

**NEBRASKA DEPARTMENT OF ROADS
MATERIALS AND RESEARCH DIVISION**

**POLICY CONCERNING TESTING, INSPECTION AND REPORTING
Of
REINFORCED CONCRETE CULVERT AND SEWER PIPE
AND CONCRETE FLARED-END SECTIONS**

January 2004

TESTING

General Tests will be conducted under the supervision of the Materials and Research Division, at the pipe manufacturer's plant, using the Department's portable testing equipment and an approved testing frame provided by the pipe manufacturer. When considered desirable by the Materials and Research Division, tests may be conducted at the Department's Lincoln Laboratory.

Specifications and Test Methods The requirements of AASHTO Specification M 170-95, M 206-95, and M 207-95 and the test methods designated therein, will govern for reinforced concrete pipe. Requirements for the class of pipe, shall be as specified by Department Policies, Plans, and the State of Nebraska Standard Specifications for Highway Construction. Concrete flared-end sections will be required to conform to the requirements of the Department's standard designs and to the applicable requirements of AASHTO Specification M 170-95, M 206-95, or M 207-95, Class II, Class A-II or Class HE-II respectively.

Plant Identification or Code Each State approved concrete pipe manufacturing plant will be issued a plant code number to be used by inspectors and by the Materials and Research Division in identifying samples and reports of tests conducted. The code or plant identification numbers assigned are as follows:

<u>Ident No.</u>	<u>Pipe Manufacturer and Location of Plant</u>
1T	Concrete Industries Inc., Lincoln
2T	Rinker Materials (Hydro Conduit), Valley
3T	WBE Company, Inc., Valley
4T	Rinker Materials, Grand Island
5T	Panhandle Concrete Products Co., Scottsbluff

Test Samples Each sample section of pipe or flared-end section to be tested will be selected by the Department's Inspector at the manufacturer's plant. Each sample selected will be marked on the interior wall with the code number of the plant (as noted above), followed by a "Serial Number" for the particular test. As an example: "1T-10" would identify a sample section of pipe manufactured by Concrete Industries Inc. in Lincoln (the tenth sample tested for this plant). In addition to the code and serial numbers, the Inspector shall also mark his own initials and the date sampled on the interior wall of the sample section.

Reinforced concrete pipe and flared-ends shall be marked as required in the Nebraska Standard Specifications for Highway Construction, Section 1037.02.

The Inspector shall prepare a sample identification form (DR Form 12) for each test specimen, stating the size and class of pipe or end section, the quantity to be represented, the date sampled and any special information concerning specifications. A copy of this form should be given to the Laboratory Technician in charge of conducting the test.

If an original sample should fail to comply with specification requirements, and additional samples are required for testing, these additional samples will be identified with the same code and serial number as the original sample (to which will be added "Check Sample A" and "Check Sample B").

Number of Tests Required One sample will be tested to represent a maximum of 1500 feet of each size and each class of pipe furnished by each manufacturer. A sufficient quantity of pipe, as determined by the Inspector, must be on-hand for random sampling prior to testing. A test section may represent pipe manufactured after a test is made, provided the quantity represented does not exceed the limit previously stated. New tests will be required for pipe manufactured, more than six months after the date of manufacture of the original test section.

The number of tests required to represent a stock of concrete flared-end sections will be determined at the time of sampling by the Inspector. Up to 15 sections of a size will be represented by one test sample, if they were manufactured during a production run not exceeding a maximum of four weeks, and they appear by visual inspection to be of uniform quality.

The Department's Inspector shall keep a record of the quantity of pipe and flared-end sections supplied to projects from the stock represented by each test. When additional tests are required, the Lincoln Laboratory shall be notified. Such notification shall provide as much time as possible so that testing can be completed in timely order, avoiding any delays in the use of the pipe. Several sizes of pipe or end sections shall be grouped together for testing, in order to avoid unnecessary trips with the testing equipment.

Basis of Approval Approval of Class III, IV and V pipe, thirty-six inches (or thirty-six inches round equivalent) and smaller in diameter, will be based on the results of three-edge-bearing strength tests for the load to produce the 0.01 inch crack and the ultimate load; by conformance with the design prescribed in the Specifications; and by freedom from defects as determined by visual inspection. Approval of Class III, IV and V pipe **larger** than thirty-six inches (or thirty-six inches round equivalent) in diameter will be determined by the results of compression tests on drilled concrete cores; by conformance with the design prescribed in the Specifications; and by freedom from defects as determined by visual inspection. **At the option of the manufacturer, pipe larger than thirty-six inches** (or thirty-six inches round equivalent) in diameter, may be accepted on the results of three-edge-bearing strength tests for the load to produce the 0.01 inch crack and the ultimate load; by conformance with design Specifications; and by freedom from defects as determined by visual inspection. For pipe larger than thirty-six inches (or thirty-six inches round equivalent), the manufacturer or his representative must select the type of test (core strength test, or three-edge-bearing strength test) to be used for acceptability of this pipe immediately **prior** to the testing performed by the Department's Inspector or representative. The manufacturer will be required to sign a document (see the sample form on page 5) indicating his or her designated test option preference for the particular manufacturing lot, size, and class of pipe under consideration. Pipe that fails to meet the strength requirements as determined by the selected test type may not be retested using one of the other testing options aforementioned.

Approval of all sizes of pipe that are a modified or special design not shown in AASHTO specifications will be based on the results of three-edge-bearing strength tests for the load to produce the 0.01 inch crack and the ultimate load; by conformance with the design shown; and by freedom from defects as determined by visual inspection.

The approval of concrete flared-end sections will be based on the results of compression tests on drilled concrete cores; by conformance with Standard Plans and design Specifications; and by freedom from defects as determined by visual inspection.

When considered necessary by the Materials and Research Division, additional tests may be conducted to represent any reinforced concrete pipe or concrete flared-end section in order to determine compliance with all specification requirements. Such tests may include three-edge-bearing strength tests, compression tests on drilled concrete cores, and tests of the cement, aggregate and reinforcement.

INSPECTION AND REPORTING

Stock Test Reports Reports of tests made on concrete pipe and flared-end sections, will be issued by the Lincoln Laboratory. Each report will be identified with the plant code and serial number assigned by the Inspector to the sample tested for the particular manufacturing plant. The Department will maintain project and stock shipping records for all tested pipe products for each plant.

Identification of Approved Pipe All approved pipe or flared-end sections scheduled for use on Nebraska projects will be identified by the Department's Inspector at a manufacturer's plant. These markings shall include the plant identification and test number (originally assigned to the test specimen representing the pipe), marked on the inside of each approved section. The Inspector's initials will also be placed on the pipe alongside this identification number. The Inspector shall use suitable marking equipment to make permanent, legible markings.

The plant code identification number is to be marked on all sections of pipe and flared-ends in the lot or batch represented by the test specimen. Approved sections should be marked just prior to the time of shipment.

Each section of pipe or flared-end will be inspected before marking and no section will be marked which contains any of the defects or does not meet Specification requirements as follows:

1. Fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint.
2. Defects that indicate imperfect proportioning, mixing, and molding.
3. Surface defects indicating a honeycombed or open texture.
4. Damaged ends, where such damage would prevent making a satisfactory joint.
5. Exposed steel reinforcement (exposed ends of stirrups or spacers used to position reinforcement is not cause for rejection).
6. Pipe does not include the required manufacturer's markings as per Nebraska Standard Specifications for Highway Construction, Section 1037.02.

Shipment Reports The Department's Inspector for each manufacturer's plant will prepare reports to cover all reinforced concrete pipe and concrete flared-end sections supplied from that plant for use on Nebraska Projects. Proper forms approved by NDR will be used for reporting shipments to each project.

The original shipment report form will be sent to the Materials and Research Engineer (Lincoln Laboratory), Box 94759, Lincoln, Nebraska 68509. One additional shipment report copy shall be sent to the Field Engineer in charge of the project, as well as one copy sent to the District Engineer concerned. It is important that these reports be complete and accurate since estimates for payment cannot be released until these reports are on file.

This policy is considered in good faith and cooperation between the Nebraska Department of Roads and Concrete Pipe Manufacturers, regarding testing, inspection and reporting of reinforced concrete pipe products for State use. This policy, with its terms and conditions, are to be adhered to by each pipe manufacturer performing work, and manufacturing products destined for State of Nebraska projects.

**State of Nebraska
Department of Roads
Materials and Research Division**

**Manufacturer Testing Designation Form For Pipe Larger Than 36 Inches
(Or 36 inch round equivalent) Diameter**

Test Date _____

Pipe Manufacturer _____

Please write next to each pipe size (and identification lot number being tested) your testing option preference. In the space provided, write “Core”, to indicate your acceptability preference based upon core strength testing. Write in “3-edge”, to indicate your preference for three-edge bearing strength testing. A signature of an authorized plant representative must accompany each test option selected.

Pipe Size (in)	Pipe Class (3, 4 or 5)	Date Mfg.	Ident. “T” No.	Test Option Selected	Authorized Plant Signature

Signature of Inspector(s) Performing Testing
