

CHAPTER 6 STORM DRAIN

(Updated 5-5-20)

SECTION 6.1 GENERAL

6.1.1 GENERAL

A. Storm Water Pollution Prevention Plan:

1. Shall be required for all construction activities as required under the Utah Pollutant Discharge and Elimination System (UPDES) permits and the following:

- a) Construction sites with a land disturbance of greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale.
- b) Construction sites related to residential building that disturb a total of one acre or less of land.
- c) Any construction activity the City Engineer or Designee deems to pose a unique threat to water quality, air quality, or public health or safety.

2. SWPPP shall be managed through the South Jordan City online storm water management system.

- a) All BMP's covering a storm drain inlet must contain an overflow feature for high volume rain/runoff events. Reference chapter 9 for acceptable inlet protection.

B. Storm Drain pipe in public right of way shall be minimum 18" RCP Class III or HDPE.

1. Storm Drain lines shall be TV'ed by the contractors hired firm after placement and compaction of road base and prior to placing asphalt. This TV'ed disk shall be reviewed by the City designated Inspector. All areas found defective shall be repair to the satisfaction of the City Inspector before placing asphalt.
2. Storm drain caution tape shall be place and centered 1' above the pipe.
3. Storm Drain lines will be TV'ed again, by City personnel prior to final bond release. All lines shall be cleaned by Developer prior to City performing the work. Any damaged pipe sections shall be repaired or replaced prior to final bond release.

C. Mirafi filter fabric may be required depending on the presence of groundwater, as determined by the City Engineer.

- D. Storm Drain manhole lid specifications: ASTM A 48-93, Class 35B Cast iron construction, machined flat bearing surface, removable lid with cleated surface and pick holes, H-20 highway load rating; lid molded with South Jordan City name and logo imprinted on lid; Provide Model A-1180 manufactured by D & L Supply., or acceptable equal. (See drawings section for detail.)
- E. Developments must provide theft-resistant permanent installation of a City-approved storm drain marker at each storm water inlet. The marker item number is SD-SP, a stainless steel, painted blue, matte finish, embossed, fish symbol, optional serialization, 30 year warranty, with 1/4" square hole made by Almetek Industries, Inc. Installation requires drive rivet and approved adhesive.
Lettering on the marker as appropriately follows:
- “Only Rain in the Drain” markers installed anywhere storm water discharges to a retention or detention pond. (See drawings section for detail.)
- F. A cleanout box with 24" silt trap is required before a private storm water system enters the City's storm drain system. All private storm drainage conveyance systems shall also have a snout in place or an oil water separator system, approved by the City Engineer, before it discharges into the city system
- G. Silt traps are required for all catch basins, inlets, manholes etc. Silt traps shall be 12" deep, measured from invert of lowest pipe to bottom of box.
- H. Boxes: Grout Boxes inside and out, and strip the forms from inside and outside of the boxes. Clean all dirt, rocks and debris from inside of the boxes. If using a pre-cast box, make sure to form a 6" collar around the outside of box with soil below pipe dug down and formed, and poured with concrete to engineering inspectors discretion. Before pouring concrete collar, contractor shall give engineering inspector 24-hour prior notice.
- I. All onsite retention and detention basins shall be designed for a 100 year 24 hour storm event. The calculations and storm intensities used in the design must be submitted to the city for review and approval. Percolation rates are not allowed to be used in the capacity calculations for the storm water basins unless otherwise approved by the City Engineer. Retention basins shall be required to drain within 3 days of the storm event. Engineer shall provide a design that meets that criteria. All calculations must be stamped and signed by a registered professional engineer.

SECTION 6.2 REINFORCED CONCRETE PIPE

6.2.1 DESCRIPTION

See the South Jordan City Standard Notes and the latest edition of the APWA Manual of Standard Specifications and Manual of Standard Plans.

SECTION 6.3 HIGH DENSITY POLYETHYLENE (HDPE) WATER TIGHT SMOOTH-LINED THERMOPLASTIC PIPE

6.3.1 DESCRIPTION

This item shall govern for the furnishing and installing of all High Density Corrugated Polyethylene (HDPE) Smooth Lined Pipe and / or materials for constructing of culverts, side road pipes, storm sewers, stubs, and all related connections and fittings, all of which shall conform to ASTM F 2306, latest edition.

6.3.2 MATERIALS

Unless otherwise specified on the plans or herein, thermoplastic pipe and joint fittings shall conform to the following:

- A. High Density Polyethylene (HDPE) Smooth Lined Pipe & Fittings shall be manufactured in accordance with requirements of ASTM F 2306, latest edition.
Type S: This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a smooth inner wall per AASHTO M294-07, section 4.1.2.
- B. High Density Polyethylene (HDPE) Smooth Lined Pipe shall be manufactured from virgin PE compounds which conform to the requirements of cell class 335400C as defined and described in ASTM D 3350.
- C. Minimum Pipe Stiffness (PS) at five percent deflection shall be as described in ASTM F 2306, Section 6.3 when tested in accordance with ASTM D 2412.
- D. All HDPE pipe shall be third party certified by either the Plastic Pipe Institute (PPI) or the National Transportation Product Evaluation Program (NTPEP).
 - 1. Installation – Installation shall be in accordance with ASTM D 2321, “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications”.

- a. General Installation Requirements - Thermoplastic pipe shall be unloaded and handled with reasonable care.
- b. Bedding and Backfill – Backfill in the trench zone shall meet the requirements of AASHTO M145 A-1-a to A-2-7 and be a 2" maximum granular material. Stable and uniform bedding shall be provided for the pipe. The middle of the bedding equal to 1/3rd of the pipe O.D. may be loosely placed, while the remainder shall be compacted to a minimum 96% of maximum density (Modified Proctor). A minimum of 4" of ¾ minus gravel shall be provided prior to placement of the pipe, unless an unyielding material (rock cuts) is present in the trench bottom, then a 6" cushion of bedding is recommended. Bedding shall be placed in layers 8" loose lift thickness and brought up evenly and simultaneously on both sides of the pipe to an elevation not less than one foot (1') above the top of the pipe. Backfill must be worked into the haunches area and compacted by hand. Backfill shall be compacted to a minimum compaction level of 96% Density (Modified Proctor).
- c. Trench Widths - Trench width shall be in accordance with ASTM D2321 and shall be sufficient to ensure working room properly and safely to place and compact haunches and other backfill materials. Minimum trench width shall not be less than 1.25 times the pipe outside diameter plus 12 inches. (1.25 x O.D. + 12")
- d. Minimum Cover - The minimum cover is one foot (1.0') for HS-25 Live Loads (18"-48" Diameters) and two feet (2.0') for larger diameter structures (60" Diameter); however, care should be taken when heavy construction equipment loads cross the pipe trench during construction. If the passage of construction equipment over an installed pipeline is necessary during project construction, compacted fill in the form of a ramp shall be constructed to a minimum elevation of one extra foot of cover in addition to the above minimum cover over the top of the pipe. Any damaged pipe shall be replaced at the contractor's expense.
- e. Joints shall be installed that the connection of pipe sections will form a continuous line free from irregularities in the flow line. Joints shall meet the following:
 - i. Watertight joints must meet a 74kPa (10.8 psi) laboratory test per ASTM D3212 and utilize a bell and spigot design with a gasket meeting ASTM F477.
 - ii. Do not exceed a deflection angle of 1 degree.

SECTION 6.4 POLYPROPYLENE PIPE

6.4.1 DESCRIPTION

This item shall govern for the furnishing and installing of all Polypropylene Pipe, materials for construction and all related connections and fittings.

6.4.2 MATERIALS

Unless otherwise specified on the plans, pipe and joint fittings shall conform to the following:

- A. Eighteen through 60-inch (460 through 1500 mm) pipe shall be smooth interior and annular exterior corrugated polypropylene (PP) pipe meeting the requirements of ASTM F2881 or AASHTO M330, Type S, for respective diameters. The pipe supplied shall be watertight as defined in the joint performance requirements of this specification.
- B. Virgin material for 18 through 60-inch pipe and fitting production shall be an impact modified copolymer meeting the material requirements of ASTM F2881 and AASHTO M330, for respective pipe diameters.
- C. Joints shall be installed in accordance with manufacturer's installation instructions. All Bell-and-Spigot pipe joints shall be thoroughly cleaned. Joint lubricant, supplied by the manufacturer, shall be liberally applied to entire interior of bell and gasket on spigot prior to assembly. Watertight joints shall be bell-and-spigot meeting the watertight requirements of ASTM F2881. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
- D. Fittings shall conform to ASTM F2881, with the exception of meeting the watertight joint performance requirements of ASTM D3212. Bell & spigot connections shall utilize a spun-on, welded or integral bell and spigot with gaskets meeting ASTM F477.

6.4.3 INSTALLATION

Installation shall be in accordance with the product manufacturer's published installation guides and these instructions.

- A. All pipe and fittings shall be delivered to the site and unloaded with handling that conforms to the manufacturer's instructions for reasonable care. Pipe shall not be rolled or dragged over gravel or rock during handling. The Contractor shall take necessary precautions to ensure the method used in lifting or placing the pipe does not induce undue stress fatigue in the pipe.

B. Bedding and Backfill

Bedding - A stable and uniform bedding shall be provided for the pipe and any protruding features of its joint and/or fittings. The middle of the bedding, equal to one-third of the pipe outside diameter, shall be loosely placed while the remainder shall be compacted to a minimum of 96% of maximum density per AASHTO T99, or as shown in the plans. Pipe bedding shall be a minimum of 4" – 6" in thickness. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.

Backfill - Backfill placement and compaction shall be constructed in accordance with the specifications herein and the product manufacturer's published installation guides. After the pipe and pipe system have been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layer depths to ensure minimum compaction density is obtained evenly throughout the backfill material. The backfill shall be brought up evenly on both sides of pipe and pipe system for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 6 inches above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 8 inches. Tests for density shall be made as necessary to ensure conformance to compaction requirements. For pipe placed in fill sections, fill shall be constructed to at least 6 inches above the top of proposed pipe prior to trench excavation. Fill shall be placed in 12 inch lifts and shall be compacted to achieve 96% of maximum density, or as shown on plans. Once fill is placed and compacted pipe trench shall be constructed in accordance with the Trench Excavation section of this specification.

C. Trench Widths - Where trench walls are stable or supported, provide a width sufficient, but no greater than necessary, to ensure working room to properly and safely place and compact haunching and other embedment materials. The space between the pipe and trench wall must be wider than the compaction equipment used in the pipe zone. Minimum width shall be not less than the greater of either the pipe outside diameter plus 16 in. or the pipe outside diameter times 1.25, plus 12 in. In addition to safety considerations, trench width in unsupported, unstable soils will depend on the size and stiffness of the pipe, stiffness of the embedment and in-situ soil, and depth of cover.

D. Dewatering - Do not lay or embed pipe fittings or drainage structures in standing or running water. At all times prevent runoff and surface water from entering the trench. When water is present in the work area, dewater to maintain stability of in-situ and imported materials. Maintain water level below pipe bedding and foundation to provide a stable trench bottom. Use, as appropriate, sump pumps, well points, deep wells, geofabrics, perforated underdrains, or stone blankets of sufficient thickness to remove and control water in the trench. When excavating while depressing ground water, ensure the ground water is below the bottom of cut at all times to prevent washout from behind sheeting or sloughing of exposed

trench walls. Maintain control of water in the trench before, during, and after pipe system installation and until embedment is installed and sufficient backfill has been placed to prevent flotation of the pipe, fitting, or drainage structures. To preclude loss of soil support, employ dewatering methods that minimize removal of fines and the creation of voids in in-situ materials.

SECTION 6.5 STORM DATA AND IDF CURVE

South Jordan City
Storm Data at 10600 South and Redwood Road
2, 10, 100 Year Storm

Time (min)	Intensity (in/hr)			Amount (in)		
	2-yr	10-yr	100-yr	2-yr	10-yr	100-yr
5	1.992	3.504	5.256	0.166	0.292	0.438
10	1.540	2.736	4.300	0.257	0.456	0.717
15	1.192	2.144	3.556	0.298	0.536	0.889
16	1.145	2.061	3.440	0.305	0.550	0.917
17	1.105	1.989	3.340	0.313	0.564	0.946
18	1.070	1.915	3.239	0.321	0.575	0.972
19	1.034	1.853	3.140	0.327	0.587	0.994
20	1.003	1.794	3.053	0.334	0.598	1.018
21	0.978	1.745	2.970	0.342	0.611	1.040
22	0.953	1.695	2.898	0.349	0.622	1.063
23	0.931	1.652	2.827	0.357	0.633	1.084
24	0.912	1.613	2.760	0.365	0.645	1.104
25	0.891	1.579	2.700	0.371	0.658	1.125
26	0.875	1.544	2.640	0.379	0.669	1.144
27	0.859	1.511	2.587	0.387	0.680	1.164
28	0.842	1.480	2.534	0.393	0.691	1.183
29	0.828	1.450	2.485	0.400	0.701	1.201
30	0.812	1.422	2.436	0.406	0.711	1.218
31	0.795	1.391	2.380	0.411	0.719	1.230
32	0.778	1.360	2.320	0.415	0.725	1.237
33	0.761	1.330	2.260	0.419	0.732	1.243
34	0.743	1.300	2.200	0.421	0.737	1.247
35	0.730	1.272	2.148	0.426	0.742	1.253
36	0.714	1.245	2.111	0.428	0.747	1.267
37	0.700	1.219	2.074	0.432	0.752	1.279
38	0.683	1.192	2.038	0.433	0.755	1.290
39	0.671	1.170	2.001	0.436	0.761	1.301
40	0.659	1.147	1.964	0.439	0.765	1.309
41	0.647	1.122	1.927	0.442	0.767	1.317
42	0.634	1.102	1.890	0.444	0.771	1.323
43	0.622	1.081	1.854	0.446	0.775	1.328
44	0.611	1.063	1.817	0.448	0.780	1.332
45	0.601	1.045	1.780	0.451	0.784	1.335

46	0.591	1.029	1.756	0.453	0.789	1.346
47	0.582	1.012	1.733	0.456	0.793	1.357
48	0.572	0.995	1.709	0.458	0.796	1.367
49	0.565	0.981	1.685	0.461	0.801	1.376
50	0.558	0.969	1.661	0.465	0.808	1.384
51	0.550	0.955	1.638	0.468	0.812	1.392
52	0.544	0.942	1.614	0.471	0.816	1.399
53	0.538	0.931	1.590	0.475	0.822	1.405
54	0.532	0.920	1.566	0.479	0.828	1.410
55	0.528	0.912	1.543	0.484	0.836	1.414
56	0.521	0.901	1.519	0.486	0.841	1.418
57	0.519	0.894	1.495	0.493	0.849	1.420
58	0.515	0.887	1.472	0.498	0.857	1.422
59	0.511	0.880	1.447	0.502	0.865	1.423
60	0.509	0.874	1.424	0.509	0.874	1.424
120	0.325	0.550	0.845	0.650	1.100	1.690
180	0.245	0.410	0.599	0.735	1.230	1.797
360	0.146	0.231	0.317	0.876	1.386	1.902
720	0.088	0.139	0.190	1.056	1.668	2.280
1440	0.049	0.079	0.109	1.176	1.896	2.616

