

SECTION 603 – CULVERTS AND STORM DRAINS

Make the following amendments to said Section:

(I) Amend **603.03(C)(1) - Culverts** by revising lines 106 to 108 to read as follows:

“Spacing between multi-barrel culverts shall be a minimum of 18 inches or 0.5 the culvert width, whichever is greater. The minimum spacing shall be 1 foot when placing controlled low strength material (CLSM) as backfill. Anchor the culverts in such a manner that the horizontal and vertical alignment of the culverts does not change.”

(II) Amend **603.03(D)(2) – Metal and High-Density Polyethylene Culverts** by revising lines 172 to 176 to read as follows:

“(2) Metal Culverts. Join metal culverts firmly with coupling bands.”

(III) Add the following after line 282:

“603.03(L) – High-Density Polyethylene Culverts:

(1) Installation. Install pipe and fittings per manufacturer’s recommendations.

The Contractor may hydrostatically test various sections of the pipeline by temporarily installing a mechanical clamp and blind flange or by fusing on a HDPE stub end, backing ring and blind flange to the open end of the pipeline as long as these temporary blanking off connections are rated for the full test pressure. All fusion joints and mechanical connections in the pipeline section being tested must be fully exposed during the testing process.

(2) Written Pipeline Installation Procedure. Prior to mobilization, the Contractor shall provide the Engineer with a written Pipeline Installation Procedure describing the installation methods used to construct the entire pipeline run, the amount of downtime required to make the necessary hot connections at each end of the new pipeline run and the bypass plumbing arrangement that may be installed to limit downtime.

The written Pipeline Installation Procedure shall describe: (1) the process of storing the pipe material and associated hardware; (2) the process of welding the pipeline sections together; and (3) the process of constructing the pipeline along the existing slope.

(3) Heat Fusion Joining. Whenever possible the polyethylene pipe should be joined by the method of thermal butt-fusion, as outlined in

ASTM D2657. Butt fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer. The temperature of the heater plate and the joining pressure to be used for the welded fusion joints shall be according to the pipe manufacturer's specifications and indicated to the Engineer prior to any trial fusions. The established heater plate temperature and pressure of the fusion joints shall also be indicated in the Written Pipeline Installation Procedure. The pipe supplier shall be consulted to obtain machinery and expertise for the joining by butt-fusion of polyethylene pipe and fittings.

Heat Fusion Daily Logs. Maintain and submit to the Engineer by 10:00 a.m. the following day, daily logs of each individual fusion, including verification of visual fusion, including verification of visual witness of fusion. This Daily Fusion Log shall include actual temperature, duration (identifying warm-up, weld, and cool down times) and applied butt pressure for each weld. Each log shall be certified by the Fusion Technician and the Engineer or Contractor's field supervisor. Electronic data acquisition or log information may be used in lieu of manual recording. No HDPE pipe or fittings shall be joined by fusion welding by any Contractor's representative unless he/she is adequately trained and qualified in the techniques involved.

Heat Fusion Technician Qualifications. Pipe and fitting joints shall be heat fused by a qualified fusion technician who has been trained by an approved manufacturer's representative and in accordance with the manufacturer's recommended fusion procedures. The Contractor shall provide written certification from the pipe manufacturer for each fusion technician employed by the Contractor. Training or requalification shall have been obtained within the 12 months prior to the beginning of work. The Fusion Technician shall have performed fusion on at least three prior projects of similar size and length.

Bent Strap Testing. Prior to the production of actual HDPE butt or socket fusion joints, each person who will be making joints shall demonstrate proficiency by making a trial joint with a small test section of the production pipe and destructively test the trial fusion by bent strap testing. Trial joints shall not fail at the joint. If the fusion fails, additional trial fusions shall be made and tested until successful fusions are made. The successful fusion procedure shall be used for the installation of all permanent production pipe and fittings within the limitations recommended by the manufacturer. A copy of bent strap test results shall be submitted to the Engineer within 24 hours of the test completion.

Heat Fusion Work Plan. Submit work plan demonstrating ability to perform work in compliance with specifications, and ASTM D2657, ASTM D3261, and ASTM D3350 including procedures, equipment specifications, manufacturer's recommendations, sample fusion log, sequence of work, work areas, and safety measures.

Fusion Equipment Experience Requirements. The fusion equipment and operator shall be required to demonstrate 5 years

successful field experience on projects of comparable pipe and fitting size. Provide equipment specifications and a list of past projects and verify conformance to these specifications.

(4) Hydrostatic Pressure Testing. Pipeline hydrostatic testing will be used to ensure that a continuous, leak free pipeline is obtained at the completion of the pipeline fabrication and assembly process.

The entire length of the high density polyethylene (HDPE) plastic pipeline including all fittings and fusion joints shall be hydrostatically tested.

Planning and executing the hydrostatic test is the Contractor's responsibility. The Contractor's plan for the execution of this test shall be submitted to the Engineer. The Contractor shall notify the Engineer of the test start time a minimum of 7 days before the planned commencement of the test. A record of the test results, including times, pressures (psi), make up water volumes (gallons), and conclusions shall be submitted to the Engineer by the Contractor. The following are the basic requirements of the hydrostatic test procedure:

- a. Test pressure for this project shall be 125% of the rated operating pressure of the pipe material. The hydrostatic pressure testing shall be conducted at night when the outside surface temperature of the HDPE pipeline has cooled substantially and is as close to the ambient air temperature at the time of testing as possible.
- b. The pipeline section under test shall be filled with water in such a way as to remove all air. Fill the pipe slowly until completely full.
- c. The pipe pressure shall be raised to the test pressure by pumping in water.
- d. This test pressure shall be maintained over a 4-hour period as the plastic pipe goes through its initial deformation. Make-up water will be added at least each hour to bring the pipe back to the full test pressure. At the completion of the 4-hour test pressure period, the amount of water required to bring the pipeline back to the full test pressure shall be recorded.
- e. After the initial 4-hour pressurization period, the actual test period shall begin. The pipe will be pressurized to the full test pressure and closed off so no new water can be added during the test period. The test period shall be run for another 1, 2 or 3 hours until the Engineer is satisfied that all joints and hardware connections have been properly inspected for leakage.
- f. Under no circumstances shall the total time in which the

pipe is pressurized to its maximum test pressure exceed 8 hours. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the tested pipe section shall be permitted to "relax" with no applied internal pressure for a minimum of 8 hours before commencing another test sequence on this same pipe section.

g. The hydrostatic pipeline pressure test shall not be conducted by a procedure other than that outlined above without the prior written approval of the Engineer.

h. The Contractor may hydrostatically test various sections of the pipeline by temporarily installing a mechanical clamp and blind flange or by fusing on a HDPE flange adapter, backing ring and blind flange to the open end of the pipeline as long as these temporary blanking off connections are rated for the full test pressure. All fusion joints and mechanical connections in the pipeline section being tested must be fully exposed during the testing process."

(IV) Amend **603.04 – Measurement** by revising lines 282 to 292 to read as follows:

"603.04 Measurement.

(A) The Engineer will measure bed course material for culverts per cubic yard in accordance with contract documents.

(B) The Engineer will measure reinforced concrete pipe, HDPE pipe, and reinforced concrete box culvert per linear foot in accordance with contract documents.

(C) The Engineer will measure cleaning of existing culverts on a force account basis in accordance with Subsection 109.06 - Force Account Provisions and Compensation and as ordered by the Engineer."

(V) Amend **603.05 – Payment** by revising lines 294 to 349 to read as follows:

"603.05 Payment. The Engineer will pay for the accepted pay items listed below at the contract price per pay unit, as shown in the proposal schedule. Payment will be full compensation for the work prescribed in this section and contract documents.

The Engineer will pay for each of the following pay items when included in the proposal schedule:

Pay Item	Pay Unit
Bed Course Material for Culvert	Cubic Yard

201		
202	_____ - Inch Reinforced Concrete Pipe, Class _____	Linear Foot
203		
204	_____ - Inch HDPE Pipe _____	Linear Foot
205		
206	_____ Box Culvert	Linear Foot
207		
208	Clean Existing Culverts	Force Account"
209		
210		
211		
212	END OF SECTION 603	