



PIERCE COUNTY INDUSTRIAL PARK RAIL ACCESS

PIERCE COUNTY, GEORGIA TECHNICAL SPECIFICATIONS

Project No. 20-1019

**BID SET
NOT FOR CONSTRUCTION**

SECTION 02231
CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 SUMMARY

Work under this section includes requirements for clearing and grubbing the project area as indicated on the drawings. The work of this section shall include, but not be limited to clearing trees and disposing of all stumps, shrubbery growth, roots, and other vegetation within the project limits. The Contractor shall furnish all labor, equipment and utilities to complete the work as indicated on the project drawings and as specified herein.

1.2 SITE CONDITIONS

The Contractor shall be responsible for visiting and examining the project site to assess the extent of clearing and grubbing work to be done.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 LIMITS OF SITE CLEARING AND GRUBBING

The Contractor shall perform site clearing to the limits of the work area shown on the drawings referred to as the Project Limits.

3.2 PROTECTION

3.2.1 Access Roads

Keep access roads free of refuse and debris at all times.

3.2.2 Trees, Shrubs, and Existing Facilities

Trees and vegetation to be left standing shall be protected from damage incident to clearing, grubbing, and construction operations by the erection of orange tree fencing or by such other means as the circumstances require.

3.2.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Owner immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Owner in ample time to minimize interruption of the service.

3.3 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obstruct, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface.

3.5 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for rail beds. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to the original adjacent surface of the ground.

3.6 DISPOSAL OF MATERIALS

3.6.1 Other Organic Materials

Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations shall be disposed of off the project site at the Contractor's responsibility. The use of burning at the project site for the disposal of refuse and debris will not be permitted.

End of Section 02231

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

The work under this section consists, in general, of furnishing all labor, materials, tools, equipment, and incidentals for providing for the excavation, backfilling and compaction of all track work as indicated on the project drawings and as specified herein.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 180 (2001) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in) Drop

AASHTO T 224 (2001) Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

ASTM D 1140 (2000) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve

ASTM D 1556 (2000) Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D 1557 (2002e1) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))

ASTM D 2487 (2000) Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D 2922 (2004) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

ASTM D 3017 (2004) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

ASTM D 422 (1963; R 2002) Particle-Size Analysis of Soils

ASTM D 4318 (2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 698 (2000ae1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu.m.))

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

- EPA 600/4-79/020 (1983) Methods for Chemical Analysis of Water and Wastes
- EPA SW-846.3-3a (1999) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods; Third Edition; Final Update III-A

GEORGIA DEPARTMENT OF TRANSPORTATION (GDOT)

- GDOT (2001) State of Georgia - Standard Specifications for Construction of Transportation Systems

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION
(AREMA)

- AREMA Manual (2008) Manual for Railway Engineering

1.3 DEFINITIONS

1.3.1 Satisfactory or Suitable Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, SW, SP, and SM. The plasticity index shall not be greater than 10 percent when tested in accordance with ASTM D 4318, and not more than 25 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140. Satisfactory materials for grading shall be comprised of stones less than 8 inches, except for fill material for pavements and railroads which shall be comprised of stones less than 3 inches in any dimension.

1.3.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. The Owner shall be notified of any contaminated materials.

1.3.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Testing required for classifying materials shall be in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

1.3.4 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve shall be expressed as a percentage of the maximum density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224. To maintain the same percentage of coarse material, the "remove and replace" procedure as described in the NOTE 8 in Paragraph 7.2 of AASHTO T 180 shall be used.

1.3.5 Topsoil

Material suitable for topsoils obtained from offsite and onsite areas, or excavations is defined as: Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

1.3.6 Hard/Unyielding Materials

Weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 8 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.3.7 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and blasting, drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement exceeding 1/2 cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.3.8 Unstable Material

Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, pavement or appurtenant structure.

1.3.9 Select Granular Material

1.3.9.1 General Requirements

Select granular material shall consist of materials classified as GW, GP, SW, SP by ASTM D 2487 where indicated. The plasticity index shall not be greater than 5 percent when tested in accordance with ASTM D 4318, and not more than 10 percent by weight shall be finer than No. 200 sieve when tested in accordance with ASTM D 1140.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01300, "Submittals."

A. Preconstruction Submittals

1. Shoring
2. Dewatering Work Plan

Submit 15 days prior to starting work.

B. Test Reports

1. Testing
2. Borrow Site Testing

Within 24 hours of conclusion of physical tests, 3 copies of test results, including calibration curves and results of calibration tests.

C. Certificates & Statements

1. Testing - Qualifications of the independent testing laboratory for approval.

1.5 SUBSURFACE DATA

Variations may exist in the subsurface between boring locations. Contractor is responsible for making any subsurface investigations as necessary to perform the specified work.

1.6 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.7 CRITERIA FOR BIDDING

Base bids on the following criteria:

- A. Surface elevations are as indicated.
- B. Pipes or other artificial obstructions, except those indicated, will not be encountered.
- C. Ground water elevations are not applicable.
- D. It is not anticipated that any rock will be encountered in this project.

1.8 DEWATERING WORK PLAN

Submit procedures for accomplishing dewatering work.

1.9 SHORING AND SHEET PLAN

See Paragraph 3.4 SHORING.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

Offsite soils brought in for use as backfill shall be tested for TPH, BTEX and full TCLP including ignitability, corrosivity and reactivity. Backfill shall contain less than 100 parts per million (ppm) of total petroleum hydrocarbons (TPH) and less than 10 ppm of the sum of Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and shall not fail the TCPL test. TPH concentrations shall be determined by using EPA 600/4-79/020 Method 418.1. BTEX concentrations shall be determined by using EPA SW-846.3-3a Method 5030/8020. TCLP shall be performed in accordance with EPA SW-846.3-3a Method 1311. Provide Borrow Site Testing for TPH, BTEX and TCLP from a composite sample of material from the borrow site, with at least one test from each borrow site. Material shall not be brought on site until tests have been approved by the Owner.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

Topsoil shall be stripped to a depth of 4 inches and stockpiled. Topsoil shall be transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later. Topsoil shall be kept separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Topsoil shall be spread on all areas to be seeded. Any surplus topsoil from excavations and grading shall be removed from the site.

3.2 GENERAL EXCAVATION

The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Grading shall be in conformity with the typical sections shown and the tolerances specified in paragraph FINISHING. Satisfactory excavated materials shall be transported to and placed in fill or embankment within the limits of the work. Unsatisfactory materials encountered below Top of Subgrade shall be excavated below grade and replaced with satisfactory materials as directed. Such excavated material and the satisfactory material ordered as replacement shall be included in excavation. Surplus satisfactory excavated material not required for fill or embankment shall be disposed of in areas approved for surplus material storage located on the project site. Unsatisfactory excavated material shall be disposed of off the Owner's Property in waste or spoil areas provided by the Contractor. During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be produced from excavated on within the project limits or imported from other approved areas selected by the Contractor as specified.

3.2.1 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. The Contractor shall establish/construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

3.2.3 Dewatering

Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches will not be permitted within 3 feet of the foundation of any structure, or rail tie, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously, at least 1 (one) foot below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system.

3.3 SELECTION OF BORROW MATERIAL

Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas from approved private sources. Unless otherwise provided in the contract, the Contractor shall obtain from the owners the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris thereon shall be considered related operations to the borrow excavation.

3.4 GRADING AREAS

Where indicated, work will be divided into grading areas within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. The Contractor shall not haul satisfactory material excavated in one grading area to another grading area except when so directed in writing. Stockpiles of satisfactory and unsatisfactory and wasted materials shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources.

3.5 SUBGRADE PREPARATION

3.5.1 General Requirements

Unsatisfactory material in surfaces to receive fill or in excavated areas shall be removed and replaced with satisfactory materials as directed by the Owner. Where the in situ material passes proofrolling (stable) and is satisfactory, the surface shall be scarified to a depth of 6 inches before the fill is started. Sloped surfaces steeper than 1 vertical to 4 horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When subgrades are less than the specified density, the ground surface shall be broken up to a minimum depth of 6 inches, pulverized, and compacted to the specified density. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

3.5.2 Proof Rolling

Proof rolling shall be done on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. Proof roll the subgrade with six passes of a dump truck fully loaded with soil transferring a load in excess of 20 tons. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 1/2 to 3 1/2 mph. Notify the Owner a minimum of 3 days prior to proof rolling. Proof rolling shall be performed in the presence of the Owner and the Contractor's Geotechnical Engineer. Rutting or pumping of material shall constitute failure of subgrade. At the Contractor's expense, additional proof rolling may be requested by the Owner on any area that is deemed questionable.

- A. In areas where the in situ material is satisfactory and passes proof roll (stable), the Contractor shall compact the top 12 inches of subgrade per Paragraph 3.5.4 "Compaction."
- B. In areas where the in situ material is satisfactory but fails proof roll (unstable), the Contractor shall dry and compact the material to a depth necessary to achieve stability in the top 12 inches of subgrade. Excavation, stockpiling, drying and compaction of

satisfactory material shall be performed at the Contractor's expense. See Paragraph 3.5.4 "Compaction" for compaction requirements.

- C. In areas where the in situ material is unsatisfactory and fails proof roll (unstable), the Contractor shall undercut the unsatisfactory material to a depth of 18 inches below Top of Subgrade and replace with select granular material. The backfill material shall be placed in lifts not to exceed 8 inches and rolled in with a static wheel roller, unless directed otherwise by the Owner. See Paragraph 3.5.4 "Compaction" for compaction requirements.

3.5.3 Construction

Subgrade shall be shaped to line, grade, and cross section, and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain specified compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut section shall be excavated to a depth of 6 inches below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified. The elevation of the finished subgrade shall not vary more than 0.05 foot from the established grade and cross section.

3.5.4 Compaction

Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. All material used as backfill shall be placed at optimum moisture content or within 2 percent below optimum moisture content. At a minimum, the top 12 inches of subgrade shall be compacted to at least 95 percent of laboratory maximum density per ASTM D1557.

3.6 UTILIZATION OF EXCAVATED MATERIALS

Unsatisfactory materials removed from excavations shall be removed from Georgia Ports Authority property. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed of in designated areas approved for surplus material storage or designated waste areas located on the Project Site as directed. Coarse rock from excavations shall be stockpiled and used for constructing slopes or embankments adjacent to streams, or sides and bottoms of channels and for protecting against erosion. No excavated material shall be disposed of to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

3.7 BACKFILLING AND COMPACTION

3.7.1 Backfill

Backfill shall be placed and compacted to at least 90 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials. Ground surface on which backfill is to be placed shall be prepared as specified in paragraph SUBGRADE PREPARATION. Compaction requirements for backfill materials shall also conform to the applicable portions of this paragraph.

3.7.2 Compaction

Compaction of select granular material for railroad shall be accomplished by heavy-duty vibratory roller or other approved equipment.

3.8 FINISHING

The surface of excavations and subgrades shall be finished to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. The degree of finish for graded areas shall be within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades shall be specified in paragraph SUBGRADE PREPARATION. Ditches shall be finished in a manner that will result in effective drainage. The surface of areas to be grassed shall be finished to a smoothness suitable for the application of grassing materials. Settlement or washing that occurs in graded, topsoiled, or backfilled areas prior to acceptance of the work, shall be repaired and grades re-established to the required elevations and slopes.

3.8.1 Subgrade

During construction, excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. No sub-ballast or ballast shall be laid until the subgrade has been checked and approved, and in no case shall sub-ballast, ballast, or cross ties be placed on a muddy, spongy, or frozen subgrade.

3.9 TESTING

Testing shall be performed by an approved independent testing laboratory subject to approval. Field in-place density shall be determined in accordance with ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D 3017; the calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed by the Owner. When test results indicate, as determined by the Owner, that compaction is not as specified, the material shall be removed, replaced and recompacted to meet specification requirements. Tests on recompacted areas shall be performed to determine conformance with specification requirements. Inspections and test results shall be certified by a Registered Professional Civil Engineer in the State of Georgia. These certifications shall state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation. All tests shall be submitted to the Owner within one working day of completion of the required test.

3.9.1 Fill and Backfill Material Gradation

One test per 500 cubic yards stockpiled or in-place source material. Gradation of fill and backfill material shall be determined in accordance with GDOT Section 812.

3.9.2 In-Place Densities

- A. One test per 500 square yards, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.

- B. One test per 300 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

3.9.3 Check Tests on In-Place Densities

If ASTM D 2922 is used, in-place densities shall be checked by ASTM D 1556 as follows:

- A. Two check tests per day.

3.9.4 Moisture Contents

In the stockpile, excavation, or borrow areas, a minimum of two tests per day per type of material or source of material being placed during stable weather conditions shall be performed. During unstable weather, tests shall be made as dictated by local conditions and approved by the Owner.

3.9.5 Optimum Moisture and Laboratory Maximum Density

Tests shall be made for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 300 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

3.9.6 Tolerance Tests for Subgrades

Continuous checks on the degree of finish specified in paragraph SUBGRADE PREPARATION shall be made during construction of the subgrades.

3.10 DISPOSITION OF SURPLUS MATERIAL

Surplus material or other soil material not required or suitable for filling or backfilling, and brush, refuse, stumps, roots, and timber shall be removed and disposed of by the Contractor. Suitable material shall be hauled and spread at a location on the Project Site to be determined by the Owner.

End of Section 02300

SECTION 05650

RAILROAD TRACK AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

The Work shall consist of jointed track construction, panel track construction, panel turnout installation, turnout construction and installation, derail construction and installation, and switch tie installation.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA)

- AREMA 1-2 (2008) Ballast and Subballast
- AREMA 4-2 (2008) Manufacture of Rail
- AREMA 4-3 (2008) Joining of Rails
- AREMA Manual (2008) Manual for Railway Engineering
- AREMA Track Plans (2008) Portfolio of Trackwork Plans

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM C 127 (2004) Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- ASTM C 131 (2003) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C 136 (2004) Sieve Analysis of Fine and Coarse Aggregates
- ASTM C 142 (1997; R 2004) Clay Lumps and Friable Particles in Aggregates
- ASTM C 535 (2003e1) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C 88 (1999a) Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- ASTM D 88 (1994; R 1999) Saybolt Viscosity
- ASTM D 1310 (2001) Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01300, "Submittals:"

A. SHOP DRAWINGS

- a. Turnouts
- b. Layout drawings

Submit for approval by the owner before work is started. do not prepare layout drawings until field surveys and measurements are completed. do not order materials until layout drawings are approved. Include on layout drawings locations of turnouts, various sizes of rail, compromise joints, and locations of rail accessories.

B. PRODUCT DATA

- a. Rails
- b. Steel ties
- c. Track bolts, nuts, and spring washers
- d. Standard, compromise, and insulated joint bars
- e. Rail clips and fasteners
- f. Turnouts
- g. Derails
- h. Gage rods
- i. Switch point protectors
- j. Switch stands
- k. Bump posts
- l. Test reports
- m. Ballast tests

C. OPERATION AND MAINTENANCE DATA

- a. Rails
- b. Accessories
- c. Turnouts
- d. Switch stands

1.4 TEMPORARY WORK

Maintain drainage and prevent accumulation of water that might affect roadbed stability.

1.5 GENERAL

All track materials shall be furnished by the Contractor unless otherwise specified in the project Contract documents.

Material furnished by the Contractor shall be approved by the Owner. No track shall be laid until the roadbed (subgrade and subballast) is completed and approved by the Owner.

1.6 LOADING AND HANDLING OF MATERIALS

Material shall be handled in such a manner as to insure against damage.

Jointed rail shall be unloaded or loaded with an approved derrick or crane without dropping, and if stacked shall be placed with the heads up and with sufficient support under the base.

PART 2 PRODUCTS

2.1 BALLAST & SUB-BALLAST

A. Ballast

Material shall be limestone, dolomite, granite, slag, or other hard, durable material free of loams, dust or other foreign particles. Material should be designated as AREMA #5, in accordance with the AREMA Manual, Chapter 1, Part 2, "Ballast," Article 2.2.2 "Gradations." The size of ballast to

be used shall be AREMA #5 in industrial tracks, spurs and yard tracks. Ballast shall conform to the grading requirements shown below in Table I.

Screen Size	Percent Passing		
	Industrial Track Ballast	Sub-ballast	
	AREMA 5	Gr. Agg. Base	Crusher Run
2-1/2"	100%		
2"	90-100%		
1-1/2"	60-90%	100%	100%
1"	10-35%		
3/4"		60-100%	
1/2"	0-3%		
3/8"			
No. 4			
No. 8			
No. 10		30-55%	15-45%
No. 60		8-35%	
No. 200		5-20%	5-12%

Table I

B. Sub-ballast

Sub-ballast shall be composed of crusher run granite or limestone and shall meet the requirements as set out in Chapter 1 (Roadway and Ballast) Part 2 (Ballast), Section 2.11 (Sub-ballast Specifications) of the current AREMA Manual. Sub-ballast material shall conform to the gradation requirements as shown in Table II.

Screen Size	Percent Passing by Weight	
	Graded Aggregate	Crusher Run
1-1/2"	100%	100%
3/4"	60-100%	
No. 10	30-55%	15-45%
No. 60	8-35%	

Table II

2.2 RAILS

115 pound RE section or equal conforming to AREMA 4-2. Provide in 39 foot lengths. Provide no closure pieces less than 13 feet.

2.3 STEEL TIES & APPURTENANCES

- A. Steel Cross-ties and Steel Turnout Sets shall be NARSTCO manufactured products or equal.
- B. Manufacturer must have a minimum 10 years of experience installed on North American railroads.
- C. Steel ties must have approval for use by at least three North American Class I railroads for 10 years.
- D. Steel ties shall be new domestic hot rolled ASTM A242/G101-01 High Strength Low-Alloy Weathering Steel with a minimum 345 MPa yield strength.
- E. Steel ties shall pass AREMA Manual Chapter 30 Section 2.7 Test 6: Wear/Abrasion. Test procedure number 3 shall be performed to a minimum of 3,000,000 cycles.
- F. Steel ties shall conform to the section profile design per the following:
 - a. For lead track and turnouts, use H10 ties - 10mm top plate thickness, Height 118mm, Width 300mm with a plastic section moduli. $Z_{top} = 153 \times 103 \text{mm}^3$, $Z_{Bottom} = 79.7 \times 103 \text{mm}^3$
 - b. For yard tracks, use M8 ties - 8mm top plate thickness, Height 98mm, Width 260mm with a plastic section moduli $Z_{top} = 97.4 \times 103 \text{mm}^3$, $Z_{Bottom} = 45.7 \times 103 \text{mm}^3$
- G. Steel ties shall have inspection holes along with 36mm holes for the NARSTCO style type hook-in shoulders suitable for rail section provided or equal.
- H. Steel ties requiring spaded ends shall have a minimum 66 degree angle at the spade.
- I. Fasteners and Hook-In Shoulders (HIS) must be compatible with the steel tie supplied.
- J. Turnouts must have channel tie type headblock ties or approved alternative design.
- K. Turnouts shall have type steel markings on ties to identify tie number and distance from point of switch.

2.4 TRACK BOLTS, NUTS, AND SPRING WASHERS

Provide new throughout the project. Provide heat-treated nuts and bolts conforming to AREMA 4-3. Spring washers shall conform to AREMA 4-3 and shall be of the size to fit the bolt and nut used and a minimum of 1/2 inch thick.

2.5 JOINT BARS

Provide new or suitable relay joint bars conforming to AREMA 4-3. Joint bars shall be 36 inches long and have six bolt holes. Contractor shall verify the punching pattern of existing rail before ordering joint bars.

2.6 COMPROMISE JOINT BARS

Provide new or suitable relay, conforming to AREMA 4-3, for changes in rail size or where rail drilling differs. Compromise joints shall be approved standard rolled joint bars forged and planed to the required compromise. Joint bars shall be manufactured by an established track appliance manufacturer.

2.7 RAIL CLIPS AND FASTENERS

Provide single tight fit clips with fillers as necessary to fit rail section furnished. Clip or fastener design shall anchor rail against longitudinal movement.

2.8 ACCESSORIES

- A. Switch Point Guard-Rail Type Protectors

Guard-rail type, standard manufacturer's product of heat-treated rail and of size to fit rail section furnished. Protectors shall be bolted to rails per CSXT Standard Guidelines.

2.9 OIL

Oil for rail and other track materials, except joints, shall conform to the following:

- A. Flash point: minimum 130 degrees F, ASTM D 1310.
- B. Asphalt: 100 penetration, minimum 45 percent.
- C. Viscosity: Saybolt Universal, 130 degrees F, 240 to 350 seconds, ASTM D 88.

2.10 TURNOUTS

Component parts of the turnouts to be furnished shall be the products of manufacturers regularly engaged in the manufacture of such products, and shall essentially duplicate items that have been in satisfactory use at least 2 years prior to bid opening. The parts need not all be made by the same manufacturer, but each turnout shall be the product of a single firm. Provide complete, including all track materials and switch ties in accordance with appropriate AREMA track work plan. Switch assemblies, stands, solid manganese steel self-guarded frogs, and guard-rail assemblies shall conform to AREMA Track Plans. The yard turn-outs shall be as indicated on the drawings. No. 10 turn-outs shall conform to CSXT Standard Guidelines "No. 10 Turnout & Crossover for 115RE Diagram."

A. Turnout Plates

Provide plates and rail braces in strict accordance with the current AREMA track work plan governing the turnout with respect to the number of the turnout. Provide turnout plate system complete with slide plates, heel plates, guard rail tie plates, hook twin tie plates, including those for the frog, rail braces, standard tie plates or other accessories required to complete the installation. Hook twin tie plates shall be in accordance with AREMA Track Plans, Plan 241-85. Gage plates shall be solid. Rail braces shall be either fixed or adjustable type of standard manufacture.

B. Switch Stands

Century Model 51-A equipped with an ergonomic bow handled throwing lever per CSXT Standard Guidelines. All switch stands shall be complete in every respect and throw rods adjusted for proper throw including grinding of stock rails if such is necessary for positive closure of switch point against the stock rail.

PART 3 EXECUTION

3.1 GENERAL

- A. The Contractor shall construct, ballast, line and surface the track to the final grade and alignment.
- B. The Contractor shall be responsible for the track until the track is accepted by the Owner.

3.2 CROSSTIES

Crosstie installation shall conform to the following:

- A. Adjust tie spacing to meeting manufacturer's requirement for degree of curvature. Maximum spacing shall be 24" on center for tangent tracks. Maximum spacing shall be 20" on center for all curved tracks.

3.3 RAIL INSTALLATION

- A. Jointed Rail Installation

Jointed rail installation shall conform to the following:

- a. Joints in opposite rails shall be staggered between 1/4th and 1/3rd of a rail length apart, except as close joints may be required at insulated joints or turnouts.
- b. Short rail, not less than 15 feet long, may be used in adjusting for proper spacing of joints.
- c. Proper allowance for expansion should be provided at rail joints.
- d. Relay jointed rail shall be laid so that the least worn side of the rail is on the gauge side.

B. Joint Bar Installation

Joint bar installation shall conform to the following:

- a. Joint bars shall be clean of any foreign material, except metal preservative, and properly installed with the full number of and correct size of bolts, nuts and spring washers.
- b. Before placing joint bars, the bearing surfaces of the bars as well as the rail ends within the joint bar area shall be free of any foreign material except metal preservative.
- c. Bolts placed with nuts alternately on inside and outside of rail shall be drawn tight before clipping.
- d. Where possible, all joints shall be kept out of road crossings.
- e. Before acceptance of work, all bolts shall be checked by the Contractor and, if necessary, tightened.

3.4 RAIL GAUGE

Final gauging shall conform to the following:

- A. Necessary final gauging shall be done after the rail is laid and jointed.
- B. Before clips are installed, crossties shall be evenly spaced and square to the rail.
- C. When installing clips, care shall be exercised not to impact the rail.
- D. The final gauge shall be 56-1/2 inches.
- E. Track shall be gauged as clips are finally secured.
- F. Any crossties that do not fully bear on the subballast shall be nipped up while clipping.
- G. When constructing skeleton track, final gauging and anchor clipping shall not be performed until after the track is lined to final alignment.

3.5 RAIL BALLAST

Ballasting shall conform to the following:

- A. Contractor shall be responsible for unloading, hauling, transferring, spreading, tamping and dressing ballast.
- B. Ballast shall be uniformly distributed as it is unloaded by the contractor after anchoring of the track has been completed.
- C. The depth of preliminary ballast for surfacing shall not be more than 4 inches between the bottom of crossties and the top of subballast. Each successive raise shall not exceed 4 inches.
- D. Care shall be taken to avoid disturbing or destroying any centerline or top of rail stakes.

- E. The Contractor shall dress ballast to conform to typical roadbed sections as shown on the plans.

3.6 RAIL SURFACING AND ALIGNMENT

A. Rail Surfacing

Surfacing shall conform to the following:

- a. A preliminary surfacing shall follow each unloading of ballast.
- b. The Contractor shall thoroughly tamp (surface) track with an on-track power (mechanical) tamper.
- c. If jacks are used they must be placed close enough together to prevent undue bending of rails or strains at joints.
- d. Both rails must be raised at one time as uniformly as possible.
- e. The track shall not be raised more than 4 inches in one lift and ballast shall be well tamped under each crosstie before the next lift is made.
- f. All crossties that are pulled loose shall be restored to proper position and fully nipped and clipped before tamping.
- g. The Contractor shall raise the track to the final profile grades with the necessary additional ballast mechanically tamped under the crossties.
- h. Ballast shall be well tamped for the full width of the crosstie.

B. Rail Alignment

The alignment for the track shall not deviate from uniformity more than 1/8 inch at the mid-offset in any 62 foot line on tangent track or more than 1/8 inch mid-offset in any 62 foot chord on curved track.

C. Track Surface

Track surface may not deviate from uniformity more than the following:

- a. The deviation from design profile on any rail at the mid-ordinate of a 62 foot chord may not be more than 1/8 inch. Cross level must be maintained.
- b. Curved track shall be superelevated as shown by the plans. Deviation from superelevation on spirals may not be more than 1/8 inch.

D. Final Surfacing

Upon completion of the final surfacing and lining of the track, the Contractor shall trim the ballast to conform to the typical roadbed section as shown on the plans and dispose of any surplus ballast as directed by the Owner. The completed ballast section shall have all tie cribs filled, and crossties and rails shall be swept clean.

3.7 RAIL ENDS

A. Sawing & Drilling

The sawing and drilling of rail ends shall conform to the following:

- a. The Contractor shall, as directed by the Owner, saw out defective or worn segments of rail and all rail ends that been torch cut or otherwise damaged.
- b. The saw cut shall be made at least 12 inches behind the cut when removing torch cuts.
- c. All cuts shall be true and vertical with the cut through the entire rail section.

- d. Rail ends shall be drilled as shown on the plans.

3.8 TURNOUT CONSTRUCTION AND INSTALLATION

- A. The Contractor may elect to provide loose turnout materials. The Contractor shall assemble the turnout on the prepared roadbed in close vicinity to its final location.
- B. Turnout construction shall be as shown on the plans.
- C. Stock and closure rails shall be cut by the Contractor.
- D. Completed turnouts shall be installed in accordance with this specification.

3.9 DERAIL CONSTRUCTION AND INSTALLATION

- A. The Contractor shall install derails, as specified, in accordance with CSXT Standard Guidelines.

3.10 SUPPLEMENTARY INSTALLATIONS

- A. Furnish and install permanent signs and signals such as crossing, clearance, derail and other safeguards as directed.

3.11 FIELD QUALITY CONTROL

- A. Visual Inspection

Inspect new rail fittings thoroughly. Pay particular attention to any defect that might hinder satisfactory operation. Inspect bolted joints for loose bolts and smooth transitions between rails of different sections. Method of correction shall be as approved by the Owner.

- B. Inspection of Track

Perform tests to verify gage, alignment, cross level and grade at least once every 100 feet or less of track centerline length. Measure gage between points on inside of rails, 5/8 inch below top of railhead.

*** End of Section 05650***