving or creeping occurs.
- I. Track shall be assembled on compacted ballast to permit placement of additional ballast for subsequent raising and tamping and to provide full depth under ties.
- J. Final track raise shall not exceed 2 inches, and ballast shall be compacted with a 16 tool vibrating squeeze-type mechanical tamper making one full tamping insertion per tie for each inch of raise. Ballast in crib areas shall be compacted by a means approved by Engineer. Track shall be raised, aligned and tamped to within the specified tolerances.
- K. Ballast shall be thoroughly tamped within a space from 15 inches inside each rail to ends of ties. In tamping ties within above described limits, simultaneous tamping shall be performed under each rail. Tamping is not permitted at center of tie except within limits of turnouts and crossings.
- L. Pneumatic or electric tamping tools, either hand held or machine mounted, shall be used. Hand tamping with shovels or picks is not permitted.
- M. Two tamping tools shall always be used opposite each other on same tie. Tamping tools shall be started from a nearly vertical position and worked downward past bottom of tie, after which tool should be slanted downward to force ballast under tie. Double tamp every joint tie.
- N. Ballast shall be mechanically dressed to provide proper section as shown on Drawings.
- O. Excess ballast shall be removed, or may, at Contractor's option, be placed as directed by Engineer. Payment will not be made for ballast in excess of dimensions shown on Drawings.
- P. Overworked and excessively tamped ballast shall be removed and replaced at Contractor's expense.

3.03 TRACK CONSTRUCTION:

- A. Trackwork: Lay rails on timber tie track with staggered joints such that joints in opposite rails shall be staggered not less than 12 feet apart. Use temporary shims to secure proper spacing between the ends of rails. The rail temperature, at the time of laying, shall determine the number and thickness of shims required. Shim thickness shall be in accordance with table 5.2 in AREMA Section 5.1.4.

- B. Space timber ties 21 inches on center for tangent track and 19-1/2 inches on center for curved track, unless otherwise noted. Any deviation from the specified spacing shall be approved by the Engineer prior to installation of spikes or hold down devices.
- C. Care shall be taken in handling or spacing ties to not damage them with picks or spiking hammers. Ties shall be lifted and supported during storage, transportation, and placed in such a manner as to prevent damage. Ties shall not be dropped to the roadbed. Tie tongs, lining bars, other suitable tools or tie spacing equipment shall be used.
- D. Place wood ties with heartwood face down and square to the rail, except as otherwise shown in the Drawings.
- E. Ties shall be placed within 0.5 inches of perpendicular to the opposite rail.
- F. Cribs shall be filled to full height unless otherwise directed by the Engineer.
- G. Tie Plates: Set tie plates in correct position on the ties, true to gage, and with shoulders in full contact with the rail. Place one tie plate under each rail at each tie.
- H. Joint Bars: Secure joint bars in place with the full number of bolts, nuts and lockwashers. Stagger bolts, with heads placed inside and outside alternately, and draw tight before fastening rail to tie.
 - 1. A lubricant shall be applied on the rail within the area of the joint bar at time of installation.
 - 2. Rail joints shall be applied so that bars are not cocked between base and head of rail. Bars are to be properly seated in rail.
 - 3. Rail joints are not to be placed in limits of paving on asphalt crossing.
- I. Screw Spikes: Two screw spikes to be provided each side of rail for a total of four screw spikes per plate.
- J. Gage Rods: Gage rods shall be provided in all curves and spaced at 13-foot centers along the centerline of track.

3.04 TRACK LAYING:

- A. The Contractor shall construct the track in conformance with the approximate alignment and profile data (at select locations where available) shown on the Drawings. Alignment is based on the center line of track, equidistant between gage sides of the rails. The Contractor shall match into existing track horizontal and vertical alignment on all legs of new turnouts, unless otherwise noted.
- B. Where track alignment and profile data is not provided, the Contractor shall match existing track alignment and profile and make any necessary adjustments to meet the FRA Safety Standards for Track Geometry Gage and Alignment for Class 3 track, except where more stringent tolerances are required as specified on the Drawings and in these Specifications.
- C. The Contractor shall perform final surfacing and tamping following all other track construction items affecting the track structure. The ballast is to conform to the ballast section shown on the Drawings.

D. The Contractor shall place the track in good alignment before the final ballast lift is made. The maximum throw for final lining shall not exceed 2 inches. Contractor shall set hubs for the alignment before the final lift is made and final alignment shall conform to the hubs.

E. Gage of Track:

1. Gage of track is the inside dimension between running rails, measured at right angles to the alignment of the track 5/8" below top of rail. The standard gage of track is 4'-8 1/2".

F. Track Tolerances:

1. The final gage, cross level, and horizontal and vertical alignment of all track shall be within the tolerance shown below:
2. Gage variation:
 - a. Gage variation shall not exceed 1/8" (+/-) in new track construction.
 - b. New track will be laid to 4'-8 1/2" gage.
3. Cross Level:
 - a. Deviation from cross level: No reverse cross level on curves will be allowed. A maximum deviation of minus 1/2 inch cross level on inside rail of curve will be allowed. A maximum of 1/4" cross level deviation will be allowed on tangent track.
4. Horizontal Track Alignment:
 - a. Maximum allowable deviation of the middle ordinate from a 62-foot chord,
 - (a) On curves: 3/8 inch
 - (b) On tangents: 1/4 inch

G. Vertical Track Profile:

1. The maximum permissible variation from profile elevation detailed on profile drawings shall be + 1/2 inch, -0 inch

H. Maximum permissible runoff per 40 feet in any interim raise shall not exceed: 1 inch

I. The maximum permissible variation from a uniform profile on either rail at the mid-ordinate of a 62-foot chord shall not exceed: 1/4 inch

3.05 ASSEMBLE AND INSTALL TURNOUTS:

- A. Install turnout as shown on Drawings.
- B. Installation of frog plates, switch plates, and plates under closure rails shall conform with AREMA trackwork standards, and Shop Drawings.
- C. Following installation of special trackwork on initial layer of ballast, special trackwork shall be lifted, aligned and supported prior to placement of final ballast.
- D. Ballast shall be uniformly placed and spread. Turnout shall then be raised and ballast tamped under both sides of each tie for the full length of tie. Tamp ballast thoroughly throughout length of all ties in turnout. Hand-held power tamping tools shall be used

where workheads of tampers cannot reach tie cribs in Special Trackwork. Final top of ballast shall conform to the ballast section as indicated except in cribs between point of switch and heel of switch where it shall be three inches below base of rail to allow clearance for switch rods.

- E. When installing various components of Special Trackwork, particular attention shall be given to the following:
 - 1. Check alignment, gage, and surface through turnout.
 - 2. See that bolts, nuts, cotter pins, and other fastenings are in place, in good condition, and properly tightened.
 - 3. See that switch points fit snugly against rail when switch is thrown in either position.
 - 4. See that connecting rod and switch rod bolts are equipped with cotter pins properly spread.
- F. Test operate switches for lost motion and loose connections and adjust as necessary.
- G. Examine rod and fastenings which connect switch point to switch stand to see that they are in place and in good condition.
- H. Switch stands shall be so installed as to hold switch point tightly against the stock rail when stand is in normal position. Switch rods shall be adjusted to hold opposite point tightly against rail when stand is in reverse position.
- I. Switch stands shall be kept securely spiked to switch ties. Switch ties shall be set square with track and kept firmly tamped.
- J. At time of installation, all sliding surfaces of special trackwork assemblies shall be lubricated with a dry film graphite lubricant in accordance with manufacturer's recommendations.
- K. Tamping shall be as per Article 3.08.D of this Section.
- L. No closed point switch point shall be installed in the main track unless it has the proper point protection in place and tested.

3.06 DRILLING:

- A. Rail ends for bolted joints shall be drilled in accordance with AREMA standards. Any additional holes in rail will be sufficient cause for rejection.
- B. Holes in rail shall be drilled to proper size and not punched, slotted, or cut with a torch, and holes shall be chamfered to remove sharp edges.
- C. A variation of 1/32 inch in size and location of bolt holes shall be allowed.
- D. Holes shall be located with proper size rail drilling template and marked with a center punch prior to drilling. Drilling through joint bars is prohibited.

3.07 RAIL ENDS:

- A. Rail shall be cut with rail saw to a tolerance of 1/32 inch from square. All burrs shall be removed and ends made smooth. Torch cut rails will be rejected.
- B. Battered or mismatched ends shall be built up or ground off

3.08 SURFACE, LINE AND GRADE:

- A. Contractor shall perform all surfacing within the stated project limits as specified to bring line and surface into compliance within track geometry tolerances specified in this section.
- B. Contractor shall surface track to zero crosslevel.
- C. Ballast shall be spread and track raised in a series of lifts. No single lift shall be higher than 2 inches. In raising track, jacks or equipment shall be regulated to avoid bending of angle bars or straining of joints. When jacks are used they shall be simultaneously used and properly spaced at not more than quarter points of rail to avoid breaks or bends in rail when track is raised. Both rails shall be raised simultaneously and to proper crosslevel by raising jacks.
- D. Each tie shall be tamped from 15 inches inside rail to end of tie. Tamping shall not be permitted at middle of tie. Both ends of a tie shall be tamped simultaneously and tamping inside and outside rail shall be done at same time. Equipment used for surfacing truck shall be subject to approval by Engineer.
- E. Ties that become loose during track raising shall be unfastened realigned, and re-fastened before tamping. During each track raise, track is to be uniformly tamped.
- F. After ballasting is completed and track is surfaced and lined, according to tolerances, ballast shall be trimmed neatly and surplus material shall be spread evenly along ballast shoulder.
- G. Contractor shall perform necessary operations to assure that all ties are at right angles to track.
- H. Contractor shall perform two tamping squeezes per tie up to 1-1/2 inches of raise with one additional insertion and squeeze for each additional 1 inch of raise. Joint ties shall be given one additional squeeze than other ties. The maximum allowable raise per surfacing pass shall be 2 inches.
- I. In locations where squeeze tampers cannot fill and compact ballast, such as at frogs, guard rails, switch points of turnouts and headblocks, etc., mechanically tamp with air tools or other hand-held power tamping tools.
- J. On curves, high rail shall be used as line rail and low rail shall be used as grade rail.
- K. When surfacing turnouts, the straight side of turnout shall be used as the line rail.
- L. After ballast regulating in turnouts, Contractor shall immediately clean excess ballast from switch point area, including switch points, switch rods, connecting rods, and guardrail and frog area.
- M. After ballast is regulated and dressed, Contractor shall ensure that resilient fasteners, track bolts and rail anchors are tight and in proper alignment.
- N. Contractor caused damage to signal equipment, shall be repaired at Contractor's sole expense.

3.09 TIE REPLACEMENT:

- A. In the area of the Lincoln Ave overpass which calls for tie replacement, the contractor shall remove and dispose of ballast as necessary to remove all existing ties. Existing

rail, tie plates, joint bars, anchors, and all other track material including but not limited to bolts, nuts and washers shall be protected and salvaged for reuse. The contractor shall provide new spikes to connect all salvaged material to new ties. New ballast shall be provided by the contractor to fill track cribs and void on either side of the track resulting from tie replacement work. Track shall be surfaced, lined, and dressed according to the specifications.

3.10 TESTING:

- A. Before final acceptance of trackwork, the Port will provide for a suitable test locomotive to be run over the entire length of new trackage in the presence of the Engineer. There shall be no noticeable settlement or deflection of ties and rail during the test. The Contractor shall re-line, surface, tamp, or otherwise correct any and all deficiencies as directed by the Engineer.

3.11 TRACK LUBRICATORS:

- A. Install track lubricators in accordance with manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. The provisions and intent of the Contract, including the General Conditions and General Requirements, apply to this work as if specified in this section.

1.02 DESCRIPTION OF WORK

- A. This Section specifies the material requirements and performance criteria for complete special trackwork including turnouts to be furnished by the Contractor in accordance with the Contract Drawings.
- B. Except as modified herein, special trackwork shall be designed, manufactured, tested, assembled, inspected, handled and shipped in accordance with the current edition of the American Railway Engineering and Maintenance-of-Way Association (AREMA) Portfolio of Trackwork Plans, and the AREMA Manual of Railway Engineering.

1.03 REFERENCE STANDARDS

- A. Comply with all applicable local, State and Federal codes provisions of most recent edition, including all addenda, of following codes, specifications, standards, and recommended practices, except as otherwise indicated:
 - 1. AREMA MANUAL – American Railway Engineering and Maintenance-of-Way Association, Manual for Railway Engineering
 - 2. AREMA PORTFOLIO – American Railway Engineering and Maintenance-of-Way Association, Portfolio of Trackwork Plans
 - 3. FRA-DOT – Federal Railroad Administration, Department of Transportation

1.04 QUALITY ASSURANCE

- A. All special trackwork specified shall be standardized throughout the project trackage. Mixing and matching of different materials from different suppliers shall not be permitted. All Contractor-furnished special trackwork assemblies shall be furnish from a single supplier.
- B. Testing and inspection shall conform to the AREMA Manual, AREMA Portfolio and these specifications.

1.05 CONTRACTOR FURNISHED MATERIAL:

- A. The Contractor shall provide all materials required for completion of the Work, ~~except those materials identified on the Drawings and in these Specifications as Port Furnished Material.~~

~~1.06 PORT FURNISHED MATERIAL:~~

- ~~A. The Port will provide the materials identified on the Drawings and in these Specifications as Port Furnished Material. Quantity of Port Furnished Material items will be as indicated in the Specifications.~~
- ~~B. Port Furnished Material will comply with product specifications of this Section.~~
- ~~C. Port Furnished Materials will be delivered to the Contractor Laydown Areas identified on the Drawings by the Port.~~

- ~~D. The Contractor shall receive products at the site and give written receipt for materials at the time of delivery, noting visible defects and omissions. If such declaration is not given, the Contractor shall assume responsibility for such defects and omissions.~~
- ~~E. The Contractor shall store materials until ready for installation and protect from loss and damage.~~

1.071.06 SUBMITTALS

- A. The Contractor shall submit, under the provisions of Section 01 33 00, "SUBMITTALS PROCEDURES", the following information:
 - 1. Compliance: Supplier's certification that the material delivered to the site is in compliance with the Specifications. Include all test results and submittals stipulated in the references sections of AREMA Manual and Portfolio.
 - 2. Shop Drawings: Submit shop drawings for turnouts detailing trackwork layout and interconnection with other special trackwork, and showing switches, frogs, tie spacing, fasteners, switch stands, point of switch and appurtenant geometric relationships, dimensions and information. All shop drawings shall be approved by the Engineer prior to beginning manufacture or fabrication of special trackwork or production of switch ties.

PART 2 - PRODUCTS

2.01 TURNOUTS

- A. Rail and frog casting shall be new, fabricated in the United States or Canada. Rail shall be 136RE as shown on the Drawings. There is not a Buy America contract requirement.
- B. Turnouts shall have 16'-6" switch points with graduated risers and shall conform to AREMA Portfolio Plan No. 112-08. Turnouts shall be furnished with appurtenant hardware for hand throw switches as indicated in these Specifications and as directed by the Engineer. Switch points shall be Samson undercut type and be manufactured per AREMA Specifications for Special Trackwork and with AREMA Plan No. 221-12. Samson points shall be head hardened and double reinforced with transit style clips. Turnouts shall include curved, straight, closure rails utilizing 136 RE rail with screw spikes and elastic fasteners. Switches shall be manganese tips (AREMA Plan No. 220-08)
- C. Guardrails shall be 13'-0" long, new or relay, and conform to AREMA Plan No. 504-03 and fastened with screw spike plates and elastic fasteners.
- D. The special trackwork components shall be designed to be hand thrown capable of providing 300 pounds of force at mid-stroke and 500 pounds of force at the end of the throw.
- E. Frogs shall be one piece, rail-bound manganese, heavy walled, explosion depth hardened per AREMA M2.7 Depth Hardening. ~~Frogs shall be radiographic tested per AREMA Portfolio Specification M2.5 Workmanship.~~ Contractor shall use resilient fastening system for all frog base plates and gage plates.

- F. Frogs shall conform to AREMA Portfolio of Trackwork Plans, Plan No. 623-03, 16' rail bound manganese steel frog for 136 RE rail with screw spike plates and elastic fasteners. Frogs shall be drilled for three (3) bolts to match the specified rail.
- G. The arm ends of the frogs shall be beveled as per AREMA Portfolio Plan No. 1005-03 "Beveling of Rail Ends for Special Trackwork". Rail bending shall be done with great care to avoid stress build up and injury to the rails. Rail shall be bent cold whenever possible. If heating the rail should be necessary, the surface temperature of the rail shall not exceed 800° F and the surface of the remainder of the rail section shall not exceed 1100° F. Heating shall be done in a manner so as to have a minimal adverse effect on the metal.
- H. All switch ties shall be provided by the Contractor.
- I. Switch points shall be in accordance with AREMA Plan No. 221-12, Detail 5100 and as indicated.
- J. Adjustable rail braces, switch plates and plates under the closure rails shall conform to details for plates in AREMA Portfolio of Trackwork Plans Plan No. 224-08. Switch plates shall use screw spikes. Turnout plates shall conform to Plan No. 112-08 and as indicated.
- K. Switch point guards shall be furnished for all switches. Switch point guards shall be boltless adjustable switch point guard Model U69 as manufactured by A&K Railroad Materials, or approved equal. Switch point guards shall be furnished with appropriate switch plates and mounting hardware. Switch point guards shall be boltless adjustable manganese steel switch point guard 5'-0" in length mounted along the gage face of the rail and ahead of the point of switch. Switch point guards shall be furnished with two gage plates on both ends, a brace plate interior to the gage plates and appropriate mounting hardware. Switch point guards shall be Progress Rail Model U69 or approved equal. See Section 01 64 00 Owner Furnished Products for switch point guards provided by the Port.
- L. Switch stands shall be Racor Model 22-E (or approved equal) trailable, adjustable switch stands with low banner, "Backsaver" handle, adjustable connecting rod and bolts with lock washers and cotter pins. The bolt hole in the switch stands, connecting rods and switch rods (42-inches) shall all be the same matching diameter with matching size bolts. Mismatch of bolts and bolt holes will be cause for rejection.
- M. Turnout sizes shall be as indicated in the Contract Drawings.
- N. Turnouts shall be of bolted design. All switch bolts shall be designed for use with cotter pins and shall be installed with lock washers for cotter pins.
- O. Switch rods and clips shall be insulated. Switch rods shall be horizontal and conform to AREMA Plan No. 222-08. Switch rods shall conform to AREMA Specification Section M6. The Contractor shall furnish switch rods with all associated slide and runoff plates.
- P. Switch rods shall conform to the AAR Signal Manual, Part 14.5.3, Signal Specifications, "Recommended Developmental Criteria for Insulating Material".
 - 1. Fiber angles, plates and end posts shall be fabricated of fiberglass mat reinforced polyester, 3/16-inch thick, GPO- I sheet stock, NEMA Class B.
 - 2. Fiber bushings shall be fabricated of NEMA Grade 10 epoxy glass fabric.

3. All cut edges of fiberglass shall be sealed with Sherwin Williams Polane, 2-part coatings or an accepted equal.
4. Prior to assembly, all contact metal surfaces shall be painted with General Electric Insulating Enamel, Red Glyptol No. 1202 or equal.

Q. Gage Plates

1. Gage plate shall be at least 3/4-inch thick and the width shall be 8 inches. Gage plates and switch plates within the turnout shall be manufactured in accordance with the AREMA Portfolio of Trackwork Plans No. 223 and shall be modified to suit elastic fasteners.
2. Plates shall conform to the AREMA "Specifications for Special Trackwork", Section M7, rolled "Mild Steel".
3. Insulation shall conform to the AAR Signal Manual, Part 116, Signal Specifications, "Assembly and Test of Insulated Track Fittings".
4. Insulated gage plates shall be provided for all turnouts and crossovers.

2.02 RAIL

- A. Rail shall be new 136 RE as shown on the Drawings, head hardened rail for turnouts conforming to AREMA Chapter 4.

2.03 SWITCH TIES

- A. Switch ties shall conform to Section 34 11 32, Timber Ties.

2.04 OTHER TRACK MATERIAL

- A. Other track material, including, but not limited to, tie plates, joint bars, compromise joint bars, bolts, nuts, washers, elastic clips and screw spikes, shall conform to Section 34 05 17, Railroad Work.

2.05 SWITCH DESIGNATION PLATES

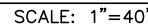
- A. Plates shall be sheet aluminum conforming to ASTM B209 with at least the strength and durability properties of Alloy 5005-H32.
- B. Plate shall be 1/8" thick.
- C. Apply Type 1 Engineer Grade silver reflective sheeting conforming to ASTM D4956 - 16b.
- D. Apply 3" high letters and numbers to sheeting. Letters and numbers shall be black vinyl, cut with clear laminate UV and weather protection manufactured International Design & Marketing, Inc., Huntington Beach, CA, 800-687-7446 or approved equal.
- E. Contractor shall apply plates to wood ties using 3/8" X 2", 316 SS or 18-8 SS lag bolts, each bolt 1" \pm 1/16" from both edges of each corner.

PART 3 – EXECUTION

3.01 GENERAL

- A. Install Special Trackwork in accordance with Section 34 05 17, Railroad Work.

END OF SECTION



1. SEE SHEETS R3-B THROUGH R7-B FOR TRACKWORK DETAILS.
2. SEE SHEETS R4-B & R5-B FOR SPECIAL TRACKWORK DETAILS AND VARIATIONS FROM PROJECT STANDARDS REQUIRED FOR TURNOUT REPLACEMENTS INCLUDING ADDITIONAL RAIL, TIES, COMPROMISE JOINTS NOT INDICATED IN PROJECT STANDARD TURNOUT CONFIGURATION.
3. TURNOUT REPLACEMENTS ARE WITHIN ACTIVE TRACKS AND YARDS. CONTRACTOR SHALL CONFINE OPERATIONS AND STAGING TO THE LAYDOWN AREA SHOWN AND THE LIMITS OF THE TURNOUTS TO BE REPLACED. CONTRACTOR SHALL YIELD TO RAIL TRAFFIC AT ALL TIMES. SEE G6 FOR SEQUENCING GUIDANCE AND REQUIREMENTS.
4. AT ALL LOCATIONS, CONTRACTOR SHALL DEMOLISH EXISTING TURNOUT AND CONNECTING TRACK TO EXTEND NECESSARY TO INSTALL NEW TURNOUT AND TRACK SHOWN.
5. CONTRACTOR TO REMOVE AND REPLACE POWER SWITCH MACHINES AT TURNOUTS 30, 31, 32 AND 33 WITH MANUAL SWITCH STANDS.
6. TYPICAL BALLASTED TRACKBED SECTION SHALL BE APPLIED AT ALL LOCATIONS OF NEW RAIL, INCLUDING NEW TURNOUT LOCATIONS. FOR TYPICAL BALLASTED TRACKBED SECTION, SEE
7. ALL NEW RAIL SHALL BE 136 LB JOINTED RAIL, UNO.
8. ALL NEW TRACK TIES ARE TIMBER, SEE R3-B FOR STANDARD DETAILS.
11. ALL START AND END REPLACEMENT TRACK LOCATIONS, WHICH MATCH INTO EXISTING TRACK, ARE APPROXIMATE. THE CONTRACTOR SHALL FIELD LOCATE NEAREST EXISTING JOINT A OR BEYOND MATCH POINT INDICATED, VERIFY VERTICAL AND HORIZONTAL ALIGNMENT AND TIE INTO EXISTING TRACK AT EXISTING JOINT.
12. CONTRACTOR LAYDOWN AREA FOR WORK ON BUBBLE TRACK 2 SHOWN ON SHEET R1-B, UNDER PORT OF TACOMA ROAD OVERPASS. LAYDOWN AREA MUST BE OFFSET MINIMUM 15' FROM CENTERLINE OF ACTIVE TRACKS.

EXISTING RAIL, TOP OF RAIL

REPLACEMENT OF #9 CROSSOVER

SURFACE, LINE, AND DRESS TRACK, SEE SPECIFICATIONS

REMOVE EXISTING TRACK AND INSTALL NEW TRACK, CENTERLINE

POINT OF SWITCH (PS)

COMPROMISE JOINTS

5. ALL EXISTING CONDUITS ASSOCIATED WITH REMOVED POWER SWITCH MACHINES SHALL BE CUT BACK TO NEAREST JUNCTION BOX. ALL WIRING SHALL BE PULLED BACK TO JUNCTION BOX AND NEATLY STORED. THE CONTRACTOR SHALL ASSUME THAT EXISTING HEAD-BLOCK TIES ARE COMPATIBLE WITH NEW MANUAL SWITCH STANDS.

