ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: March 30, 2015 Special Provision No. 12-1263

EFFECTIVE DATE: June 1, 2015

SUBJECT: Storm Sewers.

Alabama Standard Specifications, 2012 Edition, SECTION 533 and SECTION 854 shall be revised as follows:

SECTION 533
STORM SEWERS

533.01 Description.

This Section shall cover the work of furnishing and constructing storm sewers of the kind, strength, and size pipe provided in the proposal, in accordance with the requirements of these specifications and installing such sewers at the locations shown on the plans or designated and in conformity with established lines and grades. These items shall also include the furnishing and construction of such joints, necessary cutting and connections to other pipe, catch basins, endwalls, etc., as may be required to complete the work shown on the plans or directed.

533.02 Materials.

(a) General.

Materials furnished for use shall conform to the appropriate provisions of Division 800, Materials, with specific reference made to Section 854.

(b) Abbreviations:

Concrete Pipe	P.C. for plain concrete R.C. for reinforced concrete
Corrugated Metal	C.M. for any acceptable corrugated metal pipe covered by these specifications
Protective Coating	C. for any protective coating of metal pipe allowed by these specifications
Paved Invert	P.I.
Corrugated Steel	C.S. for Plain Corrugated Steel C.C.S. for Coated Corrugated Steel C.C.S.P.I. for Coated C.S. Paved Invert
Corrugated Aluminum	C.A. for Plain Corrugated Aluminum C.C.A. for Coated C.A. C.C.A.P.I. for Coated C.A. Paved Invert
Smooth Lined	S.L. for Smooth Lined C.S.L.C.M. for Coated, Smooth Lined Corrugated Metal C.S.L.C.S. for Coated, Smooth Lined Corrugated Steel C.S.L.C.A. for Coated, Smooth Lined Corrugated Aluminum
Smooth Flow	S.F. for Smooth Flow C.S.F.C.M. for Coated, Smooth Flow Corrugated Metal C.S.F.C.S. for Coated, Smooth Flow Corrugated Steel C.S.F.C.A. for Coated, Smooth Flow Corrugated Aluminum
Concrete Lined	C.L. C.C.L.C.S. for Coated C.L. Corrugated Steel
Vitrified Clay	V.C. for Vitrified Clay
High Density Polyethylene	HDPE for High Density Polyethylene
High Performance Polypropylene	PP for High Performance Polypropylene

(c) Optional Types of Pipes

Provided a specific type of pipe is not specified by the plans or proposal, the Contractor will be permitted to install any of the optional types of pipe herein. Substitutions will only be allowed with hydraulically equivalent pipes. The hydraulic equivalence of optional types of pipes will be shown on the plans. Optional types of pipe shall meet the following criteria:

Diameters less than or equal to 24 inches {600 mm} - P.C.; V.C.; Class 1 C.S.L.C.M.; 16 gage {1.6 mm} C.S.F.C.M.; 16 gage {1.6 mm} C.C.L.C.S., P.V.C.; or HDPE.

Diameters greater than24 inches {600 mm} - Class 2 R.C.; Class 2 C.S.L.C.M.; 14 gage {2.0 mm} C.S.F.C.M.; 14 gage {2.0 mm} C.C.L.C.S.; P.V.C. or HDPE, or PP (HDPE and PP up to 36 inches {900 mm} diameter) with a minimum of 24 inches {600 mm} of cover, and a maximum of 25 feet {7.5 m} fill height . Any storm sewer pipe to be placed under a roadway or subject to continuous traffic shall be not less than a Class 3 R.C., or equivalent strength C.S.L.C.M., C.S.F.C.M., or C.C.L.C.S. Pipe. The fill height charts on the plans for roadway pipe shall be used to determine strengths or equivalent strengths for storm sewer pipe.

All smooth flow pipe 48 inches {1200 mm} or larger in diameter shall be shop elongated.

The Contractor may furnish a higher grade pipe than those specified above or, with written approval, a cast iron or ductile iron pipe meeting the appropriate requirements of Section 854, provided no additional cost is incurred by the Department for such substitution. Any installation, once started, shall be completed using the same type of pipe unless specifically designated otherwise by plan details or requested and approved in writing.

533.03 Construction Requirements.

(a) General Methods.

Pipe shall not be laid except in the presence of the Engineer or Inspector and shall not be covered until approved.

Any sewer line placed under a roadway or subject to continuous traffic shall be placed in accordance with the appropriate provisions of Article 530.03.

(b) Excavation and Foundation.

1. Excavation.

The trench shall be excavated beginning at the outlet end and proceeding upgrade, true to the established line and grade. Tunneling will not be permitted unless authorized in writing. The removal of trees or other obstructions encountered necessary for the construction of the work shall be done by the Contractor without extra compensation. Trenches shall be properly sheeted and braced wherever needed. Unless otherwise directed, the trench shall be of the size, within the limits, provided by Subarticle 214.04(a).

2. Foundation.

If deemed necessary, foundation backfill as provided by Article 214.02 shall be used. The foundation in the trench shall be so formed and treated as to prevent subsequent settlement. If the foundation is in rock, foundation backfill consisting of a 12 inch {300 mm} cushion of well compacted sand, fine gravel, slag, broken stone, or other approved material shall be placed upon the rock. If the excavation has been made deeper than necessary, proper bearing shall be secured by means of a layer of fine gravel, or other suitable material. In all cases recesses shall be formed to receive the bell or hub, so that the full length of the pipe barrel will rest on the trench bottom.

(c) Laying Pipe.

1. General.

The laying of pipes in finished trenches shall be started at the outlet end and proceed upgrade so that the spigot or groove ends point in the direction of flow. All pipes shall be laid with ends abutting and with not more than 1 inch {25 mm} variation from established alignment at the vertical centerline or from grade at the flow line. The bottom of the trench shall be shaped accurately to the outside surface of the pipe for a depth at least 0.10 times the outside diameter. Pipes shall be fitted and matched so that when laid in the work they will form a sewer with a smooth, uniform invert. Hubs or bells shall be carefully cleaned before pipes are lowered into the trenches. Pipe shall be so lowered as to avoid damage and unnecessary handling in the trench.

2. Sealing Joints.

Unless otherwise directed, all joints shall be sealed as specified in Item 530.03(d)3 for the entire circumference of the pipe. Trenches shall be kept free from water until mortar in the joints and masonry has hardened. Walking or working on or over the completed pipe line, except such as is necessary for tamping or backfilling, will not be permitted until at least 3 feet {1 m} of backfill is in place over the pipe.

(d) Backfilling.

1. Material.

All trenches and excavations shall be backfilled with approved natural soil or, if directed or provided by the plans, with foundation backfill material after the sewer pipe is laid therein, unless otherwise specified.

2. Methods.

Backfilling shall not begin until mortar joints have cured or until backfilling is authorized by the Engineer. The material shall be carefully deposited simultaneously on both sides of the pipe in uniform layers not to exceed 6 inches {150 mm} in compacted thickness, solidly tamped or rammed with proper tools so as not to injure or disturb the pipe. If stone, gravel, or slag is provided or specified as backfilling, the sewer pipe shall be covered with clean gravel or broken stone or slag placed around and above it to a height of not less than 4 inches {100 mm} above

the upper surface of the pipe. The remainder of the trench shall then be backfilled with the excavated material. The Contractor shall restore all roadways or crossings, which are disturbed by the placing of sewers, to their original condition and shall replace all surface material and all paving, macadam, sidewalk, sod, or other surface disturbed, furnishing all the new material necessary without extra compensation, except as herein provided. Whenever excavation is made for installing sewer pipe across private property, the topsoil disturbed by excavation operations shall be replaced as nearly as possible in its original position.

Bedding, placing, and backfilling of storm sewers within roadway limits shall be as provided in Section 530, using the type and strength of pipe specified on the plans.

3. Compaction and Density.

Compaction and density requirements shall meet that specified by Article 530.03. Ramming of material over, around, and to within 1 foot {300 mm} above the top of the sewer shall be done by careful use of approved mechanical tampers.

4. Clean Up.

After completing the backfill, the Contractor shall immediately remove all surplus material, dirt, rubbish, and all tools and other equipment or material, leaving the entire site and the whole area involved in the construction operations in a neat and presentable condition. All pipe lines shall be thoroughly cleaned out prior to final acceptance.

(e) Testing For Excessive Deformation in P.V.C., HDPE, and PP Pipe.

P.V.C. HDPE, and PP pipe shall be tested for excessive deformation. The test shall be performed by the Contractor in the presence of the Engineer. Testing shall be conducted no fewer than 30 days after the completion of the compaction of all fill over the pipe.

The Contractor shall conduct the test by pulling a nine point mandrel through the entire length of the pipe by hand.

The mandrel shall meet the following requirements:

- It shall be made of steel or aluminum;
- It shall have an effective diameter of 95 % of the nominal inside diameter of the pipe;
- It shall be at least as long as the diameter of the pipe;
- It shall be fitted with pulling rings at each end;
- It shall be stamped or engraved on some segment other than a runner with the pipe size and mandrel outside diameter.

Prior to testing, the Contractor shall provide the Engineer with a proving ring to verify the mandrel size.

The deformation is unacceptably excessive if the mandrel cannot be pulled through the pipe by hand without damaging the pipe. If the deformation is unacceptably excessive, the pipe shall be replaced without extra compensation.

There will be no direct payment for testing.

533.04 Method of Measurement.

Storm sewer pipe, excavation, and foundation backfill will each be measured in the same manner as specified in Article 530.04.

533.05 Basis of Payment.

(a) General.

The accepted length of a storm sewer pipe, measured as specified above, will be paid for at the respective contract unit price for the sizes and types of pipe provided in the proposal, complete in place, which shall be payment in full for all materials, equipment, labor, and incidentals necessary to complete the work, except that excavation and backfill will be paid for as provided in Section 214.

(b) Payment Will Be Made Under Item No.:

533-A ___ inch {mm} Storm Sewer Pipe (*) - per linear foot {meter}
533-B ___ inch {mm} Span, ___ inch {mm} Rise Storm Sewer Pipe (*) - per linear foot {meter}
* Show specific type, if required. Example: P.C. or V.C., or Class ____ R.C., or Class ____ C.S.L.C.S., or Class ____ C.S.L.C.A., C.S.F.C.S., C.S.F.C.A., or C.C.L.C.S.

SECTION 854
STORM SEWER PIPE

854.01 Concrete (Storm) Sewer Pipe.

(a) Plain Concrete Pipe (PC).

Only plain concrete pipe 24 inches {610 mm} or less in diameter (or equivalent area in arch pipe) will be permitted. Circular pipe shall meet the requirements for Class 2 pipe of AASHTO M 86 or for Class II of AASHTO M 170 without steel reinforcement, provided the same strength requirements for the same size pipe provided in AASHTO M 86 for Class II pipe are met.

(b) Reinforced Concrete Pipe (RC).

Circular pipe over 24 inches {610 mm} in diameter shall meet the requirements of AASHTO M 170 for Class II unless another class is designated by the plans or proposal.

Arch pipe larger than 18 inch {455 mm} rise by 28.5 inch {725 mm} span shall meet the requirements of AASHTO M 206 for Class A-II unless another class is designated by the plans or proposal.

(c) Acceptance.

In addition to the above requirements, all precast products furnished must meet the requirements of Section 831, Precast Concrete Products.

854.02 Coated, Smooth Lined Corrugated Metal (Storm) Sewer Pipe (CSLCM).

CSLCM shall meet the requirements of AASHTO M 36 or AASHTO M 196 for Type 1A pipe. The shell and liner shall be pre-coated on both sides with a 10 mil {0.25 mm} polymeric coating as per AASHTO M 246.

For correlation purposes the following table provides acceptable shell and liner plate thickness which may be used to equate with Corrugated Metal Pipe (CM) wall thicknesses.

Class of Pipe	Equivalent Single Steel Sheet Wall Thickness	S.L. Wall Thickness	
		Shell	Liner
1	0.064 inches {1.6 mm}	0.052 inches {1.3 mm}	0.04 inches {1.0 mm}
2	0.079 inches {2.0 mm}	0.052 inches {1.3 mm}	0.04 inches {1.0 mm}
3	0.109 inches {2.8 mm}	0.079 inches {2.0 mm}	0.04 inches {1.0 mm}
4	0.138 inches {3.5 mm}	0.109 inches {2.8 mm}	0.04 inches {1.0 mm}
NOTE: For aluminum all thicknesses may be reduced by 0.004 inches {0.10 mm} to compensate for zinc coating.			

Connecting bands shall conform to the appropriate provisions of AASHTO M 36 or M 196 for the type material used and shall have the same type coating as used on the pipe.

Appropriate designed waterproof gaskets shall be used in conjunction with connecting bands to form a watertight joint. Gasket material shall be neoprene or other approved material.

Damage to coatings shall be repaired in accordance with the appropriate provisions of AASHTO M 245 for a polymeric coating.

854.03 Coated Smooth Flow Corrugated Metal (Storm) Sewer Pipe (CSFCM).

CSFCM shall meet the applicable requirements of Article 850.02 or Article 850.03 and the following:

- All pipes shall have a protective coating in accordance with the applicable provisions of Subarticle 850.02(c). In addition the inside of the pipe shall have a paved lining for the entire inside periphery which will fill the valleys to the extent that the thickness above the top of the crest of the corrugations will not be less than 1/8 inch {3 mm}. The lining shall be smooth and uniform and its surface shall be parallel to a line projected along the crest parallel to the centerline.
- Bituminous coating and pavement lining shall conform to the requirements of AASHTO M 246 for Type B sheets with the pavement lining formed from material compatible with the coating material and otherwise meeting the same basic requirements of Section 5 of AASHTO M 190.
- Connecting bands shall meet the requirements of Subarticle 850.02(d) and have appropriate waterproof seals in accordance with Article 846.02.
- Damage to coating and pavement linings shall be repaired in accordance with the appropriate provisions of AASHTO M 245 for polymeric material and approved asphalt mastic as noted in AASHTO M 245.

854.04 Concrete Lined Corrugated Metal (Storm) Sewer Pipe (CL).

CL shall meet the requirements of Article 850.02 or Article 851.02 with the lining as specified in Item 850.02(c)4.

854.05Polyvinyl Chloride (Storm or Sanitary) Sewer Pipe (PVC) and Fittings.

PVC and fittings shall meet the requirements of ASTM D 2665, ASTM D 3034 SDR 35, or ASTM F 949.

854.06 High Density Polyethylene (Storm) Sewer Pipe (HDPE).

HDPE shall meet the requirements of AASHTO M 294, Type S. HDPE shall be furnished from an approved producer. Approved producers are shown on List I-11, "Producers of High Density Polyethylene Pipe" in the Department's "Materials, Sources and Devices with Special Acceptance Requirements" manual. Information concerning this list is given in Subarticle 106.01(f).

854.07 High Performance Polypropylene (Storm) Sewer Pipe (PP).

PP shall meet the requirements of AASHTO M 330. PP shall be furnished from an approved producer. Approved producers are shown on List I-14, "Producers of High Density Polyethylene Pipe" in the Department's "Materials, Sources and Devices with Special Acceptance Requirements" manual. Information concerning this list is given in Subarticle 106.01(f).

854.08 Handling and Storage.

Pipe shall be handled, transported, delivered, and stored by methods that will not damage the pipe, coatings, or linings. Any pipe damaged or bent will be rejected even though previously inspected and found satisfactory, and shall be replaced or repaired at the Engineer's option, without additional compensation. Coating or linings scratched shall be repaired in a satisfactory manner with appropriate material.

854.09 Joint Materials.

Joint material shall provide a suitable waterproof joint capable of withstanding internal pressure of the system involved and be of an approved type. Basic requirements are as follows; however, other types may be considered if appropriate backup data, etc. is submitted in writing to the Central Office for evaluation.

Joint material for storm sewers shall be the same as specified in Section 530 for Roadway Pipe, or those specified for Sanitary Sewers in Section 645.