



To: n-30-1-87728- Design Quality Assurance Bureau SUPERSEDED BY EB 99-066 EFFECTIVE 11/4/99		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 98-019
Title: STANDARD SPECIFICATION REVISION FOR 706-02, REINFORCED CONCRETE PIPE CLASSES II, III, IV, V			
Distribution: <input type="checkbox"/> Manufacturers (18) <input type="checkbox"/> Surveyors (33) <input checked="" type="checkbox"/> Main Office (30) <input checked="" type="checkbox"/> Consultants (34) <input type="checkbox"/> Local Govt. (31) <input type="checkbox"/> Contractors (39) <input checked="" type="checkbox"/> Regions/Agencies (32) <input type="checkbox"/> _____ ()		Approved:  P. J. Mack, Deputy Chief Engineer, Technical Services Division <div style="text-align: right;"> 5/12/98 Date </div>	

This Engineering Instruction will become effective with the letting of 09/10/98. The revised specifications may be substituted on ongoing projects at no cost based on the procedure in the Contract Administration Manual, §104-03, I.4.

PURPOSE: The purpose of this instruction is to transmit the revised 706-02 Standard Specification by a shelf note.

BACKGROUND:

Flyash. The New York State Concrete Pipe Association have shown interest in raising the maximum allowable flyash content to 25%. An in-house study of durability of core samples taken from pipe producers and manufacturers indicated that the increase in flyash had no detrimental effect on the durability of the pipe produced. Manufacturers may propose mix designs incorporating this increased flyash to the Department for review.

AASHTO M 170M. Concrete pipe manufacturers that supply New York have plants located in several states in the northeast. They adhere to specifications of each of the states that they supply. In an effort to conform to national standards the Department will adopt the AASHTO M 170M specification with some modifications and exceptions.

COST IMPACTS: The changes to the 706-02 Specification will be cost neutral.

The revisions to the Standard Specifications book dated January 2, 1995 will be incorporated into the next addenda and/or the next update to the Standard Specifications.

CONTACT PERSON: Direct any questions regarding this Engineering Instruction to Guy Hildreth of the Materials Bureau, Field Engineering I Section at (518) 457-5956.

706-02 REINFORCED CONCRETE PIPE CLASSES II, III, IV, V

Make the following **changes** to the Standard Specifications of January 2, 1995.

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Delete §706-02 REINFORCED CONCRETE PIPE CLASSES II, III, IV, V entirely and replace it with the following:

**706-02 REINFORCED CONCRETE PIPE
CLASSES II, III, IV, V**

SCOPE. The material, fabrication, and physical requirements of reinforced concrete pipe and cattle pass.

GENERAL. Apply the requirements of AASHTO M 170M, Reinforced Concrete Culvert, Storm Drain and Sewer Pipe, Classes II, III, IV, and V, except as modified by this specification. Reinforced concrete pipe shall be machine made or wet cast in accordance with working drawings approved by the Department and in full compliance with the details of this specification. Pipe shall be manufactured under the inspection procedures stipulated by the written directives of the Materials Bureau.

Pipe manufactured for a specific class will be acceptable for any class having a lower design strength.

Methods of manufacture shall include the following:

- A. Wet cast units are those made from concrete placed and consolidated by conventional equipment. These units develop resistance to freeze-thaw damage through the use of entrained air in the concrete. Air content in wet cast concrete shall range between 5.0% and 9.0%
- B. Machine made units are those made by any method other than wet cast. These methods use very low slump concrete and the methods of consolidation produce a dense product with low permeability and good resistance to freeze-thaw damage.

MATERIAL REQUIREMENTS

1. Materials.

Portland Cement (Type 1, Type 2 or Type 3)	701-01
Concrete Repair Material	701-04
Coarse Aggregate	703-02
Concrete Sand	703-07
Reinforcement & Stirrups	
Bar Reinforcement, Grade 420	709-01
Wire Fabric for Concrete Reinforcement	709-02
Bar Reinforcement, Grade 300	709-03
Cold Drawn Wire for Concrete Reinforcement	709-09
Admixtures	711-08
Water	712-01
Concrete Pipe Joint Sealing Compound	705-16
Concrete Pipe Joint Elastomeric Gaskets	705-17
Flyash	711-10

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2. **Cementitious Content.** Use a minimum cementitious content of 335 kilograms per cubic meter (Portland Cement plus Flyash). The maximum allowable total chloride content in concrete shall not exceed 0.10 percent by weight of cementitious material tested in accordance with written procedural directives of the Materials Bureau.
3. **Pozzolans.** Fly ash may constitute up to a maximum of 25 percent by weight of the cementitious material.
4. **Admixtures.** Calcium Chloride is not allowed in concrete. Admixtures, other than an approved Air Entraining agent for wet cast pipe, are not allowed unless otherwise approved by the Materials Bureau.
5. **Reinforcement.** Sample the reinforcement in accordance with the written directives of the Materials Bureau. Accept stirrups based on the manufacturer's certification, unless otherwise directed by the Materials Bureau.
6. **Pipe Joint Materials**
 - A. **Elastomeric Gaskets.** The gaskets used in the installation of round pipe shall meet the specification requirements of §705-17 and only those types and sizes designated by the pipe manufacturer on the approved drawings of the particular pipe.
 - B. **Sealing Compounds.** Concrete pipe joint sealing compound, meeting the specification requirements of §705-16, shall be used only on elliptical pipe and reinforced cattle pass.

FABRICATION REQUIREMENTS

1. **Drawings.** Submit detailed working drawings conforming to the Materials Bureau concrete pipe templates. All diameter sizes of a particular geometric shape can be included on one drawing. Separate template drawings are required for cattle pass, jacking pipe and special designs.

Full approval of the working drawings is required prior to the manufacture of any concrete pipe.
2. **Design, Reinforcement and Dimensions.**
 - A. **General.** Apply the Design, Reinforcement and Permissible Variations requirements of AASHTO M 170M for Class II, III, IV and V pipe, walls B & C. The AASHTO tables show minimum reinforcement. The manufacturer may submit drawings detailing alternatives to the specified reinforcement and/or wall thickness for Materials Bureau consideration. To gain full approval, the pipe shall be manufactured and tested in accordance with the written procedural directives of the Materials Bureau.
 - B. **Reinforced Concrete Cattle Pass.** Apply the requirements of NYSDOT Standard Sheet M603-4 with the following modification. A minimum length of 1200 mm is required for each section. Variations in laying lengths of two opposite sides of a cattle pass section shall not be more than 3 mm per 300 mm of diameter, with a maximum of 16 mm in any length of cattle pass, except where beveled or curved cattle pass lengths have been specified.

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3. **Concrete Batch Placement.** Clean and properly assemble the forms prior to placing any concrete. Transport and place the concrete mixture such that no segregation of the concrete materials or displacement of the reinforcing steel occurs within the form.
4. **Curing.** Cure the pipe in accordance with AASHTO M 170M. Include the type of curing, curing time and any temperature requirements on the drawing template. The AASHTOM 170M compressive strength requirements do not apply except for cattle pass. Other methods of curing are subject to approval by the Director, Materials Bureau.
5. **Joints.** Use either bell and spigot or tongue and groove design. Design the joints so as to permit effective jointing to reduce leakage and infiltration and to permit placement without irregularities.
6. **Marking.** In addition to the AASHTO M 170M requirements, the pipe markings must be identified on the inside barrel. If the diameter is less than 450 mm the markings may be stenciled on the outside of the pipe .
Each pipe length with elliptical or quadrant reinforcing shall have the word "top" indelibly marked on the inside and outside of the barrel at the appropriate location.
7. **Pipe Repair.** In no case shall more than 10% of the lot be repaired. Pipe may be repaired at the plant or in the field using 701-04 Concrete Repair Material. The repair will be acceptable if, in the opinion of the Department, the repairs are sound and properly finished and cured, and the repaired pipe conforms to the requirements of these Specifications and the written procedural directives of the Materials Bureau.

PHYSICAL REQUIREMENTS

1. **Strength.** Apply the requirements of AASHTO M 170M. Conduct, in the presence of a representative of the Department, such number and type of three-edge bearing tests as the Materials Bureau deems necessary to establish the quality of pipe.
Each manufacturer furnishing pipe under these specifications shall be equipped with a testing machine of a type approved by the Materials Bureau to carry out this test. Employ a commercial testing agency to calibrate the testing machine according to ASTM E4 at a minimum of once a year. Upon request of the Materials Bureau, a record of this calibration shall be furnished.
Reinforced concrete cattle pass will not require a three-edge bearing test. Cast concrete cylinders during production and achieve a minimum 28-day compressive strength of 25 MPa as certified by the manufacturer.
2. **Absorption Requirements For Machine Made Pipe.** For all pipe the maximum average absorption shall not exceed 8.0% by weight for the last three specimens tested. Specimens for this test shall be cores from each lot drilled by the manufacturer in the presence of a representative of the Department. The cores will be tested by the Materials Bureau in accordance with the test method specified in ASTM C497 except that under "absorption test" the drying period shall be 48 hours at a temperature of 110°C.
Plug the holes when cores are taken. Plugs shall be sound and properly finished and cured according to the requirements of "Pipe Repair."
3. **Freeze-Thaw Requirements.** The Materials Bureau reserves the right to test the pipe for durability by freeze-thaw testing. The test will be run in accordance to the written procedural directives of the Materials Bureau.

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4. **Sampling and Testing.** The Reinforced Concrete Pipe units manufactured under the requirements of this specification shall be separated into specific and identifiable production lots. The maximum number and type of units in a lot shall be in accordance with the written procedural directives of the Materials Bureau.

The type of testing required for a given lot of Reinforced Concrete Pipe or Reinforced Concrete Cattle Pass will be determined by the method of manufacture as follows:

- A. For both Machine-Made and Wet Cast Reinforced Concrete Pipe.
Three Edge Bearing Test - The test procedure shall be as shown in procedural directives issued by the Materials Bureau.
- B. For Machine-Made Reinforced Concrete Pipe Only.
Absorption Test - This test shall be performed on machine-made reinforced concrete pipe lots in accordance with the requirements detailed above and at the frequency directed in procedural directives issued by the Materials Bureau.
- C. For Wet Cast Reinforced Concrete Pipe Only.
1. Determination of Air Content. This property of the wet cast concrete unit will be determined on a lot basis in accordance with either of the following methods at the option of the Department.
(a) End Product Testing: The testing of hardened concrete for air content will be performed by the Materials Bureau on 100 mm diameter cores, drilled by the manufacturer under the supervision of a Department representative.
(b) Production Testing: The testing will be performed by the manufacturer, subject to the approval of the Materials Bureau. It will consist of testing the plastic concrete for compliance to the air content required by this specification. The Department reserves the right to test the hardened concrete at any time in which case the manufacturer will drill 100 mm diameter cores at the direction of a Department representative. Sampling and test procedures for this option may be obtained from the Materials Bureau.

SHIPPING. No units will be considered for shipment unless the units are free from defects as noted under Pipe Repair in this specification and according to the written procedural directives of the Materials Bureau.

OTHER REQUIREMENTS. In addition to the above tests, the pipe will be subject to inspection at any time prior to placing, and rejection may be made through failure to comply with the criteria shown in the written procedural directives of the Materials Bureau.

BASIS OF ACCEPTANCE. Pipe units will be accepted in stock lot quantities at the manufacturing location in accordance with the written procedural directives of the Materials Bureau.