

Utah Department of Transportation



**Supplemental Specifications  
for  
2012 Standard  
Specifications  
FOR ROAD AND BRIDGE  
CONSTRUCTION**

Issued March 13, 2014

# Memorandum

UTAH DEPARTMENT OF TRANSPORTATION

**DATE:** March 13, 2014

**TO:** Holders of Hard Copy of Standard Specifications

**FROM:** Barry Axelrod  
Standards and Specifications

**SUBJECT:** Supplemental Specifications Distribution, dated March 13, 2014

Applicable files for the change are attached. Maintain these files as a supplemental update to the UDOT Standard Specifications dated January 1, 2012. No pages are to be removed or replaced in the basic book, electronic or hard copy.

Refer to the Standards and Specifications Web site, Standard and Supplemental Specifications at <http://www.udot.utah.gov/go/2012specifications> for electronic copies of any Standard or Supplemental Specification. Select the appropriate subtopic from there.

Refer to the Standards and Specifications Web site, Engineering Services Web Store at <http://www.udot.utah.gov/go/webstore> to purchase a hard copy of the Standard Specifications or Standard Drawings books.

Contact Barry Axelrod at 801-964-4570, 801-725-8823 (cell), or by email at [baxelrod@utah.gov](mailto:baxelrod@utah.gov) if you have any questions or problems with the electronic files.

Attachments

## **Listing of Supplemental Specifications**

### **Issue Date: September 19, 2012**

Revised August 30, 2012

Section 00120M Article 1.15, paragraph A20, Article 1.17, Article 1.18, and Article 1.20 replaced and Article 1.21, paragraph A14 and Article 1.27 added.

Section 00515M Article 1.11, paragraph A replaced.

Section 00570M Article 1.7, paragraph A38 and A66 through A104 replaced.

Section 00820M Article 1.17, paragraph C replaced.

Section 01315M Article 3.1, paragraph D2 and H1 replaced.

Section 01571M Article 2.1, paragraph B1 replaced.

Section 02822M Article 1.3, paragraph G and H and Article 2.5, paragraph B8 replaced.

Section 02823M Article 1.3 and Article 2.2, paragraph B6 replaced.

Section 02891M Article 1.3, Article 1.4, paragraph A1, and Article 2.1, paragraph C replaced.

Section 02893M Article 1.3, Article 2.1, paragraph A3c, Article 2.1, paragraph C1, and Article 2.1, paragraph D2 replaced.

Section 03211M Article 1.3 replaced, Article 2.1, paragraph C added, Article 2.2, paragraph A replaced, Article 2.7, paragraph D and Article 2.8, paragraph D added, Article 3.1, paragraph B1a replaced, and Article 3.1, paragraph E and Article 3.2, paragraph O added.

Section 03393M Article 1.5, paragraph B deleted, Article 2.1, paragraph A, Article 3.1, paragraph B, and Article 3.3, paragraph C and D replaced, and Article 3.3, paragraph I added.

Section 03924M Article 1.1, paragraph B added.

Section 05120M Article 1.3, Article 1.5, paragraph B1, Article 2.2, paragraph C1, and Article 2.2, paragraph D replaced.

Section 06055M Article 1.3 and Article 2.3 replaced.

Section 13553M Article 3.2, paragraph O replaced.

### **Issue Date: November 14, 2012**

Revised October 25, 2012

Section 02752M Article 3.10, paragraph E

Section 03211M Article 1.3 replaced, Article 2.1, paragraph C added, Article 2.2, paragraph A replaced, Article 2.7, paragraph B replaced, Article 2.7, paragraph D and Article 2.8, paragraph D added, Article 3.1, paragraph B1a replaced, and Article 3.1, paragraph E and Article 3.2, paragraph O added. (This issue replaced previously issued Supplemental Specification for this section.)

Section 13557M Article 3.1, paragraph A and Article 3.2, paragraph E replaced.

## **Issue Date: March 14, 2013**

Revised February 28, 2013

Section 00570M Article 1.7, paragraph A38, paragraph A49 Table 1, and paragraphs A66 through A104 replaced.

Section 00727M Article 1.28, paragraph B replaced.

Section 00820M Article 1.13, Article 1.17, paragraph C, and Article 1.17, paragraph F3 replaced.

Section 01282M Article 1.9, paragraphs C1b and D5 and Article 1.11, paragraph E1 replaced

Section 01456M Article 1.6, paragraph C replaced.

Section 02821M Article 1.3, paragraph H and Article 2.2, paragraph A1 replaced.

Section 02891M Article 1.3, Article 1.4, paragraph A1, Article 2.1, paragraph B, Article 2.1, paragraph C, and Article 2.1, paragraph E replaced.

## **Issue Date: May 9, 2013**

Revised April 25, 2013

Section 01721M Article 1.3 and 1.5, paragraph C replaced.

Section 02765M Article 1.3, paragraphs M through R and Article 2.2 replaced.

Section 03055M Article 2.1, Table 2, note replaced.

Section 13551M Article 3.13 added

Section 13553M Article 1.5 paragraph B, Article 2.1, paragraph A3, Article 3.2 paragraph F, and Article 3.2 paragraph O replaced. (This issue replaced previously issued Supplemental Specification for this section.)

## **Issue Date: July 17, 2013**

Revised June 27, 2013

Section 00120M Article 1.15, paragraph A20, Article 1.15, paragraph B, Article 1.17, Article 1.18, and Article 1.20 replaced and Article 1.21, paragraph A14 and Article 1.27 added. (This issue replaced previously issued Supplemental Specification for this section.)

Section 00570M Article 1.7, paragraph A38, Article 1.7, paragraph A49 Table 1, and Article 1.7, paragraphs A66 through A104 replaced. (This issue replaced previously issued Supplemental Specification for this section.)

Section 01282M Article 1.8, paragraph A1, Article 1.9, paragraphs C and D, Article 1.10, paragraph A2, Article 1.11, Article 1.12, paragraph C, Article 1.13 title and paragraph A, Article 1.14, paragraph A4, and Article 1.15, paragraph A3 replaced. (This issue replaced previously issued Supplemental Specification for this section.)

Section 02373M Article 2.1, paragraph D replaced.

Section 02841M Article 3.1, paragraph C and Article 3.3, paragraph B replaced.

Section 02843M Article 3.1, paragraph A2b replaced.

## **Issue Date: September 16, 2013**

Revised August 29, 2013

Section 02768M Article 1.5 paragraph B replaced.

Section 02841M Article 3.1 paragraph C and Article 3.3 paragraph B replaced.

Article 3.6 added. (This issue replaced previously issued Supplemental Specification for this section.)

Section 13553M Article 1.3 paragraph G, Article 1.5 paragraph B, Article 2.1, paragraph A3, Article 3.1 paragraph B, Article 3.1 paragraph H, Article 3.2 paragraph F, and Article 3.2 paragraph O replaced. (This issue replaced previously issued Supplemental Specification for this section.)

## **Issue Date: November 21, 2013**

Revised October 31, 2013

Section 00120M Article 1.15, paragraph A20, Article 1.15, paragraph B, Article 1.17, Article 1.18, and Article 1.20 replaced and Article 1.21, paragraph A14 and Article 1.27 added. (This issue replaced previously issued Supplemental Specification for this section. Article 1.20 updated with this version.)

Section 01315M Article 3.1, paragraph D2 and H1 replaced. (This issue replaced previously issued Supplemental Specification for this section.)

Section 01355M Article 3.7, paragraph A1 replaced.

Section 13592M Article 2.3, paragraph B and Article 3.3, paragraph A replaced.

## **Issue Date: March 13, 2014**

Revised February 27, 2014

Section 00515M Article 1.11, paragraph A replaced. (This issue replaced previously issued Supplemental Specification for this section.)

Section 00820M Article 1.13, Article 1.17, paragraph C, Article 1.17, paragraph F3, and Article 1.18, paragraph B2a replaced. (This issue replaced previously issued Supplemental Specification for this section.)

Section 02056M Article 1.4, paragraph A, Article 2.9, and Article 3.3, paragraphs C and D replaced.

Section 02317M, Article 1.4 replaced.

Section 02610 replaced.

Section 02890M Article 2.3, paragraph C1 replaced. Text immediately following Table 3 replaced.

Section 03372M Article 1.5, paragraph D replaced. Article 1.5, paragraph E deleted.

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 00515M**

**CONTRACT AWARD AND EXECUTION**

**Delete Article 1.11, paragraph A and replace with the following:**

- A. The awarded Contractor must return the signed contracts, properly executed contract bonds, National Safety Rating Scores, and all required insurances to the Department within 15 calendar days after receipt of contracts for signature.
  - 1. The bidder can withdraw the proposal without penalty if the Department does not execute the contract within 30 calendar days after receiving requisite signed contracts, bonds, and insurances.
  - 2. The contract is not considered in effect until executed by all parties.

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 00820M**

**LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC**

**Delete Article 1.13 and replace with the following:**

**1.13 PROTECTING AND RESTORING PROPERTY AND LANDSCAPE**

- A. Preserve public and private property during the work.
- B. Do not perform work on public or private property if the legal right to access the property has not been secured. All damage as a result of trespass will be the financial responsibility of the Contractor including additional acquisition costs.
- C. The Engineer verifies the location of monuments and property line markers and provides written approval before they are moved, disturbed, or damaged.
- D. Accept liability for any damage to public or private property resulting from defective work, materials, or non-execution of the contract until contract completion.
- E. Restore damaged property and items removed temporarily during construction to a condition similar or equal to that existing before the damage at no cost to the Department.
- F. Temporarily discontinue work if remains of prehistoric dwelling sites or artifacts of historical or archeological significance are encountered. Refer to Section 01355.

**Delete Article 1.17, paragraph C and replace with the following:**

- C. Contractor and the Department agree to provide each other with a copy of the summons and complaint within a reasonable time if served with a lawsuit or Notice of Claim. Do not file a responsive pleading on behalf of the Department until receiving written notice that the Department chooses to have Contractor handle the defense. The Department will provide the Contractor such written notice in a timely manner allowing the Contractor adequate time to respond to the summons.

**Delete Article 1.17, paragraph F3 and replace with the following:**

3. Notify claimants of denied or partially denied claims of \$5,000 or less of their right to request re-examination by the  
UDOT Claims Re-Examination Board  
4501 South 2700 West  
West Valley City, UT 84114-8430  
Phone: (801) 965-4715
  - a. The information provided to the claimant includes:
    - 1) A time deadline for requesting re-examination equal to seven days after notification of denial or partial denial
    - 2) Address and name of the person to whom it should be directed
    - 3) General information helpful in making a determination

**Delete Article 1.18, paragraph B.2.a and replace with the following:**

- a. Provide General Liability insurance with the following minimum limits of liability:
  - 1) \$1 million Bodily Injury and Property Damage – Each Accident
  - 2) \$3 million General Aggregate
  - 3) \$3 million Products and Complete Operations Annual Aggregate



**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 02056M**

**EMBANKMENT, BORROW, AND BACKFILL**

**Delete Article 1.4, paragraph A and replace with the following:**

- A. Well-graded material – Material having an even distribution of different particle sizes. This even distribution of particles of different sizes results in a dense mass upon compaction.

**Delete Article 2.9, and replace with the following:**

**2.9 PIPE FOUNDATION, BEDDING, AND BACKFILL**

- A. Pipe Foundation (When Required)
  - 1. Classification A-1. Refer to AASHTO M 145.
  - 2. Use suitable backfill material or granular backfill borrow when directed by Engineer.
  - 3. Use Free-Draining Granular Backfill or other uniformly graded materials only with the approval of the engineer and only if enclosed with an appropriate drainage geotextile. Refer to Section 02075.
  - 4. Overexcavate and replace unsuitable materials according to Section 02317 when directed by the Engineer.
  
- B. Pipe Bedding and Backfill
  - 1. Classification A-1. Refer to AASHTO M145.
  - 2. Non-plastic, well-graded material.
  - 3. Maximum aggregate size is 1½ inches for plastic pipe, 2 inches for all other pipes.
  
- C. Other materials/trench configurations for pipe bedding and backfill may be used only upon approval of the Contractor's engineering proposal. Proposals using this option may include the use of native material or uniformly graded materials enclosed in an appropriate drainage geotextile. The Department decides whether or not to consider or approve the Contractor's engineering proposal. Any proposal must include all of the following:
  - 1. Stamped drawings and specifications signed and sealed by a Professional Engineer licensed in the state of Utah.

2. Evaluation of site specific conditions and surrounding soils, including potential for migration of fines.
3. A structural evaluation of the pipe support system for the proposed pipe that includes the pipe structural capacity and the depth of fill.
4. Complete bedding or backfill source information including gradation, soil classification, and laboratory testing reports.

**Delete Article 3.3, paragraphs C and D and replace with the following:**

- C. Structural Backfill Placement includes bridges, foundation, box culverts, drains, and other structures.
  1. Place suitable backfill material in structural backfill sections. Refer to Section 02317.
    - a. Use granular backfill borrow when specified.
  2. Use appropriate compaction equipment adjacent to abutments, backwalls, approach slabs, wing walls, retaining walls, and other structures.
- D. Pipe Foundation, Bedding, and Backfill
  1. Refer to Section 02317 and DG Series Standard Drawings for excavation and over-excavation requirements.
  2. Imported material for pipe bedding and pipe backfill and embankment in the pipe trench are incidental when constructed according to the plans and specifications. No separate measurement or payment for these items will be made except for pipe foundation work or other over-excavation of unsuitable material beyond the limits indicated in the contract.
  3. Place uniform layers of pipe backfill on both sides of the pipe.
  4. Use compaction equipment smaller than the trench width between the pipe and the trench wall. Expand the width of the trench to accommodate necessary compaction equipment .
  5. Fully compact the haunch areas. Hand-tamp areas where compaction equipment cannot compact the soil.

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 02317M**

**STRUCTURAL EXCAVATION**

**Delete Article 1.4 and replace with the following:**

**1.4 DEFINITIONS**

- A.** Unsuitable material – Material not meeting specifications, organic materials, frozen lumps, soils such as peat or bog, and over-saturated silts, clays, or sands whose water content prevents appropriate compaction.

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 02610**

**DRAINAGE PIPE**

**Delete Section 02610 and replace with the following:**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Materials and procedures for installing drainage pipe.
- B. Class, type, and size designations for drainage pipe.
- C. Inspection and acceptance.

**1.2 RELATED SECTIONS**

- A. Section 01282: Payment
- B. Section 02056: Embankment, Borrow, and Backfill
- C. Section 02317: Structural Excavation

**1.3 REFERENCES**

- A. AASHTO M 36: Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
- B. AASHTO M 167: Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
- C. AASHTO M 170: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- D. AASHTO M 196: Corrugated Aluminum Pipe for Sewers and Drains
- E. AASHTO M 197: Aluminum Alloy Sheet for Corrugated Aluminum Pipe
- F. AASHTO M 198: Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

- G. AASHTO M 207: Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
- H. AASHTO M 219: Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
- I. AASHTO M 243: Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe Arches, and Arches
- J. AASHTO M 245: Corrugated Steel Pipe, Polymer Precoated, for Sewers and Drains
- K. AASHTO M 246: Steel Sheet, Metallic-Coated and Polymer-Precoated for Corrugated Steel Pipe
- L. AASHTO M 274: Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe
- M. AASHTO M 294: Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
- N. AASHTO M 304: Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
- O. AASHTO M 330: Polypropylene Pipe
- P. AASHTO MP 20: Steel Reinforced Polyethylene Pipe
- Q. AASHTO PP 63: Pipe Joint Selection for Highway Culvert and Storm Drains
- R. AASHTO LRFD Bridge Construction Specifications
- S. ASTM A 849: Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
- T. ASTM C 443: Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- U. ASTM D 1056: Flexible Cellular Materials—Sponge or Expanded Rubber
- V. ASTM D 1784: Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

- W. ASTM D 3212: Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- X. ASTM D 3350: Polyethylene Plastics Pipe and Fittings Materials
- Y. ASTM F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- Z. ASTM F 949: Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
- AA. ASTM F 2562: Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
- BB. ASTM F 2881: Polypropylene Pipe
- CC. National Transportation Product Evaluation Program (NTPEP)
- DD. Occupation Safety and Health Administration (OSHA)
- EE. UDOT Minimum Sampling and Testing Requirements
- FF. UDOT Quality Management Plan 505

#### **1.4 DEFINITIONS**

- A. The following definitions apply to this Section and the DG Series Standard Drawings.
  1. Backfill – Material used to fill the trench or excavation, exclusive of bedding material.
  2. Bedding Material – Material on which a pipe is supported.
  3. Cover – The vertical dimension above the crown to the finished fill elevation or pavement surface.
  4. Crown – The top or highest point of a pipe.
  5. Culvert – A pipe, open on both ends, that conveys surface runoff through an embankment.
  6. Distortion – A deviation from a pipe’s original shape due to earth pressure or surface loads.
  7. Down Drain – A pipe that is connected to a drainage structure that drains vertically down to a surface below.
  8. Drainage pipe – A pipe that conveys water regardless of shape and material type such as culverts, irrigation pipes, and storm drains.
  9. End Section – A structure made of steel or concrete, attached to the ends of a pipe to retain the embankment and provide anchorage.
  10. Foundation – The natural ground or prepared base.

11. Haunch – The area of backfill material placed under the pipe, between the spring line and the bottom of the pipe.
12. Headwall – A concrete wall placed at the end of a pipe to serve one or more of the following purposes:
  - a. Protect embankment fill from scour or undermining
  - b. Increase hydraulic efficiency
  - c. Alter the direction of flow
  - d. Anchor the pipe
  - e. Provide needed structural support
13. Invert – The floor, bottom, or lowest part of the internal cross section of a pipe.
14. Irrigation Pipe – A pipe designed to convey seasonal irrigation water.
15. NASSCO – National Association of Sewer Service Companies.
16. NHS – National Highway System.
17. Nominal Diameter – The inside diameter of the pipe as specified in the plans.
18. NTPEP – National Transportation Product Evaluation Program
19. Pipe Corrosion Classifications:
  - a. Class A – Pipe used in mostly non-reactive soils that requires no special materials, treatments, or coatings.
  - b. Class B – Pipe used in moderately reactive and corrosive soils.
  - c. Class C – Pipe used in soils that are highly reactive and corrosive.
  - d. Class D – Untreated structural plate pipe used in mostly non-reactive and non-corrosive soils.
  - e. Class E – Structural plate pipe used in highly reactive and corrosive soils.
20. Pipe Interior Roughness:
  - a. Corrugated – Interior surface that is formed into a series of alternating crests and valleys with a Manning's "n" coefficient greater than 0.013.
  - b. Smooth Lined – Interior surface that is essentially smooth, with a Manning's "n" coefficient less than or equal to 0.013.
21. Pipe Sample Unit – The length of pipe from inlet to outlet or from drainage structure to drainage structure.
22. Rise – The maximum vertical dimension of a pipe arch.
23. Slope drain – A pipe that is placed along the face of a cut or fill slope.
24. Span – The maximum horizontal dimension of a pipe arch.
25. Spring Line – The location of the maximum horizontal dimension of a pipe.
26. Storm Drain – A pipe that conveys surface drainage from one drainage structure to another or an outfall.

27. Working Drawings – Drawings produced by the Contractor that supplement the contract drawings to provide information not included in the contract documents but that are required to fabricate, erect, transport or temporarily support the structure or structural elements in the completion of the work.
  - a. Approval of Working Drawings - Acceptance by the Department for use on the project.

## 1.5 SUBMITTALS

- A. Manufacturer's Certificate of Compliance for the following:
  1. Material, structural, and coating according to requirements of Table 5.
  2. Pipe joints according to AASHTO PP 63. Refer to this Section, article 2.2.
  3. Concrete pipe manufacturer is prequalified according to UDOT Quality Management Plan 505, Precast/Prestressed Concrete Structures.
  4. Thermoplastic pipe manufacturer is compliant with the AASHTO NTPEP for the diameter of pipe specified in the plans.
- B. Manufacturer's installation instructions for each type of pipe used and any incidental materials required for installation.
- C. NASSCO pipe inspection certification.
- D. Inspection reports. Refer to this Section, article 1.6.
- E. Installation plan and working drawings for structural plate pipe. Refer to this Section, article 2.1 paragraph E.
  1. Working drawings must be sealed by a Professional Engineer (PE) or Professional Structural Engineer (SE) licensed in the State of Utah.
- F. Repair plan when required according to this Section, article 1.6 paragraph D.



## 1.6 ACCEPTANCE

### A. General

1. Inspect pipes after installation and placement of backfill according to Table 1 and Table 2.

Table 1

Roadway Functional Classification	Percent of Pipes to Inspect*
Interstate Freeways, NHS Highways and Arterials	100
Collectors and Local Roads	50

\* Indicated in the project plans

Table 2

Pipe Testing Requirements				
Pipe Size	Visual		Deflection*	
	Manual	Remote	Manual	Mandrel**
≤ 48-inch dia.		X		X
> 48-inch dia.	X		X	

\* Deflection testing is required for circular metal and thermoplastic pipe only

\*\* A manual inspection or other method may be performed in place of a mandrel inspection with the approval of the Engineer

2. The Engineer will determine which pipe sample units to inspect when the percentage of pipes to inspect is less than 100 percent.
  - a. Inspect additional pipe sample units with apparent defects or as directed by the engineer.
    - 1) Repair or replacement will be at the contractor's expense if pipe does not meet the acceptance criteria in this article.
    - 2) The Department will pay for the cost of additional inspection if pipe meets the acceptance criteria in this article.
3. Perform inspections so that pipe sample units and required repairs are accepted by the Engineer before placing pavement or finished grade. Exceptions to this requirement are at the discretion of the Engineer.

4. The Department will not make final payment for a pipe installation until the pipe has been inspected and accepted according to this article.
  - a. Refer to Section 01282 regarding progress payments and payment for material on hand.
  - b. Protect all pipe from damage throughout the duration of the project.
5. No inspection is required for any slope drain or down drain. No inspection is required for a pipe extension or pipe sample unit that is less than 20 ft long.
6. Clean and flush the pipe with water immediately before the inspection.
  - a. Remove all material or debris from pipes.
  - b. Do not discharge debris into other pipes, structures, or drainage ditches.
7. Submit an inspection report to the Engineer for each pipe sample unit as specified in this article for remote and manual inspections within five calendar days of completing inspection.
  - a. The Engineer will determine acceptance within seven calendar days of receipt of complete inspection reports.
8. Notify the Engineer at least 24 hours before performing a mandrel inspection or a manual inspection of a pipe.

B. Remote Inspection

1. Perform remote inspection for pipes with a nominal diameter less than 48 inches using closed-circuit television (CCTV) video inspection and a mandrel test as outlined below.
2. Remote video inspection operator is to have a current NASSCO certification.
3. CCTV Equipment: Record video using a crawler mounted camera capable of panning and tilting to a 90 degree angle with the axis of the pipe and rotating 360 degrees.
4. CCTV Inspection: Produce a picture quality that satisfies the Engineer. Repeat unsatisfactory inspections at no additional cost to the Department. Use the video image to determine horizontal and vertical alignment deviations, joints gaps, and pipe damage.
  - a. Center the camera head in the pipe both vertically and horizontally and use lighting sufficient to allow a clear picture of the entire periphery of the pipe.
  - b. Do not move the crawler through the pipe at a speed greater than 30 ft/minute. Stop the crawler and video the entire circumference at each joint. Stop the crawler and zoom when necessary to video defects.

- c. Video image must be continuously illuminated, clear, focused, and free from roll, static, or other image distortion qualities that may prevent the reviewer from evaluating the pipe's condition.
    - 1) Calibrate the video's lighting and focus to view the internal markings within the pipe.
  - d. Superimpose the pipe identification and location within the pipe on the video recording.
  - e. Document all defects with captions in the video.
    - 1) Note the defect at each location and provide a still image of the defective area in the inspection report.
    - 2) Document all cracks and joint separations.
5. Mandrel Inspection: Used for circular metal and thermoplastic pipes only.
- a. Perform the mandrel inspection for pipes in the presence of the Engineer or representative according to Table 2.
  - b. Provide a mandrel that meets the following requirements to determine pipe deflection:
    - 1) The diameter of the mandrel, whether it is fixed or variable size, must be verified with a proving ring or other method according to manufacturer's guidelines.
    - 2) Contains at least nine equally spaced runners (40 degree angles).
    - 3) Length not less than the diameter.
  - c. Provide a proving ring to verify mandrel size when requested by the Engineer.
  - d. Mandrel Inspection Procedure
    - 1) Pull a mandrel that is 5 percent less than the pipe nominal inside diameter.
    - 2) The inspection is complete if the mandrel passes through at 5 percent.
    - 3) Accomplish the following before completing the inspection if the mandrel cannot pass through:
      - a) Record the maximum distance achieved from the inlet side.
      - b) Remove the mandrel and continue the inspection from the outlet end of the pipe toward the inlet end. Record the maximum distance achieved from the outlet side.
      - c) Repeat with the mandrel set to 7.5 percent less than the pipe nominal inside diameter.
6. Prepare an Inspection Report and include:
- a. A video recording of each pipe inspection in a digital format.

- b. The project number, date, and time of the inspection for each pipe inspection, the pipe identification used in the plan set, and type and size of pipe.
- c. Written and still image documentation of locations where alignment deviations, joint gaps, pipe damage, and any other deficiencies were observed.
- d. The size of the mandrel and whether or not it was successfully pulled through the pipe.
  - 1) Mandrel size and maximum distance pulled from each side of the pipe if the mandrel was not able to pass.

C. Manual Inspection

- 1. Perform manual inspection for pipes in the presence of the Engineer or representative according to Table 2.
  - a. Follow OSHA requirements for inspecting confined entry spaces.
- 2. Perform the following inspection:
  - a. Deflection (for circular metal and thermoplastic pipes only). Perform a mandrel inspection or take the following measurements every 10 ft along the length of the pipe to the nearest  $\frac{1}{4}$  inch:
    - 1) Vertically from the crown to invert
    - 2) Horizontally at the spring line
    - 3) Two measurements, each diagonally at 45 degrees to the pipe springline
  - b. Cracks – Measure observed cracks using a feeler gauge capable of measuring 0.01 inch. Other measuring devices may be used when approved by the Engineer.
  - c. Gaps – Measure and record the widest gap at each joint to the nearest  $\frac{1}{4}$  inch.
- 3. Inspection Report
  - a. Include the project number, date and time of the inspection, the pipe identification used in the plan set, and type and size of pipe.
    - 1) Document inspection results for deflection and observations of alignment deviations, joint gaps, and pipe damage. Include the type and location along the pipe for each measurement along with still images for each observation.

D. Acceptance

- 1. Each pipe sample unit is accepted after verifying that the allowable tolerances for the following requirements have been met:
  - a. Horizontal and vertical alignment deviations
  - b. Deflection

- c. Joints gaps
- d. Damage
- 2. Repair or replace damaged or improperly installed pipes at no cost to the Department.
- 3. Evaluate each pipe that does not meet the acceptance criteria described in this article and recommend appropriate action. Submit documentation that has been signed and sealed by a Professional Engineer (P.E.), competent in the structural design of pipe material being evaluated, either:
  - a. No repair is required for the pipe to function and maintain its structural integrity over its design life.
  - b. A repair is required to allow the pipe to function and maintain its structural integrity over its design life.
    - 1) Submit repair plans to the Engineer, obtain written approval from the Engineer before performing work.
    - 2) Inspect the repaired portion of the pipe and any feature potentially affected by the repair.
- 4. Alignment
  - a. Evaluate each pipe that exceeds the alignment tolerances shown in Table 3 and recommend appropriate action.
  - b. Evaluate each pipe that has areas where ponding occurs and recommend appropriate action.

Table 3

<b>Installation Alignment Tolerances</b>		
<b>Design Grade</b>	<b>Horizontal</b>	<b>Vertical*</b>
		inch/100 ft
> 1%	Horizontal joint deflections not to exceed industry standards	1½
0.5% - 1%		1
< 0.5%		½

\* Increase tolerance by 50 percent for culverts.

- 5. Distortion – Based on the percentage change from the nominal diameter.
  - a. Evaluate each pipe with a distortion between 5 percent and 7.5 percent and recommend appropriate action.
  - b. Remove and replace each pipe with a distortion greater than 7.5 percent.

- 6. Joint Gaps
  - a. Evaluate each pipe joint with a gap exceeding the tolerance specified in Table 4 and recommend appropriate action according to manufacturer's recommendations.

Table 4

<b>Joint Gap Tolerances</b>	
<b>Nominal Diameter (inches)</b>	<b>Joint Gap (inches)</b>
12 to 36	0.75
42 to 48	1.00
54 to 90	1.25
96 to 144	1.75

- b. Repair joints showing visible signs of soil or water infiltration according to the approved plans submitted.
- 7. Damage – Fractures, cracks, or other defects passing through the walls or joints sufficient to impair strength, durability, function or product serviceability. Evaluate damage and recommend appropriate action according to this Section, Article 1.6 paragraph D.3.
  - a. Metal pipe – Repair damaged, delaminated, or scaled coating on metal pipe according to the approved plans submitted.
  - b. Plastic pipe – Evaluate pipes that show the following signs:
    - 1) Damaged pipe cross section such as dents, cuts, cracks, breaks, fractures, or deformations.
  - c. Reinforced concrete pipe
    - 1) Evaluate pipes that show the following:
      - a) Cracks between 0.01 inch and 0.10 inch
      - b) Damaged pipe cross section such as breaks or fractures
      - c) Broken bells or spigots
    - 2) Remove and replace pipe that show the following:
      - a) Exposed reinforcing steel
      - b) Imperfect proportioning mixing and casting such as honeycomb or open texture
    - 3) Repair or replace reinforced concrete pipe if cracks are greater than 0.10 inch.

## **PART 2 PRODUCTS**

### **2.1 PIPE**

- A. General – pipes are identified according to interior roughness, joint type, diameter or span and rise, and corrosion class.
1. Provide the type of pipe specified in the plans with the following exceptions:
    - a. Provide any pipe type that meets the interior roughness requirements of Table 5 and the specified pipe joint rating and corrosion classification when no material type is specified in the plans.
    - b. Substitutions to a higher pipe corrosion classification are allowed.
  2. Do not change the material type, strength, or thickness of the pipe along an installation unless approved in writing by the Engineer.
  3. Use the cover over the pipe to determine the strength or thickness. Refer to the DG Series Standard Drawings.
  4. Internally label each section of pipe with the manufacturer's name or trademark, nominal diameter, and manufacture date. Include the pipe class, gauge, and coating according to the pipe material type.
    - a. Place the pipe so that the location of the label is above the spring line of the pipe.

Table 5

<b>AASHTO/ASTM Specifications for Pipe</b>					
<b>Interior Roughness and Material Type</b>	<b>Corrosion Class</b>				
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Corrugated</b>					
Corrugated steel pipe and pipe arch	M 36	M 36 Polymeric Coating (outside only) M 245 & M 246 ASTM A 849 or Aluminized Type II Steel M 274	M 36 Polymeric Coating (both sides) M 245 & M 246 ASTM A 849	N/A	N/A
Corrugated aluminum pipe and pipe arch	M 196 M 197	M 196 M 197	M 196 M 197	N/A	N/A
Corrugated polyethylene (HDPE) pipe	M 294 ASTM D 3350	M 294 ASTM D 3350	M 294 ASTM D 3350	N/A	N/A
<b>Smooth Lined</b>					
Smooth lined corrugated polyethylene (HDPE) pipe	M 294 ASTM D 3350	M 294 ASTM D 3350	M 294 ASTM D 3350	N/A	N/A
Smooth lined polyvinyl chloride (PVC) pipe	M 304 & ASTM F 949 Cell Class # 12454C ASTM D 1784	M 304 & ASTM F 949 Cell Class # 12454C ASTM D 1784	M 304 & ASTM F 949 Cell Class # 12454C ASTM D 1784	N/A	N/A
Smooth lined polypropylene pipe	M 330 ASTM F 2881	M 330 ASTM F 2881	M 330 ASTM F 2881	N/A	N/A
Steel reinforced thermoplastic ribbed pipe	MP 20 ASTM F 2562	MP 20 ASTM F 2562	MP 20 ASTM F 2562	N/A	N/A
Spiral rib steel pipe and pipe arch	M 36	M 36 Polymeric Coating (outside only) M 245 & M 246, ASTM A 849 or Aluminized Type II Steel M 274	M 36 Polymeric Coating (both sides) M 245 & M 246 ASTM A 849	N/A	N/A
Spiral rib aluminum pipe and pipe arch	M 196 M 197	M 196 M 197	M 196 M 197	N/A	N/A
Reinforced concrete pipe	M 170 Type II Cement	M 170 Type II Cement	M 170 Type V Cement	N/A	N/A
Elliptical reinforced concrete pipe	M 207 Type II Cement	M 207 Type II Cement	M 207 Type V Cement	N/A	N/A



AASHTO/ASTM Specifications for Structural Plate Pipe					
Interior Roughness and Material Type	Corrosion Class				
	A	B	C	D	E
<b>Corrugated</b>					
Structural steel plate pipe and pipe arch	N/A	N/A	N/A	M 167	M 167 M 243
Aluminum alloy structural plate pipe and pipe arch	N/A	N/A	N/A	M 219	M 219

**B. Reinforced Concrete Pipe**

1. Concrete pipe manufacturer is pre-qualified according to UDOT QMP 505.
2. Do not cast lift holes except for circular pipe that has a nominal diameter greater than 54 inches or any elliptical pipe.
  - a. Fill lift holes with a plug supplied by the manufacturer or with non-shrink grout according to the pipe manufacturer's recommendations.

**C. Metal Pipe**

1. Do not allow pipes of different types of metal to contact each other.
2. Use matching materials to make direct extensions of existing pipes.
3. Do not use aluminum pipe when a paved invert is required unless protective measures are taken.
4. Class B Aluminized Type II Steel is acceptable only when the minimum metal thickness is 16 gauge and where pH is greater than 5.5 and less than 8.5 and soil resistivity is greater than 1,500 ohm-centimeters.

**D. Thermoplastic Pipe**

1. HDPE pipe – Do not use greater than 60 inch diameter.
  - a. HDPE pipe manufacturer is compliant with NTPEP.
2. PVC pipe – Do not use greater than 36 inch diameter.
3. Do not use in permanent above ground installations unless approved in writing by the Engineer.

**E. Structural Plate Pipe**

1. Spray or brush-coat all areas of aluminum pipe contacting concrete with an asphalt mastic or tar based material at least 0.05 inch thick. Refer to AASHTO M 243.
2. Assembly
  - a. Provide the Engineer an installation plan and working drawings showing the position of each plate and the assembly order.

- b. Do not begin work until working drawings have been approved.
    - 1) The Department will review working drawings for general conformance with the design concept and compliance with the contract documents.
    - 2) Approval does not relieve the Contractor from responsibility for errors, correctness of details, conformance to the contract, and the successful completion of the work.
  - c. Follow the manufacturer's instructions.
- F. Steel Reinforced Thermoplastic Ribbed Pipe
- 1. Do not use greater than 60 inch diameter.
  - 2. Do not use in permanent above ground installations unless approved in writing by the Engineer.
- G. Polypropylene Pipe
- 1. Do not use greater than 60 inch diameter.
  - 2. Do not use in permanent above ground installations, unless approved in writing by the Engineer.

## 2.2 JOINTS OR COUPLING BANDS

- A. General
- 1. Supply pipe joints that have been evaluated according to AASHTO PP 63.
    - a. Culverts – Meet the silt-tight joint requirements of at least 2 psi for all culverts except where project plans or specifications require a higher pressure rating.
    - b. Storm Drains and Irrigation Pipes – Meet the leak resistant joint requirements of at least 10.8 psi for all storm drains and irrigation pipes except where project plans or specifications require a higher pressure rating.
  - 2. Comply with manufacturer's recommendations for connecting pipes and for connecting pipe to end sections, concrete headwalls, catch basins, and similar structures.
  - 3. Elliptical, arched, and structural plate pipes are not pressure rated.
- B. Reinforced Concrete Pipe
- 1. Use a rubber gasket joint that meets the requirements of ASTM C 443 for circular reinforced concrete pipe.
  - 2. Use a mastic joint sealant that meets the requirements of AASHTO M 198 for elliptical reinforced concrete pipe.

- C. Metal Pipe
  - 1. Use an external corrugated connecting band with a neoprene sleeve/flat gasket. Refer to ASTM D 1056.
    - a. Continuous one piece construction closed-cell neoprene, skin on all sides.
    - b. Minimum thickness of  $\frac{3}{8}$  inch and no less than the width of the connection band used.
  - 2. Re-roll ends of helically corrugated pipe to form at least two full annular corrugations each before being joined.
  - 3. Refer to AASHTO LRFD Bridge Construction Specifications and AASHTO M 36 or M 245 with the following modifications for external corrugated connecting bands:
    - a. Use bands of the same or better corrosion class as the pipe. Maintain a minimum thickness of 16 gauge but not less than a 2 gauge step lighter than the pipe gauge.
    - b. Use bands with projections (dimple bands) only in extension of existing pipes or a field cut where annular corrugations do not exist.
- D. Thermoplastic Pipe
  - 1. Use bell and spigot joints with an elastomeric rubber seal that meets the requirements of ASTM F 477.
- E. Steel Reinforced Thermoplastic Ribbed Pipe
  - 1. Use pipe joints that meet the requirements of ASTM D 3212.

## **2.3 PIPE BEDDING AND BACKFILL**

- A. Refer to Section 02056.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Excavation
  - 1. Refer to Section 02317.
  - 2. Keep trenches free from water.
- B. Foundation
  - 1. Grade and prepare the bottom of the trench to provide a firm and uniform bearing throughout the entire length of the pipe. Do not use blocking to bring the pipe to grade.
  - 2. Shape the foundation to have recesses to fit any projecting hubs or bells.

## 3.2 INSTALLATION

- A. Refer to DG Series Standard Drawings, Standard Specifications, AASHTO LRFD Bridge Construction Specifications, and manufacturer's installation requirements for installing all types of pipe. Adhere to the more stringent requirement if there is a conflict between any of the above installation requirements.
- B. Pipe Bedding
  - 1. Refer to Section 02056 and DG Series Standard Drawings for bedding requirements.
  - 2. Place the bottom of the pipe in contact with the bedding throughout its full length.
  - 3. Shape the bedding to have recesses to fit any projecting hubs or bells.
- C. Pipe Placement
  - 1. Check pipe for alignment and grade when joining the sections.
  - 2. Remove and relay or replace pipe that is out of alignment, settled, or damaged.
  - 3. Verify joints are assembled properly.
- D. Pipe Backfill
  - 1. Refer to Section 02056 for backfill requirements.
  - 2. Test frequency according to UDOT Minimum Sampling and Testing Requirements and Section 02056.
- E. Provide adequate cover and protect pipe during project construction.

END OF SECTION

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 02890M**

**RETROREFLECTIVE SHEETING**

**Delete Article 2.3, paragraph C1 and replace with the following:**

1. Vertical panels, barricade Types I, II, and III, and directional indicator barricades.
  - a. Meet or exceed the minimum requirements of ASTM Type IX.
  - b. Use of standard orange acceptable.

**Delete the text immediately following Table 3 and replace with the following:**

4. Use fluorescent retroreflective sheeting for orange and yellow.

**Supplemental Specification  
2012 Standard Specification Book**

**SECTION 03372M**

**THIN BONDED POLYMER OVERLAY**

**Delete Article 1.5, paragraph D and replace with the following:**

- D. Material and Installation Warranty
1. Provide a warranty letter to the Engineer and the Department Bridge Management Engineer stating guarantee of the thin bonded polymer overlay system against all material and installation defects incurred during normal traffic for a period of 5 years.
    - a. The guarantee period starts on the date of Substantial Completion.
    - b. Include in the letter:
      - 1) State Project Designation
      - 2) State Project Name
      - 3) State Structure Numbers
      - 4) Contractor name
      - 5) Overlay system provider and installer names
    - c. The guarantee covers 100 percent of the thin bonded polymer overlay system materials and installation costs.
  2. Assume responsibility for quality control of the proper surface preparation, placement of materials, and all other factors that affect the service life of the overlay system.
  3. Remove and replace all failed sections at no cost to the Department in the event of a performance failure. Performance failures are defined by the following defects:
    - a. Spalling: Broken or missing pieces of overlay due to material degradation.
    - b. Scaling: Visible, exposed, rough surface texture resulting from a loss of aggregate or resin.
    - c. Delamination: Visible or audible debonding of the overlay at the bond line (interface) with the existing bridge receiving surface.
    - d. Cracking: Any visible crack not reflected from a crack in the existing deck.
    - e. Skid resistance: Skid resistance less than 40 as measured according to AASHTO T 242.

4. The Department will notify the Contractor in writing of defects to be repaired during the guarantee period
  - a. Submit detailed plans and procedures of corrective work according to manufacturer's recommendations and obtain the Department's approval before commencing work.
  - b. Perform corrective work within 60 days at no additional cost to the Department.

**Delete Article 1.5, paragraph E.**