941 CONCRETE CULVERT PIPE (ROUND).

(REV 12-19-00) (FA 2-2-01) (7-02)

SUBARTICLE 941-1.1 (Page 876) is deleted and the following substituted:

941-1.1 General Specifications: Concrete pipe shall meet the design requirements of the class of pipe called for in the plans and the specific requirements of this Section.

The process of manufacture and the details of the pipe design, including strength of concrete, will comply with the Standard Operating Procedure for the inspection of Precast Drainage Products.

SUBARTICLE 941-1.2 (Page 876) is deleted and the following substituted:

941-1.2 Specific Requirements:

941-1.2.1 Steel Reinforced Concrete Pipe: Meet ASTM C 76 [ASTM C 76M] and the modifications to ASTM C 76 [ASTM C 76M] set forth in 941-1.3. For Special Designs meet the requirements of ASTM C 655 [ASTM C 655]. Pipe designated Class S, will meet the requirements for ASTM C 655 [ASTM C 655] and the 0.01 inch [0.03 mm] crack and ultimate D – loads given on the Design Standards, Index 205. Such pipe shall be properly marked.

942-1.2.2 Non-Reinforced Concrete Pipe: Meet ASTM C 985 [ASTM C 985M] and the ultimate D – loads given on the Design Standards, Index 205 with the following exception: Modify material requirements set forth in ASTM C 985 [ASTM C 985M] with the material requirements set forth in 941-1.3(a). Such pipe shall be properly marked.

941-1.2.3 Fiber Reinforced Concrete Pipe: Meet ASTM C 1450 and the modification to ASTM 1450 set forth in 941-1.7. Such pipe shall be properly marked.

SUBARTICLE 941-1.5 (Page 877) is deleted and the following substituted:

941-1.5 Special Requirements for Pipe Joints when Rubber Gaskets are to be Used:

SUBARTICLE 941-1.5.1 (Page 877) is deleted and the following substituted:

941-1.5.1 General: When rubber gaskets are to be installed in the pipe joint, the gasket shall be the sole element relied on to maintain a tight joint. Test pipe joints at the plant hydrostatically using test methods in ASTM C-443. Soil tight joints

must be watertight to 2 psi [13.8 kPa]. Watertight joints must be watertight to 5 psi [34.5 kPa] unless a higher pressure rating is required in the plans.

ARTICLE 941-1 (Pages 876-878) is expanded by the following new Subarticle:

941-1.7 Modifications to ASTM C 1450:

Modify the provisions of ASTM C 1450 with the following: Material requirements shall meet requirements set forth in 941-1.3(a). In addition, fiber reinforced concrete pipe shall be designated Class S, Class I, Class II, Class III and Class IV. The corresponding strength requirements are given in the following table:

Minimum Long-Term Service D-Load:

Pipe Class	D Load N/m/mm	D Load Lb/ft/ft
S	30	600
I	40	800
II	50	1000
III	65	1350
IV	100	2000

The manufacturer shall provide the relationship between short-term crush loads required to achieve 100-year long-term design loads. In addition, the manufacturer shall provide the relationship between the saturated and dry crush loads. The minimum dry crush load shall not be less than a factor of 2 times the long-term service load. The short term crush load shall be determined as required in Section 10.2 of ASTM C 1450 except the specimen shall be tested by the appropriate section of ASTM C 497, External Load Crushing Strength by the Three-Edge Bearing Test Method.

Expand Section 5.1 of ASTM C 1450 with the following: The manufacturer shall state the type of fiber used in the pipe and provide the Department with documented evidence that the fibers employed are compatible with other materials of manufacture. The pipe manufacturer will establish quality control assurance procedures to ensure that the fibers used in the manufacture of the pipe are of consistent composition and quality. The assurance procedures will be subject to the approval of the Department.

Expand Section 6 of ASTM C 1450 with the following: The manufacturer shall state the minimum wall dimensions of the pipe that complies with the minimum crush loads presented in the table above.

In lieu of Section 6.2 of ASTM C 1450 meet the following: The under run in length of a section of pipe shall not be more than 1/8 in/ft [10 mm/m] with a maximum of 1/2 inch [12.7 mm] in any single pipe.

In lieu of Section 6.3 of ASTM C 1450 meet the following: The average inside diameter shall not be less than the nominal size by more that 0.25 inch [6 mm] or 1.5% of the nominal size, whichever is the greater value.

In lieu of Section 7.1 of ASTM C 1450 meet the following: All material tested under this Specification shall be tested in the saturated condition after immersion

in water at an ambient temperature above 41°F [5°C] for a period of 21 to 28 days immediately prior to testing.

In lieu of Section 8 of ASTM C 1450 meet the following: Each length of pipe shall be provided with a joint for the purpose of maintaining alignment and to ensure a close joint. Joints shall be of a design and the ends of the pipe sections are laid together they will make a continuous line of pipe with a smooth interior free of appreciable irregularities and compatible with the tolerances in Section 6.