



# BUREAU OF MATERIALS

# MATERIALS

# PROCEDURES

**MP NUMBER: 10-08**

**EFFECTIVE DATE: 07/01/2008**

**APPROVAL: Eileen Sheehy**

## REINFORCED CONCRETE PIPE PLANT INSPECTION AND TESTING

### **PURPOSE:**

To establish a standard procedure for plant inspection and testing of reinforced concrete pipe.

### **SUPERSEDES:**

Materials Procedure Number 10 – Dated 10/01/2001

### **REFERENCES:**

Special Provisions, Supplementary Specifications, Standard Specifications, Addenda and Attachments

- AASHTO M32 - Standard Specifications for Cold Drawn Steel Wire for Concrete Reinforcement
- ASTM C150 - Standard Specifications for Portland Cement
- AASHTO M170 - Interim Specifications for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
- AASHTO M206 - Reinforced Concrete Arch Culvert Storm Drain and sewer Pipe
- AASHTO M207 - Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
- AASHTO M221 - Standard Specifications for Welded Deformed Steel Wire Fabric for Concrete Reinforcement
- AASHTO M225 - Standard Specifications for Deformed Steel Wire for Concrete Reinforcement
- AASHTO M240 - Standard Specifications for Blended Hydraulic Cements
- AASHTO T33 - Standard Method of Test for Determining Physical and Chemical Properties of Culvert Pipe, Sewer Pipe and Drain Tile
- AASHTO T280 - Standard Method of Testing Concrete Pipe, Manhole Sections, or Tile

## **FORMS:**

- LB-5 - Report of Analysis of Portland Cement
- LB-9 - Report of Analysis of Aggregate
- LB-10 - Report of Analysis of Reinforced Metals
- LB-11 - Analysis of Concrete Sand
- LB-14 - Analysis of Miscellaneous Materials
- LB-88 - Sample Envelope
- LB-114 - Report of Analysis of Reinforced Concrete Pipe
- LB-150 - Inspection Report of Miscellaneous Materials
- LB-201 - Analysis of Concrete Cylinder
- LB-265 - Concrete Pipe Daily Inspection Report
- LB-296 - Notice of Non-complying Material

## **INSTRUCTIONS:**

### **I. Assignment Procedures**

The inspector shall receive from their supervisor the following:

- A. Name of pipe manufacturer, plant location, class of pipe, wall size designation, and linear feet (meters) to be inspected.
- B. A copy of the specifications for the pipe to be inspected.
- C. Required tests to be performed and list of samples to be taken and submitted to the Bureau of Materials.
- D. Name of project and job code number to which inspection time and pipe is to be charged.

### **II. Duties after Arriving at Plant**

The inspector shall:

- A. Make their presence known to the pipe manufacturer's representative.
- B. Inspect aggregate stockpiles and delivery tickets to ensure that materials used in the manufacture of pipe are from approved sources.
- C. Inspect three-edge bearing test machine for calibration seal. Machines must be calibrated annually.
- D. Select at random one pipe from each size, class, and wall designation for three-edge bearing test. One test pipe shall not represent more than 1,000 linear feet.
- E. Ensure that the two lower bearing strips and upper bearing block are properly positioned.

- F. During application of load, inspect interior wall of pipe for cracking. Record load when 0.01-inch gauge can be inserted into a crack. If crack does not develop, continue testing until ultimate strength is reached. Should the pipe fail to meet the strength requirements, the manufacturer shall be allowed to retest two additional specimens from the same day's production. Pipe shall be acceptable only if both retest specimens meet the strength requirements.

NOTE: The loads required to produce a 0.01-inch crack and ultimate load can be determine by the following:

(Pipe diameter in feet) multiplied by (D-load requirement) multiplied by (the laying length in feet)

Example: Class III - Internal Diameter 48" Length 8' \*\*

D-load to produce a 0.01-inch crack 1350

D-load to produce the ultimate load 2000

$4 \times 1350 \times 8 = 43,200$  lbs. minimum required to produce a 0.01-inch crack

$4 \times 2000 \times 8 = 64,000$  lbs. minimum required to produce the ultimate load.

- G. Secure one core from the test pipe that complied with the load requirements. It should represent the full wall thickness. This core shall be measured to determine wall thickness and concrete cover over reinforcing steel. Cores meeting these requirements shall be submitted to the Bureau of Materials for absorption testing.

The area of circular reinforcement in square inch per linear foot of pipe wall can be determined by the following: Measure diameter of circular wire and wire spacing in inches, from either broken test pipe or from reinforcement in pipe manufacturer's stock. Use the following formula:

$A = 0.7854(d)^2 (12)$  divided by wire spacing. Wire spacing is determined by measuring the circumferential wire center to center.

Example:

Welded Wire Fabric: 3" x 6" - W2.0 x W2.0

circular wire diameter = 0.159

circular wire spacing = 3"

$$A = \frac{0.7854 (d)^2 (12)}{3}$$

$$A = \frac{0.7854 (0.159)^2 (12)}{3}$$

$$A = \frac{0.7854 (.025) (12)}{3}$$

$$A = 0.08 \text{ in}^2/\text{Linear ft. of pipe wall}$$

- H. Pipe represented by test specimen meeting the load requirement and measurement noted in "G" above, shall be inspected for permissible variations in internal diameter, length of two opposite sides, and length of pipe. This inspection shall also include evaluating workmanship, finish, defects and markings (pipe class, date of manufacture, and name or trademark of the manufacturer).
- I. Stamp all pipe represented by approved test specimen(s) and meeting all requirements.
- J. Complete LB-265 at plant and distribute to the manufacturer.

### **III. Additional Duties**

The Inspector Shall:

- A. Complete LB-114 and submit with cores to Laboratory for absorption testing.
- B. Upon returning to office, enter quantity inspected and approved into Drainage Access Database. Inventory balances can be checked to determine if testing is needed for particular sizes..
- C. When directed by supervisor, submit samples of aggregates, cement, admixtures and steel reinforcing to the Bureau of Materials.
- E. Maintain a diary with notations and pertinent information that could be referred to later.

### **IV. Authority and Responsibility**

- A. Should any of the above inspection procedures or test results reveal noncompliance with the specifications, do not approve (stamp) pipe.
- B. Refuse to test pipe on three-edge bearing machines not calibrated during current year.
- C. Bring to the attention of their supervisor any uncertainties regarding the quality of materials, tests, equipment, or methods of operations. Document the discussion and the corrective action taken on LB-150 and in diary.

**V. Distribution of Forms**

<u>Forms</u>		<u>Distribution</u>
LB-5, LB-9, LB-10 LB-11A	1	Original to Lab.
LB-14, LB-114	1	Original to Lab
LB-201	1. 2. 3. 4.	Original in LB-88 Lab. Supervisor Bureau Headquarters Supplier Precast/Prestressed Plant File
LB-150	1. 2. 3.	Original to Bureau of Materials Headquarters Regional Construction Engineer RE
LB-265	1.	Original to Supervisor
LB-296	1. 2. 3.	Original to Bureau Headquarters RE Regional Materials Office