

SECTION 04100
STRUCTURE EXCAVATION AND BACKFILL

BNSF Standard Construction Specifications Section 04100, Structure Excavation and Backfill, is invoked for this contract.

END OF SECTION

SECTION 04300

DRILLED SHAFT FOUNDATIONS

BNSF Standard Construction Specifications Section 04300, Drilled Shaft Foundations, is invoked for this contract and modified as follows:

Article 2.1, CONCRETE, is added with:

- D. Cement shall be Type I or Type II Portland Cement in accordance with ASTM C150 Specification.
- E. Fly ash replacement may account for up to 25% of cement by substitution. Fly ash substitute must be approved by BNSF.
- F. Aggregates shall be graded in accordance with ASTM C33 specifications. Coarse aggregate shall be No. 67. Fine aggregate shall be natural sand.
- G. Air content shall be between 4% and 7% (by volume).
- H. Admixtures or the addition of water shall not be used without prior approval by BNSF. If multiple admixtures are used, all admixtures should be obtained from the same manufacturer, or confirmation shall be obtained that admixtures from multiple manufacturers will be compatible. Modifying the concrete mix design, including the addition of water, in the field shall not be allowed without obtaining approval from BNSF.
- I. Prior to the addition of admixtures, concrete shall have a slump not greater than 4 inches. During placement, concrete shall have a slump of not less than 4 inches using the dry uncased or permanent steel casing method, or not less than 9 inches using tremie placement and slurry displacement methods unless otherwise accepted by BNSF.
- J. Curing shall be accomplished by wet curing or membrane curing compound. Membrane curing compound shall conform to ASTM C309, Type 2. If ambient temperatures drop below 40 degrees Fahrenheit in the first 72 hours following concrete placement, the top of the drilled shaft shall be insulated or heated.
- K. Do not use calcium chloride or any admixture containing intentionally added chloride ions. Testing for chloride ions is not required.
- L. All concrete material, placement, and workmanship shall be in accordance with Chapter 8: Concrete Structures and Foundations of the AREMA Manual for Railway Engineering.

Article 2.2, REINFORCING STEEL, is added with:

- B. Fabrication of reinforcing steel shall be per Chapter 7 of the CRSI Manual of Standard Practice. Dimensions of bending details are out to out of bar.
- C. Splice bars in conformance with the design drawings. Submit any alternative splice details to BNSF for acceptance.
- D. The minimum clear distance between vertical reinforcing steel, including lapped bars, shall be 1.5 times the equivalent bundle bar diameter or four times the maximum aggregate size, whichever is larger.
- E. All reinforcing steel materials and placement shall be in accordance with Chapter 8: Concrete Structures and Foundations of the AREMA Manual for Railway Engineering.

Article 2.4, SLURRY, is added:

- A. Slurry shall consist of a stable colloidal suspension of polymers or pulverized clay minerals (bentonite/attapulgate) thoroughly mixed with water and shall meet the following specified properties at 60° F:
 - 1. Density of slurry at a distance of 1' from shaft bottom shall be measured by mud balance before concrete placement in accordance with ASTM D4380. For mineral slurries, maximum density shall be 85 pcf for shafts in side friction only and 70 pcf for shafts with end bearing capacity included. Maximum density shall be 64 pcf for polymer slurries.
 - 2. Marsh funnel viscosity shall be measured per the "Standard Procedure for Field Testing Water-Based Drilling Fluids" American Petroleum Institute API-RP13B-1, Section 2. The allowable range for entry shall be 26 to 50 seconds per quart for mineral slurries. For polymer slurries, the allowable range for entry shall be 40 to 90 seconds per quart, or as recommended by manufacturer and accepted by BNSF.
 - 3. Sand content at a distance of 1' from shaft bottom shall be measured by sand screen set before concrete placement in accordance with ASTM D4381. For mineral slurries, maximum sand content shall be no greater than 4% by volume. Maximum sand content shall be no more than 1% by volume for polymer slurries.
 - 4. During excavation, the pH of the slurry shall be measured in accordance with ASTM D4972. Allowable range of pH shall be 7 to 11.
- B. Slurry shall be from sources acceptable to BNSF. Mix, store, and transport slurry using equipment made for these purposes. Mixing or storing slurry in an excavation onsite is no acceptable.

- C. Water used to mix slurry shall be free from contaminants and be from sources acceptable to BNSF. Provide any physical or chemical treatment of the water or slurry that is necessary to meet the specified properties for controlled slurry required by these notes, subject to the acceptance of BNSF.
- D. Required slurry properties shall be maintained before and during concrete placement to prevent settlement of soil solids and to maintain a stable hole.

Article 3.4, SHAFT CONSTRUCTION, is added with:

- G. Qualified construction personnel shall be present during drilled shaft installation at all times. Appropriate fall protection shall be provided at all times when an open excavation is present. Tie off for fall protection shall be provided by the Contractor for all its staff and BNSF representatives. Open excavations shall be covered with a cap secured against movement if construction activities are not ongoing.
- H. Place concrete in shaft in one continuous operation unless otherwise directed by the design drawings or permitted by BNSF. Cold joints in the shaft are not acceptable.
- I. Laitance shall be removed from the top of the drilled shaft to a depth exposing undisturbed structural concrete. After the shaft has completed the initial cure and the required testing, the top of the shaft shall be chipped or buffed as necessary to remove any excessive concrete paste, remaining laitance, or other unsuitable materials from the top of the shaft. If excessive laitance or "soft tops" are documented, BNSF shall be notified immediately.
- J. Protect tops of shafts against damage and for curing to prevent moisture loss and temperature extremes in accordance with AREMA Manual of Railway Engineering, Chapter 8, Part 1: Materials, Tests and Construction Requirements.
- K. Perform concrete testing for quality control. Provide a minimum of 5 standard test cylinders per 50 cubic yards of concrete placement. A minimum one set of cylinders shall be collected per drilled shaft, and per day of concrete placement. Perform concrete compressive tests as follows: 1 cylinder at 3 days, 1 cylinder at 7 days and 2 cylinders at 28 days. Hold 1 cylinder for further testing as required.

END OF SECTION

SECTION 04310

SONIC TESTING OF DRILLED SHAFT FOUNDATIONS

BNSF Standard Construction Specifications Section 04310, Sonic Testing of Drilled Shaft Foundations, is invoked for this contract and modified as follows:

Add following language to the end of paragraph A of PART 1 DESCRIPTION:

The independent testing organization shall have a licensed California Professional Engineer to either supervise or oversee the testing and interpretation of results. The independent testing organization shall have with experience on at least 5 drilled shaft projects over the past 5 years related to transportation, railroad, or similar related projects.

Add following language to the end of paragraph B of PART 1 DESCRIPTION:

Sonic testing shall be completed on each drilled shaft as described by the project documents.
Sonic testing shall be implemented per ASTM D6760-16 or the latest approved ASTM standard.

END OF SECTION

SECTION 04400
CONCRETE CONSTRUCTION

BNSF Standard Construction Specifications Section 04400, Concrete Construction, is invoked for this contract.

END OF SECTION

SECTION 04500

PRECAST CONCRETE CONSTRUCTION

BNSF Standard Construction Specifications Section 04500, Precast Concrete Construction, is invoked for this contract and modified as follows:

Article 1.3, DESCRIPTION, paragraph A is deleted in its entirety and replaced with the following:

- A. The Fabricator shall furnish all labor, plant, materials, equipment and services necessary to fabricate the precast prestressed concrete units in accordance with Contract Plans and these Specifications. Work in this section includes design to be performed by Contractor.

Article 1.4, SUBMITTALS, is added with:

- E. Submit size, configuration, location and quantity of reinforcing bars and prestressing strands.
- F. Indicate the initial prestress forces.
- G. Submit a full description and details of the method to form inner girder void. Include support material, method of restraint, and details required to successfully cast girders and ensure void shape, member thicknesses, and wall dimensions.
- H. Design of lifting devices shall be the responsibility of the Fabricator. Submit details of lifting devices.
- I. Submit a plan to ensure tolerances are met and quality control plan to ensure successful casting.

Article 1.5, DRAWINGS, paragraph A is deleted in its entirety and replaced with the following:

- A. The concrete products shall conform in all respects to Contract plans and approved shop drawings.

Article 1.6, CASTING PLANT STANDARDS, is added with:

- B. Provide units manufactured by plant which has regularly and continuously engaged in the fabrication of prestressed precast box girders with inner voids for a minimum of five (5) years.
- C. Manufacturer's testing facilities shall meet requirements of ASTM E329.

Following paragraph is added to PART 3 EXECUTION:

Do not fabricate units until Shop Drawings have been approved by BNSF and Engineer, and returned to Contractor. Field verify dimensions shown on the Contract Drawings prior to fabrication of any precast concrete structure. Notify the Engineer of any differences between field measurements and those shown on the Contract Drawings.

Article 3.1, FORMS, is added with:

- B. Forms shall be accurately constructed to produce units to dimension, shape, configuration, and profile indicated. When not otherwise indicated, construct forms to produce smooth concrete.
- C. Remove side forms before prestressing force is transferred.
- D. Inner box girder voids shall be formed with foam capable of withstanding forces and maintaining shape and meeting tolerances specified herein under full hydrostatic pressure of the vibrated concrete. The internal voids shall be securely tied down to prevent displacement during concrete placement. Void dimensions shown on the Contract Drawings are maximum and shall not be exceeded at any point.

Article 3.10, CURING, is added with:

- G. Void drains in closed end box girders shall be open on the bottom of the girder and effective at draining interior moisture.

Article 3.13, HANDLING STORING, AND ERECTION, paragraph A, General, is added with:

- 12. The Contractor shall ensure that the bearing pads do not deform or kink during girder erection.

END OF SECTION

SECTION 04600
STEEL CONSTRUCTION

BNSF Standard Construction Specifications Section 04600, Steel Construction, is invoked for this contract.

END OF SECTION

SECTION 04620
PROTECTIVE COATINGS FOR STEEL SURFACES

BNSF Standard Construction Specifications Section 04620, Protective Coatings for Steel Surfaces, is invoked for this contract.

END OF SECTION

SECTION 04700
STRUCTURE MONITORING

BNSF Standard Construction Specifications Section 04700, Structure Monitoring, is invoked for this contract.

END OF SECTION

SECTION 04800

WATERPROOFING

BNSF Standard Construction Specifications Section 04800, Waterproofing, is invoked for this contract and modified as follows:

Article 1.2, DESCRIPTION, Paragraph A. is added with:

3. Dampproofing shall apply to the back of the abutments and the wing walls.

END OF SECTION

SECTION 04810

DECK WATERPROOFING SYSTEM

BNSF Standard Construction Specifications Section 04810, Deck Waterproofing System, is invoked for this contract and modified as follows:

Article 1.1, DESCRIPTION, Paragraph B. is replaced with:

- B. Waterproofing system shall be 80 mil spray applied elastomeric waterproofing membrane as manufactured by Bridge Preservation LLC, or approved equal.

Article 2, MATERIALS, Paragraph B. is replaced with:

- B. A sloped integrated ballast protection mat manufactured by Bridge Preservation LLC, or approved equal shall be used on the deck surface as indicated.

END OF SECTION

SECTION 04900

ELASTOMERIC BEARING PADS

BNSF Standard Construction Specifications Section 04900, Elastomeric Bearing Pads, is invoked for this contract and modified as follows:

Article 2.1, ELASTOMER, the table in paragraph A is replaced with:

Material Property and Test	ASTM Designation	Values
Hardness, Durometer, Shore A points	D2240	90 (±5)
Minimum Tensile Strength	D412, Die B	5000 psi
Minimum Elongation at break		250%
Heat Resistance, Oven aged 70 hrs. at 100°C	D573	
Change in durometer hardness, max. Shore A points		+5
Change in tensile strength, max		-10%
Change in ultimate elongation, max		-10%
Compressive Strain, method B	D575	
At 800 psi, Shape Factor = 8, max strain		7%
At 400 psi, Shape Factor = 6, max strain		7%
Compression set, 22 hrs. at 70°C, method B, max	D395	35%
Low Temperature Brittleness, at -40°F	D2137	No failure

END OF SECTION