

715-R-809 PIPE CULVERTS, AND STORM AND SANITARY SEWERS

(Revised 04-16-26)

The Standard Specifications are revised as follows:

SECTION 715, BEGIN LINE 25, DELETE AND INSERT AS FOLLOWS:

Materials shall be in accordance with the following:

B Borrow	904.06*
Concrete.....	702
Flowable Backfill.....	213
Geotextiles	918.02
Pipe Joint Sealant.....	907.11
Reinforcing Bars	910.01
Rubber Type Gaskets	907.13
Straps, Hook Bolts, and Nuts.....	908.12
Structure Backfill	904

* B borrow or structure backfill consisting of ACBF or GBF shall not be used within 2 ft of the free water level.

The maximum particle size of backfill material for corrugated pipe shall be less than 1/2 the corrugation depth.

(a) Type 1 Pipe

Type 1 pipe shall be used for culverts under mainline pavement and public road approaches and shall be in accordance with the following:

Clay Pipe, Extra Strength	907.08
Corrugated Aluminum Alloy Pipe and Pipe-Arches.....	B
Corrugated Polyethylene Pipe, Type S.....	A
Corrugated Polypropylene Pipe	A
Corrugated Steel Pipe and Pipe-Arches	B
Non-Reinforced Concrete Pipe, Class 3.....	907.01
Polymer Precoated Galvanized Corrugated Steel Pipe and Pipe-Arches	B
Profile Wall Polyethylene Pipe, Closed.....	A
Profile Wall Polyethylene Pipe, Ribbed.....	A
Profile Wall PVC Pipe.....	A
Reinforced Concrete Horizontal Elliptical Pipe	907.03
Reinforced Concrete Pipe.....	907.02
Smooth Wall Polyethylene Pipe.....	A
Smooth Wall PVC Pipe.....	A
Spiral Rib Steel Pipe	B
Structural Plate Pipe and Pipe-Arches.....	908.09

^A ~~All~~ Thermoplastic pipes shall be from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16.

^B Metal pipes shall be from the QPL of Metal Pipe Sources in accordance with 908.01.

(b) Type 2 Pipe

Type 2 pipe shall be used for storm sewers and shall be in accordance with the following:

Clay Pipe, Extra Strength	907.08
Corrugated Polyethylene Pipe, Type S.....	^A
Corrugated Polypropylene Pipe	^A
Fully Bituminous Coated and Lined Corrugated Steel Pipe and Pipe-Arches.....	^B
Non-Reinforced Concrete Pipe, Class 3.....	907.01
Polymer Precoated Galvanized Corrugated Steel Pipe and Pipe-Arches Type IA and Type IIA.....	^B
Profile Wall Polyethylene Pipe, Closed	^A
Profile Wall Polyethylene Pipe, Ribbed	^A
Profile Wall PVC Pipe.....	^A
Reinforced Concrete Horizontal Elliptical Pipe	907.03
Reinforced Concrete Pipe.....	907.02
Smooth Wall Polyethylene Pipe.....	^A
Smooth Wall PVC Pipe	^A

^A All thermoplastic pipes shall be from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16.

^B Metal pipes shall be from the QPL of Metal Pipe Sources in accordance with 908.01.

SECTION 715, BEGIN LINE 98, DELETE AND INSERT AS FOLLOWS:

(d) Type 4 Pipe

Type 4 pipe shall be used for drain tile and longitudinal underdrains and shall be in accordance with the following:

Clay Pipe*	907.08
Corrugated Polyethylene Drainage Tubing	^A
Corrugated Polyethylene Pipe, Type S*	^A
Corrugated Polyethylene Pipe, Type SP.....	^A
Drain Tile*	907.10
Non-Reinforced Concrete Pipe.....	907.01
Perforated Clay Pipe*.....	907.09
Perforated PVC Semicircular Pipe.....	^A
Profile Wall PVC Pipe.....	^A

^A All thermoplastic pipes shall be from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16.

* These materials shall be used for drain tiles only.

(e) Type 5 Pipe

Type 5 pipe shall be used for broken-back pipe runs where coupled or jointed pipe is desirable and shall be in accordance with the following:

Corrugated Aluminum Alloy Pipe and Pipe-Arches	^B
Corrugated Polyethylene Pipe, Type S.....	^A
Corrugated Polypropylene Pipe	^A

Corrugated Steel Pipe and Pipe-Arches B
 Fully Bituminous Coated and Lined Corrugated
 Steel Pipe and Pipe-Arches..... B
 Polymer Precoated Galvanized Corrugated
 Steel Pipe and Pipe-Arches..... B
~~Profile Wall Polyethylene Pipe, Closed..... A~~
~~Profile Wall Polyethylene Pipe, Ribbed..... A~~
 Profile Wall PVC Pipe..... A
~~Smooth Wall Polyethylene Pipe..... A~~
~~Smooth Wall PVC Pipe..... A~~
 Spiral Rib Steel Pipe B

^A ~~All~~ Thermoplastic pipes shall be from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16.

^B Metal pipes shall be from the QPL of Metal Pipe Sources in accordance with 908.01.

SECTION 715, BEGIN LINE 148, DELETE AND INSERT AS FOLLOWS:

(h) End Bent Drain Pipe

End bent drain pipe shall be ~~perforated profile wall PVC pipe, perforated smooth wall PVC pipe, or corrugated polyethylene drainage tubing Type SP from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16~~ one of the following:

<i>Pipe Material Type</i>	<i>In accordance with:</i>
<i>Corrugated Polyethylene Drainage Tubing, Type SP</i>	<i>907.17(a)</i>
<i>Perforated Profile Wall PVC</i>	<i>907.22</i>
<i>Perforated Smooth Wall PVC</i>	<i>907.23</i>

(i) Underdrain Outlet Pipe

Pipe for underdrain outlets and drain tile outlets shall be ~~PSM PVC pipe, profile wall PVC pipe, smooth wall polyethylene pipe, or smooth wall PVC pipe from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16 and 907.24. Schedule 40 PVC pipe in accordance with 907.24(b) is also allowable~~ one of the following:

<i>Pipe Material Type</i>	<i>In accordance with:</i>
<i>Profile Wall PVC</i>	<i>907.22</i>
<i>PVC Plastic Pipe, Schedule 40</i>	<i>907.24(b)</i>
<i>Smooth Wall Polyethylene</i>	<i>907.21</i>
<i>Smooth Wall PVC</i>	<i>907.23</i>
<i>Type PSM PVC</i>	<i>907.24(a)</i>

(j) Grated Box End Sections

Grating for box end sections shall be in accordance with 910.22. Threaded inserts for Type II grated box end sections shall have a minimum pull-out capacity of 6,000 lb. The 1/2 in. round bolts shall have hex heads, cut washers, and where necessary, shall be furnished with the grating. The aggregate leveling bed required for precast units shall be

coarse aggregate No. 8 in accordance with 904.03.

The hardware cloth used to cover the weep holes ~~may~~shall be plastic with 1/4 in. mesh or galvanized steel wire No. 4 mesh with a minimum wire diameter of 1/32 in. It shall be firmly anchored to the outside of the structure and shall be centered on the holes.

A Type C certification in accordance with 916 shall be provided for the materials in this section unless otherwise specified.

SECTION 715, BEGIN LINE 186, DELETE AND INSERT AS FOLLOWS:

(m) Drainage Pipe through Concrete Masonry

Pipe used as drainage pipe through concrete masonry as described in 702.16 shall be ~~either profile wall or smooth wall PVC from the QPL of Thermoplastic Pipe and Liner Pipe Sources in accordance with 907.16, or steel in accordance with 908.1.~~one of the following:

<i>Pipe Material Type</i>	<i>In accordance with:</i>
<i>Profile Wall PVC</i>	<i>907.22</i>
<i>Smooth Wall PVC</i>	<i>907.23</i>
<i>Steel</i>	<i>908.11</i>

SECTION 715, BEGIN LINE 399, DELETE AND INSERT AS FOLLOWS:

After the visual or video inspection, the Contractor shall check pipe deflection by performing a mandrel test as directed on pipes manufactured from materials listed in the following table. The Engineer will determine the runs of pipe installations to be mandrel tested with a minimum of 10% of the total length of each material to be inspected.

PIPES REQUIRING MANDREL TESTING	
Pipe Material	Standard Specifications
Corrugated Polyethylene Pipe*	907.17(b)
Corrugated Polypropylene Pipe	907.19
Profile Wall Polyethylene Pipe	907.20
Smooth Wall Polyethylene Pipe	907.21
Profile Wall PVC Pipe*	907.22
Smooth Wall PVC Pipe	907.23
* When used as underdrain pipe, mandrel testing will not be required.	

SECTION 907, BEGIN LINE 212, DELETE AND INSERT AS FOLLOWS:

907.16 Thermoplastic Pipe Requirements

A QPL of Thermoplastic Pipe and Liner Pipe Sources will be maintained by the Department. The QPL will specify the manufacturer and thermoplastic pipe designation.

All of these materials shall comply with the applicable AASHTO or ASTM requirements listed in the following table and will only be accepted from qualified manufacturers. The manufacturer is defined as the plant which produces thermoplastic pipe. The manufacturer shall become qualified by establishing a history of satisfactory

quality control of these materials as evidenced by the test results performed by the manufacturer's testing laboratory.

SUMMARY OF THERMOPLASTIC PIPE SPECIFICATION REQUIREMENTS				
Pipe Material	Standard Specification	AASHTO	ASTM	Manufacturer Requirement
Corrugated Polyethylene Drainage Tubing	907.17(a)	M 252		ITM 806, Procedure O
Corrugated Polyethylene Pipe	907.17(b)	M 294*		ITM 806, Procedure O
Corrugated Polypropylene Pipe	907.19	M 330		ITM 806, Procedure O
Perforated PVC Semicircular Pipe	907.18		D3034	ITM 806, Procedure A916, Type D certification
Profile Wall HDPE Liner Pipe	907.25(b)		F894	ITM 806, Procedure A or 916, Type A Certification
Profile Wall PVC Liner Pipe	907.25(c)		F949	ITM 806, Procedure A or 916, Type A Certification
Profile Wall PVC Pipe	907.22 907.24(c)	M 304		ITM 806, Procedure O
Profile Wall Polyethylene Pipe	907.20		F894	ITM 806, Procedure A916, Type D certification
PVC Plastic Pipe, Schedule 40	907.24(b)		D1785	916, Type C Certification
Slotted Vane Drain Pipe	908.14	M 278	F679	ITM 806, Procedure A916, Type D certification
Smooth Wall Polyethylene Pipe	907.21 907.24(d)		F714	ITM 806, Procedure A916, Type D certification
Smooth Wall PVC Pipe	907.23 907.24(e)	M 278	F679	ITM 806, Procedure A916, Type D certification
Solid Wall HDPE Liner Pipe	907.25(a)		F714	ITM 806, Procedure Q or 916, Type A Certification
Type PSM PVC Pipe and Fittings	907.24(a)		D3034	ITM 806, Procedure A916, Type D certification

* Pipe in accordance with AASHTO M 294 shall be manufactured with virgin materials.

SECTION 907, BEGIN LINE 238, DELETE AND INSERT AS FOLLOWS:

907.18 Perforated PVC Semicircular Pipe

Perforated PVC semicircular pipe may be used as an alternate to 6 in. or less

diameter pipe or tile. Pipe shall be in accordance with ASTM D3034, DR 35. This semicircular pipe shall have a smooth top and a smooth, semicircular bottom, nominally 4 5/8 in. in diameter, with perforations uniformly distributed along the top of the bottom section in accordance with AASHTO M 252 perforation requirements. The top section shall extend a minimum of 1/2 in. beyond the top of the semicircular section. The top section shall be approximately 6 3/8 in. wide including the sloping overhangs on each side. ~~Pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure AA Type D certification in accordance with 916 shall be provided for the perforated PVC semicircular pipe.~~

SECTION 907, BEGIN LINE 254, DELETE AND INSERT AS FOLLOWS:

907.20 Profile Wall Polyethylene Pipe

Pipe and fittings shall be either closed profile or ribbed open profile in accordance with ASTM F894. ~~Pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure AA Type D certification in accordance with 916 shall be provided for the profile wall polyethylene pipe.~~

907.21 Smooth Wall Polyethylene Pipe

Pipe shall be in accordance with ASTM F714 for nominal diameters of 39 in. or less. Fittings shall be in accordance with ASTM F1055. The pipe sizes shall be in accordance with ISO sizing system. The pipe DR shall be 26 or less. The resin used in manufacturing this type of pipe shall have a minimum cell classification of 335434C in accordance with ASTM D3350 or a minimum grade of PE4710 in accordance with ASTM F714. ~~Pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure AA Type D certification in accordance with 916 shall be provided for the smooth wall polyethylene pipe.~~

SECTION 907, BEGIN LINE 274, DELETE AND INSERT AS FOLLOWS:

907.23 Smooth Wall PVC Pipe

Pipe and fittings shall be in accordance with AASHTO M 278 for pipe sizes 4 in. through 15 in., and ASTM F679 for pipe sizes 18 in. through 27 in. ~~Pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure AA Type D certification in accordance with 916 shall be provided for the smooth wall PVC pipe.~~

907.24 Pipe for Outlets

Pipe and pipe fittings used for outlets shall be smooth interior wall, unperforated plastic pipe.

(a) Type PSM PVC Pipe and Fittings

Pipe and fittings shall be in accordance with ASTM D3034, DR 23.5. ~~Pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure AA Type D certification in accordance with 916 shall be provided for the type PSM PVC pipe and fittings.~~

SECTION 907, BEGIN LINE 306, DELETE AND INSERT AS FOLLOWS:

907.25 Thermoplastic Liner Pipe

Thermoplastic liner pipe shall be HDPE or PVC pipe with sufficient rigidity to withstand the installation operation and shall exhibit a minimum amount of distortion. The

liner pipe shall be free from visible cracks, holes, foreign inclusions, or other defects. ~~Liner pipe shall be either from the QPL or a Type A certification in accordance with 916 shall be provided for the liner pipe. The results of the tests listed in ITM 804 shall be shown on the certification.~~

(a) Solid Wall HDPE Liner Pipe

Solid wall HDPE liner pipe shall be in accordance with ASTM F714. *Solid wall HDPE liner pipe shall either be selected from a source listed on the QPL of Thermoplastic Pipe and Liner Pipe Sources or a Type A certification in accordance with 916, with the results of the tests listed in ITM 804 shown on the certification, shall be provided for the liner pipe.* The maximum SDR as defined in ASTM F412 for the liner pipe shall be 32.5. The actual calculated minimum DR as defined in ASTM F412 for the liner pipe shall be 30.0. The resin used in the manufacture of the liner pipe shall have a minimum cell classification of 345464C in accordance with ASTM D3350 or a minimum grade of PE4710 in accordance with ASTM F714. A 12 in. section of the liner pipe shall show no evidence of splitting, cracking, or breaking when compressed between parallel plates to 40% of its outside diameter within 2 to 5 minutes. Thermoplastic liner pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure Q.

(b) Profile Wall HDPE Liner Pipe

Profile wall HDPE liner pipe shall be in accordance with ASTM F894. *A Type A certification in accordance with 916, with the results of the tests listed in ITM 804 shown on the certification, shall be provided for the liner pipe.* The minimum liner ring stiffness constant, RSC, shall be 160 for circular installations and 250 for deformed installations. ~~Thermoplastic liner pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure A.~~

(c) Profile Wall PVC Liner Pipe

Profile wall PVC liner pipe shall be in accordance with ASTM F949. ~~Thermoplastic liner pipe will be considered for inclusion on the QPL by completing the requirements of ITM 806, Procedure A.~~ *A Type A certification in accordance with 916, with the results of the tests listed in ITM 804 shown on the certification, shall be provided for the liner pipe.*
