DS-15068
(Replaces DS-15006)

DEVELOPMENTAL SPECIFICATIONS
FOR
SLIPLINING EXISTING PIPE CULVERTS

Effective Date
November 20, 2018

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

15068.01 DESCRIPTION.
Furnish and install liner pipe at locations specified in the contract documents.

15068.02 MATERIALS.

A. Furnish liner pipe meeting the material requirements for the type of pipe specified.

1. **Solid Wall HDPE Pipe with Integral Joint.**
   ~~**a.** ASTM F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter. O.D. tolerances are +/- 0.60%.~~
   ~~**b.** ASTM D 3350 Polyethylene Plastics Pipe and Fittings Materials. PE cell classification 334433C or higher or Type III, Class C, Category 5, grade PE 34 will both assure pipe grade, UV protection Class C-2% minimum carbon black.~~
   Comply with requirements of ASTM F 714 (SDR 32.5) and ASTM D 3350 (cell classification 334433C or higher).

2. **Profile Wall HDPE Pipe with Integral Joint.**
   ~~**a.** ASTM F 894, PE Plastic Pipe. Based on Outside Diameter. O.D. tolerances should be +/- 0.60%.~~
   ~~**b.** ASTM D 3350, Polyethylene Plastics Pipe and Fittings Materials. PE cell classification 334433C or higher or Type III, Class C, Category 5, grade PE 34 will both assure pipe grade, UV protection Class C-2% minimum carbon black.~~
   ~~**c.** Minimum pipe stiffness according to ASTM D 2412 is 46 psi.~~
   Comply with requirements of ASTM F 894, ASTM D 2412 (minimum RSC of 160 at 3% deflection), and ASTM D 3350 (cell classification 334433C or higher).

3. **Profile ~~Wall~~ Machine Spiral~~ly~~ Wound PVC Pipe with Integral Joint.**
   Comply with requirements of ASTM ~~F 949, minimum pipe stiffness, 46 psi.~~ F 1697 and provide a pipe stiffness as defined in ASTM F 1741 using a safety factor of 2.0.

4. **Profile Wall PVC Pipe with Integral Joint.**

~~**a.** ASTM F 949, PVC Corrugated Sewer Pipe with A Smooth Interior and Fittings.~~
~~**b.** ASTM D 1784, Rigid PVC Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds. PVC minimum cell classification 12454 B.~~
Comply with requirements of ASTM F 949 or F 1803.

5. Corrugated Steel Pipe (CSP).
~~**a.** ASTM A 760, Corrugated Steel Pipe, Metallic-Coated, For Sewers and Drains.~~
~~**b.** Corrugated Steel Pipe meeting the~~ Comply with requirements of Article 4141.02 of the Standard Specifications~~.~~
~~**c.** Corrugated Steel Pipe gauges meeting the requirements of~~ and Standard Road Plan ~~RF-32 or RF-33~~ DR-104.

~~**6. Flowable Mortar.**~~
~~Apply Section 2506 of the Standard Specifications.~~

6. Polypropylene Pipe (PP).
Comply with requirements of ASTM F 2764 or F 2736.

7. Steel Reinforced Polyethylene (SRPE)
Comply with requirements of ASTM F 2562, Class 1.

B. Pipe Connections.
Use liner pipe capable of being joined into a continuous length. Ensure joints are adequate for pushing or pulling the liner pipe through the ~~host culvert~~ existing pipe.

C. Pipe Dimension Table.
Use liner pipe meeting dimensions as shown in Table 1. Verify there is enough clearance in existing pipe to ensure adequate room for liner pipe installation (based on manufacturer's dimensions) and grouting.

~~**Table DS-15006.02-1: Pipe Dimension.**~~

~~Nominal Pipe Size, inches~~	~~Profile Wall HDPE O.D., inches~~	~~Profile Wall HDPE I.D., inches~~	~~Solid Wall HDPE O.D., inches~~	~~Solid Wall HDPE I.D., inches~~	~~Spirally Wound PCV Pipe O.D., inches~~	~~Spirally Wound PVC Pipe I.D., inches~~	~~Profile Wall PVC O.D., inches~~	~~Profile Wall PVC I.D., inches~~	~~CSP Nominal Size., inches~~
~~24~~	~~20.24~~	~~18.00~~	~~22.00~~	~~20.65~~	~~20.45~~	~~20.00~~	~~22.60~~	~~20.70~~	~~21~~
~~30~~	~~27.06~~	~~24.00~~	~~28.00~~	~~26.29~~	~~27.45~~	~~27.00~~	~~25.60~~	~~23.50~~	~~27~~
~~36~~	~~33.82~~	~~30.00~~	~~32.00~~	~~30.03~~	~~32.79~~	~~32.00~~	~~32.20~~	~~29.50~~	~~30~~
~~42~~	~~40.65~~	~~36.00~~	~~40.00~~	~~36.95~~	~~38.79~~	~~38.00~~	~~38.70~~	~~35.50~~	~~36~~
~~48~~	~~45.20~~	~~40.00~~	~~42.00~~	~~39.42~~	~~42.79~~	~~42.00~~	~~---~~	~~---~~	~~42~~
~~54~~	~~47.47~~	~~42.00~~	~~48.00~~	~~44.33~~	~~48.79~~	~~48.00~~	~~---~~	~~---~~	~~48~~
~~60~~	~~---~~	~~---~~	~~54.00~~	~~50.68~~	~~54.79~~	~~54.00~~	~~---~~	~~---~~	~~54~~
~~66~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~60~~
~~72~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~66~~
~~78~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~72~~

~~84~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~78~~
~~90~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~84~~
~~96~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~---~~	~~90~~

Existing Pipe, Nominal Size, Inches	Liner Pipe, Nominal Size, Inches						
	Profile Wall HDPE	Solid Wall HDPE	Profile Spiral Wound PVC	Profile Wall PVC	CSP	PP	SRPE
24	18	22	19	18	21	18	-
30	24	28	25	24	27	24	-
36	30	32	30	30	30	30	30
42	36	36	36	36	36	36	36
48	40	42	42	42	42	42	42
54	42	48	48	48	48	--	48
60	48	54	54	54	54	48	54
66	54	--	60	--	60	--	60
72	60	63	66	60	66	60	66
78	66	--	69	--	72	--	72
84	72	--	--	--	78	--	72
90	--	--	--	--	84	--	84
96	--	--	--	--	90	--	-

D. Annular Space Grouting

Use foamed cellular concrete meeting the requirements of Section 2506 of the Standard Specifications.

15068.03 CONSTRUCTION.

A. Prior to sliplining, clean the existing pipe of obstructions~~, solids, and so forth~~ or debris that will prevent the insertion of the liner.

B. ~~Hold the liner pipe down to create the minimum change in flowline, especially on the inlet end. An example of this would entail attaching a block to the top of the liner pipe, or adding weight to the invert to resist floatation during backfilling with flowable mortar.~~ Secure the liner pipe to prevent floating during grouting and ensure minimum change in flowline, especially on the inlet end.

C. ~~Fill all voids between the liner pipe and the host culvert with flowable mortar. Staged grouting is recommended. Ensure that all voids between the liner pipe and host pipe have been filled with flowable mortar by providing 2 feet of head when filling.~~

Annular Space Grouting.

Comply with construction requirements in Section 2506 of the Standard Specifications.

15068.04 METHOD OF MEASUREMENT.

~~A. Sliplining Existing Culverts.~~

Measurement for Sliplining Existing Culverts will be the linear ~~F~~feet~~, measured to the nearest foot,~~ shown in the contract documents for each culvert.

~~B. Flowable Mortar~~

~~Article 2506.04 of the Standard Specifications applies.~~

15068.05 BASIS OF PAYMENT.

~~**A. Sliplining Existing Culverts.**~~

~~**1.** Per lineal foot.~~

2. Payment per linear foot includes all costs to inspect and clean the ~~host~~ existing culvert and all labor, equipment, and materials for sliplining, ~~and blocking~~ securing the liner pipe in~~to~~ the ~~host~~ existing culvert, and annular space grouting. If Contractor demonstrates the grouting is greater than 120% of the estimated amount to fill the annular space, the grouting volume greater than 120% of the estimate will be paid for as extra work as provided in Article 1109.03, B of the Standard Specifications.

~~**B. Flowable Mortar.**~~

~~Article 2506.05 of the Standard Specifications applies.~~