

**NORFOLK SOUTHERN CORPORATION**  
**SPECIFICATIONS FOR**  
**CAST-IN-PLACE CONCRETE**

**JULY 30, 1993**

**I. SCOPE**

These specifications cover all cast-in-place concrete required for completion of the project.

**II. GENERAL**

Except as otherwise specified hereunder, the current American Railway Engineering Association (ARE) Manual for Railway Engineering (Specifications), Chapter 8 - Concrete Structures and Foundations, shall apply to all work under this section.

**III. STRENGTH, PROPORTIONS AND MIXES**

A. Cement, unless otherwise specified, shall conform to the following:

1. Standard Concrete

Cement shall be Portland Cement, Type I or Type IA, conforming to the requirements of ASTM Designation C150.

2. High Early Strength Concrete

Cement shall be Type III, or Type IIIA, conforming to the requirements of ASTM Designation C150.

B. Minimum compressive strength at 28 days shall be 4000 PSI, unless indicated otherwise on the Plans.

Minimum cement content shall be 6.50 Bags/CY (610 LBS/CY).

*NOTE:* Fly Ash, and any other admixtures, approved by the Engineer, shall be in addition to the minimum cement content indicated above, not in lieu of cement.

C. Nominal size of coarse aggregate shall be 1" - No. 4 (Size 57). See AREMA Table 1.3.3

D. Concrete shall be air-entrained by the use of an air entraining admixture conforming to requirements of ASTM Designation, C260, or by the use of air-entraining Portland cement meeting the requirements of ASTM Specification C150. The concrete shall have an air content between 4.0% and 6.0%

- E. Admixtures, except air-entraining agents, used to alter the normal properties of concrete for densifying, dispersing, retarding, accelerating, plasticizing, coloring, or waterproofing, shall be used only upon written permission of the Engineer.
- F. Testing: Compression tests and field tests will be required as specified in the AREMA Manual, Chapter 8, Part 1. The Contractor shall furnish all test materials and test cylinder molds, shall perform all work to make and cure the test cylinders, and after proper curing, shall deliver the test cylinders to an independent testing laboratory where they shall be tested at the Contractor's expense. The test results shall be furnished directly to the Engineer in writing, by the testing laboratory, on a standard testing report form. Not less than four test cylinders shall be made for each twenty cubic yards, or fraction thereof, of cast-in-place concrete. One pair of cylinders shall be tested at 7 days and the second pair at 28 days.
- G. Slump range shall be two to four inches. At least one slump test shall be made for each truckload of concrete delivered to the project for inclusion in the work. A record of the amount of slump shall be made and furnished to the Engineer.

#### IV. REINFORCING STEEL

- A. Reinforcing steel bars shall be intermediate grade, new billet steel, conforming to ASTM Designation A615, Grade 60. Reinforcing bars shall be bent cold in the shop or in the field around a pin not less than 6 times the diameter of the bar. Reinforcing partially embedded in concrete or in mortar in dowel holes shall not be field bent, except as permitted by the Engineer.
- B. Welded wire mesh shall conform to ASTM Designations A82 and A185.
- C. Epoxy coated reinforcing bars, where specified or shown on the Plans, shall conform to ASTM A775, "Standard Specification for Epoxy-Coated Reinforcing Bars". Epoxy coated reinforcing bars shall be tied with plastic or epoxy coated wires or approved plastic clips, and shall be set on plastic or epoxy coated wire chairs.

## **V. INTERFACING WITH EXISTING CONCRETE**

- A. Surface preparation and anchorage shall be as specified in AREMA Specifications, Chapter 8, Part 14, unless otherwise indicated on the Plans. Dowels shall be made of deformed bars, ASTM A615, Grade 60, and shall be spaced as shown on the Plans. Dowels shall be grouted in place with an Epoxy Grout intended for dowel bars, and shall be applied in accordance with the manufacturer's recommendations. Horizontal dowel holes shall be drilled downward on a slope of approximately one inch per foot or as otherwise indicated on the Plans.
- B. The surface of the existing material to which the new concrete will be bonded shall be cleaned by either sandblasting, waterblasting, hammers or wire brushes, so that all foreign material and loose or unsound concrete is removed and that a clean sound surface remains. The exposed surface shall be washed with clean water or air cleaned with oil free air to remove all loose dust. Grease and oil shall be scrubbed and removed with a detergent and the surface washed with clean potable water.
- C. New concrete shall be bonded to clean sound material with an Epoxy Bonding Compound. Bonding System shall meet the requirements of ASTM C881, Type II Grade 1 or 2, and shall be subject to approval by the Engineer. Bonding System shall be applied in accordance with manufacturer's recommendations. It is further recommended that Bonding Compound be applied as a spray application by use of a Binks bottom discharge pressure vessel operating at approximately 100 psi. Bonding Compound shall not be applied to surfaces that have visible or standing water.

## **VI. DAMPPROOFING**

All surfaces of concrete masonry which will be in contact with backfill or embankment shall be dampproofed, with Asphalt Primer and Asphalt, in accordance with AREMA Specifications, Chapter 29, Part 3.

## **VII. CONSTRUCTION JOINTS**

Construction joints shall be made only where shown on the Plans, unless otherwise approved by the Engineer, and shall be adequately keyed and, if required by the Engineer, be provided with 6"x3/8" polyvinyl-chloride waterstops.

#### VIII. FORMED SURFACE FINISH

All unformed surfaces shall be constructed to lines and contours shown on the drawings with a wood or hard rubber float finish. Formed surfaces shall be made with plywood faced wood forms or with steel faced forms.

#### IX. CURING

Concrete shall be protected as required by AREMA Specification, Chapter 8, Section 1.17, for a minimum of 7 days. Membrane curing compounds are permitted, on all cast-in-place concrete surfaces except those that will abut other new concrete. Curing of such abutting surfaces shall be by wet curing methods. Membrane curing shall be compatible with the specified Concrete Surface Sealer, or the membrane curing compound shall be removed to promote adhesion of the sealer to the concrete.

#### X. BEARING PADS

Bearing pads shall be used whenever steel Masonry Plate, or other steel bearing plate, bears on concrete. Pads shall be preformed fabric bearing pads, 1/2" thick, and shall be either Shock Pad Style 15175, as manufactured by the Alert Manufacturing and Supply Company, Chicago, IL; or Fabreeka Pads, as manufactured by the Fabreeka Products Company, Boston, MA; OR AN APPROVED EQUAL.

#### XI. MEASUREMENT AND PAYMENT

1. Measurement: The quantity of Cast-in-Place Concrete to be paid for, will be the number of cubic yards of concrete which has been incorporated into the completed and accepted work. The number of cubic yards of concrete will be computed from dimensions shown on the plans or from revised dimensions authorized by the Engineer. No deduction will be made for the volume of encased reinforcement.
2. Payment: The quantity of Cast-in-Place Concrete, as measured above, will be paid for at the contract unit price per cubic yard for the item CAST-IN-PLACE CONCRETE. The above price will be full compensation for furnishing all material, equipment and labor necessary for placing the dewatering, dampproofing, curing, excavation and backfill, forms, finishing, and casting, curing and testing concrete test cylinders.

\*\*\* END OF SPECIFICATION \*\*\*

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