



Chandler • Arizona
Where Values Make The Difference

MEMORANDUM

Case # **13-05**

DATE: February 6th, 2013

TO: MAG Specifications and Details Committee Members

FROM: Warren White, City of Chandler Representative

SUBJECT: Proposed MAG Section 740, Polypropylene Pipe and Fittings for Gravity Storm Drain and Sanitary Sewer

The City of Chandler began accepting polypropylene pipe for storm drain applications in 2010. Our acceptance was based a number of key factors including stiffness, maintenance, and installation. We adopted new supplements to MAG which included modifications to the following Sections:

Section 618 Storm Drain Construction, Section 739 HDPE Pipe & Fittings for Storm Drain and Sanitary Sewer and Section 615 Sewer Line Construction. See attached.

The preference is to incorporate changes into MAG standards allowing us to remove these supplements in favor of MAG. This Case includes the proposed MAG Section 740 (a modified Section 738) as a starting point. Other cases (or additions to this Case) may spinoff based on the guidance of the working group.

SECTION 618

STORM DRAIN CONSTRUCTION

618.1 DESCRIPTION: is changed to read:

This section covers concrete, polypropylene and high density polyethylene (HDPE) pipeline construction used for the conveyance of irrigation water and storm drainage in streets, easements, and alley rights-of-way, under low hydrostatic heads.

618.2 MATERIALS: is changed to read:

Polypropylene pipe and fittings shall be in accordance with COC Supplement Section 739 - Polypropylene pipe & Fittings for Storm Drain and Sanitary Sewer.

Pipe bedding for polypropylene pipe shall be ABC in accordance with Section 701.

618.3 CONSTRUCTION METHODS: is changed to add:

Water stops will be required when connecting HDPE and polypropylene pipe to concrete structures, manholes, etc.

Lateral service taps for polypropylene pipe shall be made utilizing standard manufacturer fittings.

Backfilling and compaction shall be in accordance with Section 601 and ASTM D2321 for polypropylene pipe.

SECTION 739

POLYPROPYLENE PIPE & FITTINGS FOR STORM DRAIN AND SANITARY SEWER

739.1 GENERAL:

This specification presents the requirements for polypropylene pipe utilized for gravity flow, low pressure storm drain and sanitary sewer systems.

739.2 MATERIALS:

Pipe and fittings shall be double wall, smooth interior, with annular exterior corrugations in conformance to ASTM F-2736 for pipe diameters up to and including 24". Pipe and fittings shall be triple wall, smooth interior and exterior, with annular inner corrugations in conformance to ASTM F-2764 for pipe diameters 30" to 60".

739.3 JOINTING SYSTEMS:

Pipe shall be joined with a gasketed integral bell and spigot joint. The joint shall be water-tight in accordance with ASTM D-3212. Sanitary sewer pipe shall have dual gaskets. Gaskets shall conform to ASTM F-477. They shall be installed by the pipe manufacturer and covered with a removable protective wrap to ensure the gasket is free of debris. A manufacturer-recommended joint lubricant shall be applied during assembly. The pipe bells shall be reinforced with a polymer composite band installed by the manufacturer.

739.4 FITTINGS:

Lateral pipes shall be connected to the main by manufactured fittings. Water stops in accordance with ASTM C-923 shall be installed at structures. Water stops, joint seals, field repair couplers, and connections to dissimilar pipe shall be in accordance with manufacturer's recommendations, and shall be submitted to the City for approval prior to use.

SECTION 615

SEWER LINE CONSTRUCTION

615.1 DESCRIPTION: is modified to add:

Polypropylene pipe shall conform to Section 739.

615.4 LAYING PIPE: is changed to read:

HDPE, polypropylene, and PVC pipe and fittings shall be installed in accordance with ASTM D-2321.

Pipe bedding for polypropylene pipe shall be ABC in accordance with Section 701.

615.6.2 Water Stops is changed to read:

Water stops will be required when connecting HDPE and polypropylene pipe to concrete structures, manholes, etc.

615.7 SANITARY SEWER SERVICE TAPS: is modified to add:

Sanitary sewer service taps for polypropylene pipe shall be made utilizing standard manufacturer fittings.

615.10 BACKFILLING: is modified to add:

Backfilling and compaction shall be in accordance with Section 601 and ASTM D2321 for polypropylene pipe.

615.11 TESTING (C) is changed to read:

(C) Deflection Test for HDPE, Polypropylene, and PVC Pipe

In addition to the tests prescribed above, the Contractor shall perform a deflection test on the system as directed by the Engineer. Any part of the installation which shows deflection in excess of 5% of the nominal inside diameter per Section 738 for HDPE pipe, or in excess of 5% of the minimum inside diameter per ASTM F-2736 or F-2764 for polypropylene pipe, or in excess of 5% of the average inside diameter per ASTM D-3034 for PVC pipe, shall be corrected.

SECTION 738XXX

HIGH DENSITY POLYETHYLENE/POLYPROPYLENE PIPE & FITTINGS FOR STORM DRAIN & SANITARY SEWER

738.1 GENERAL:

This specification covers the requirements of ~~profile reinforced and corrugated~~ profile wall (both dual wall and triple wall) (Type S or Type D) ~~high density polyethylene (HDPE)- polypropylene (PP)~~ pipe manufactured per ASTM F894, AASHTO M 252 or AASHTO M 294 ASTM F2736, ASTM F2764, AASHTO MP21-11 for gravity flow, low pressure storm drain and sanitary sewer systems. When noted on the plans or in the special provisions, gravity flow, low pressure storm drains and sanitary sewers may be constructed using HDPE-PP pipe. The HDPE-PP pipe will be of the sizes 8-12 inch diameter through 420-60 inch diameter. For the purpose of this specification, low pressure is defined as the test pressures of 3.5 psi of air or 4 feet of water as specified in Section 615.11.

All pipe joints shall conform to the controlled pressure lab test of 10.8 psi of air or 25 feet of water as stipulated in ASTM D3212.

The size ~~and class~~ of the HDPE-PP pipe to be furnished shall be designed by the Engineer and shown on the plans or in the project specifications. ~~At no time will the class designed be less than RSC 63 for profile pipe, or minimum equivalent Pipe Stiffness (PS) for corrugated pipe per the requirements of AASHTO M 252 or AASHTO M 294.~~

738.2 MATERIALS:

738.2.1 Base Material Composition: Profile pipe base material and fittings shall meet polypropylene materials requirements as stated in Section 4, Table 1 of ASTM F2736, Section 5, Table 1 of ASTM F2764 or Section 6, Table 1 AASHTO MP21-11, in accordance with ASTM F894, be made from a PE plastic compound meeting the requirements of Type III, Class C, Category 5, Grade P34 as defined in ASTM D1248 and with established hydrostatic design basis (HDB) of not less than 1250 psi for water at 73.4 degrees F° as determined in accordance with Method ASTM D2837. Materials meeting the requirements of cell classification PE 334433 C or higher cell classification, in accordance with ASTM D3350 are also suitable. Corrugated pipe base material shall comply with the requirements of AASHTO M 252 (Type S) or AASHTO M 294 (Type S or D) and have a minimum cell classification PE335420C.

~~**738.2.2 Other Pipe Materials:** Materials other than those specified under Base Materials shall comply with ASTM F894, AASHTO M 252 or AASHTO M 294.~~

738.2.3 Gaskets: Rubber gaskets shall be manufactured from a natural rubber, synthetic elastomer or a blend of both and shall comply in all respects with the physical requirements in ASTM F477, unless the project specifies a special gasket, such as nitrile.

738.2.4 Water Stops: Water stops shall be manufactured from a natural or synthetic rubber and shall conform to the requirements of ASTM C923. The water stop shall have expansion rings, a tension band, or a take-up device used for mechanically compressing the water stop against the pipe.

738.2.5 Thermal Welding Material: The material used for thermally welding the pipe material shall be compatible with the base material.

738.2.6 Lubricant: The lubricant used for assembly shall comply to manufacturer's recommendations and have no detrimental effect on the gasket or pipe.

738.3 JOINING SYSTEMS:

738.3.1 Gasket Type: Joints for the piping system and fittings shall consist of an integrally formed bell and spigot gasketed joint. The joint shall be designed so that when assembled, the elastomeric gasket located on the spigot is compressed radially on the pipe or fitting bell to form a water tight seal. The joint shall be designed so to prevent

displacement of the gasket from the joint during assembly and when in service. The elastomeric gasket shall meet the provision of ASTM F477.

All pipes shall have a home mark on the spigot end to indicate proper penetration when the joint is made.

The bell and spigot configurations for the fittings shall be compatible to those used for the pipe.

Joints shall provide a seal against exfiltration and infiltration. All surfaces of the joint upon which the gasket may bear, shall be smooth and free of any imperfections, which would adversely affect sealability. The assembly of the gasketed joints shall be in accordance with the pipe manufacturer's recommendations.

~~738.3.2 Thermal Weld Type: The pipe ends shall consist of an integrally formed bell and spigot, with or without the elastomeric centering gasket, which join together to form an interface between bell and spigot, such that it is suitable to seal by thermal weld using the extrusion welding process, in accordance with the manufacturer's recommended procedure.~~

~~Thermal welded joints may be effected by welding from inside the pipe or outside, or both.~~

~~The assembly of the welded joints shall be in accordance with the manufacturer's recommendations.~~

~~Thermal welded joints shall be used only when specified on plans or in specifications.~~

738.4 FITTINGS:

Fittings for ~~HDPE-PP pipe profile wall or corrugated pipe~~ may include tees, elbows, manhole adapter rings, plugs, caps, adapters and increasers. Fittings shall be joined by gasket type ~~or thermal weld~~ type joints in accordance with Subsection 738.3.

A clamp gasket or approved method shall be provided at manhole entry or connection to reduce infiltration and exfiltration. Where precast manholes are used, entrance holes must be large enough to allow for proper grouting around the manhole gasket. A non-shrink grout shall be used for grouting.

738.5 CERTIFICATION:

The manufacturer shall furnish an affidavit (certification) that all materials delivered shall comply with the requirements of ASTM ~~F894 or AASHTO M-252~~ F2736, ASTM F2764 or AASHTO MP21-11.

~~Pipe and resin producers that manufacture according to AASHTO M-294 shall be certified according to the Plastic Pipe Institute protocol for their Third Party Certification Program.~~

738.6 DIMENSIONS AND TOLERANCES:

~~Profile wall HDPE Polypropylene pipe dimensions shall comply with dimensions given in Section 6.2 of ASTM F2736, Section 6.2 of ASTM F2764 or Section 7.2 of AASHTO MP21-11. Table 1 of ASTM F894. The average or nominal inside diameter of profile wall HDPE pipe shall not deviate from its normal pipe size by more than as specified in Table 1 of ASTM F894. Corrugated HDPE pipe dimensions shall be nominal inside diameter dimensions and shall not deviate from its nominal pipe size by more than the minimum and maximum tolerances as described in AASHTO M-252 or AASHTO M-294, Section 7.2.3.~~

~~Profile pipe shall have a Ring Stiffness Constant (RSC) or Pipe Stiffness (PS) as shown on the plans. The minimum RSC for profile HDPE pipe shall be RSC-63. The minimum PS for corrugated pipe shall be as shown in AASHTO M-252 (Section 7.5) or AASHTO M-294 (Section 7.4) and tested per ASTM D2412. In no case shall the minimum PS be less than the equivalent PS value for RSC-63.~~

738.7 CLASSIFICATIONS:

~~HDPE profile reinforced pipe products shall be made in four standard Ring Stiffness Constant (RSC) classifications, 40, 63, 100 and 160. These are referred to as RSC 40, RSC 63, RSC 100 and RSC 160. The RSC test shall be conducted in accordance with ASTM D2412 with the exceptions listed in accordance with ASTM F894. HDPE PP corrugated pipe (Type S or Type D) shall meet the minimum Pipe Stiffness (PS) requirements of ASTM F2736, ASTM F2764 or AASHTO MP21-11. AASHTO M 252 or AASHTO M 294. The PS test shall be conducted in accordance with ASTM D2412 with the exceptions listed in accordance with AASHTO M 252 or AASHTO M 294. ASTM F2736, ASTM F2764 and AASHTO MP21-11.~~

738.8 MARKINGS:

Markings on pipe shall be per ASTM ~~F894~~F2736, ~~AASHTO M 252~~ASTM F2764 or AASHTO M-~~294~~P 21-11. These markings shall be clearly shown on the pipe at intervals of approximately 12 feet and include but not limited to the following: the manufacturers name or trademark, nominal size, the specification designation, plant designation code, date of manufacture or an appropriate code. All fittings shall be marked with the designation number of the specification and with the manufacturers identification symbol. ~~In addition, manufacturers of corrugated HDPE, AASHTO M 294, shall print on or affix the appropriate Plastic Pipe Institute Program Mark on each length of pipe produced that meets the requirements of the program.~~

738.9 CARE OF PIPE AND MATERIALS:

Care of pipe materials shall comply with Subsection 736.5.

~~HDPE profile reinforced RSC type pipe in shipping or storage shall not be stacked higher than three rows for pipes 21 inches in diameter or less, nor higher than two rows for pipes 24 to 36 inches in diameter inclusive. Pipe shall not be stacked, shipped, or stored with weight on the bells of the pipe.~~

~~Corrugated HDPE pipe in shipping and storage shall be stacked per manufacturers recommendation, but in no case higher than 5 rows for pipe 24 inches or less in diameter, or 3 rows for pipe greater than 24 inches in diameter.~~

Pipe that is gouged marred or scratched forming a clear depression shall not be installed and shall be removed if damaged in the installation.

- End of Section -

SECTION 740

POLYPROPYLENE PIPE & FITTINGS FOR STORM DRAIN & SANITARY SEWER

740.1 GENERAL:

This specification covers the requirements of profile wall (both dual wall and triple wall) (Type S or Type D) polypropylene (PP) pipe manufactured per ASTM F2736, ASTM F2764, AASHTO MP21-11 for gravity flow, low pressure storm drain and sanitary sewer systems. When noted on the plans or in the special provisions, gravity flow, low pressure storm drains and sanitary sewers may be constructed using PP pipe. The PP pipe will be of the sizes 12 inch diameter through 60 inch diameter. For the purpose of this specification, low pressure is defined as the test pressures of 3.5 psi of air or 4 feet of water as specified in Section 615.11.

All pipe joints shall conform to the controlled pressure lab test of 10.8 psi of air or 25 feet of water as stipulated in ASTM D3212.

The size of the PP pipe to be furnished shall be designed by the Engineer and shown on the plans or in the project specifications.

740.2 MATERIALS:

740.2.1 Base Material Composition: Profile pipe base material and fittings shall meet polypropylene materials requirements as stated in Section 4, Table 1 of ASTM F2736, Section 5, Table 1 of ASTM F2764 or Section 6, Table 1 AASHTO MP21-11.

740.2.3 Gaskets: Rubber gaskets shall be manufactured from a natural rubber, synthetic elastomer or a blend of both and shall comply in all respects with the physical requirements in ASTM F477, unless the project specifies a special gasket, such as nitrile.

740.2.4 Water Stops: Water stops shall be manufactured from a natural or synthetic rubber and shall conform to the requirements of ASTM C923. The water stop shall have expansion rings, a tension band, or a take-up device used for mechanically compressing the water stop against the pipe.

740.2.5 Thermal Welding Material: The material used for thermally welding the pipe material shall be compatible with the base material.

740.2.6 Lubricant: The lubricant used for assembly shall comply to manufacturer's recommendations and have no detrimental effect on the gasket or pipe.

740.3 JOINING SYSTEMS:

740.3.1 Gasket Type: Joints for the piping system and fittings shall consist of an integrally formed bell and spigot gasketed joint. The joint shall be designed so that when assembled, the elastomeric gasket located on the spigot is compressed radially on the pipe or fitting bell to form a water tight seal. The joint shall be designed so to prevent displacement of the gasket from the joint during assembly and when in service. The elastomeric gasket shall meet the provision of ASTM F477.

All pipes shall have a home mark on the spigot end to indicate proper penetration when the joint is made.

The bell and spigot configurations for the fittings shall be compatible to those used for the pipe.

Joints shall provide a seal against exfiltration and infiltration. All surfaces of the joint upon which the gasket may bear, shall be smooth and free of any imperfections, which would adversely affect sealability. The assembly of the gasketed joints shall be in accordance with the pipe manufacturer's recommendations.

740.4 FITTINGS:

Fittings for PP pipe may include tees, elbows, manhole adapter rings, plugs, caps, adapters and increasers. Fittings shall be joined by gasket type joints in accordance with Subsection 738.3.

A clamp gasket or approved method shall be provided at manhole entry or connection to reduce infiltration and exfiltration. Where precast manholes are used, entrance holes must be large enough to allow for proper grouting around the manhole gasket. A non-shrink grout shall be used for grouting.

740.5 CERTIFICATION:

The manufacturer shall furnish an affidavit (certification) that all materials delivered shall comply with the requirements of ASTM F2736, ASTM F2764 or AASHTO MP21-11.

740.6 DIMENSIONS AND TOLERANCES:

Polypropylene pipe dimensions shall comply with dimensions given in Section 6,2 of ASTM F2736, Section 6.2 of ASTM F2764 or Section 7.2 of AASHTO MP21-11.

740.7 CLASSIFICATIONS:

PP pipe (Type S or Type D) shall meet the minimum Pipe Stiffness (PS) requirements of ASTM F2736, ASTM F2764 or AASHTO MP21-11. The PS test shall be conducted in accordance with ASTM D2412 with the exceptions listed in accordance with ASTM F2736, ASTM F2764 and AASHTO MP21-11.

740.8 MARKINGS:

Markings on pipe shall be per ASTM F2736, ASTM F2764 or AASHTO M-P 21-11. These markings shall be clearly shown on the pipe at intervals of approximately 12 feet and include but not limited to the following: the manufacturers name or trademark, nominal size, the specification designation, plant designation code, date of manufacture or an appropriate code. All fittings shall be marked with the designation number of the specification and with the manufacturers identification symbol.

740.9 CARE OF PIPE AND MATERIALS:

Care of pipe materials shall comply with Subsection 736.5.

Pipe that is gouged marred or scratched forming a clear depression shall not be installed and shall be removed if damaged in the installation.

- End of Section -