

SECTION 027602
GRAVITY WASTEWATER LINES

1. DESCRIPTION

This specification shall govern all work required for furnishing, handling and installing gravity wastewater lines required to complete the project.

2. MATERIALS

A. Pipe and Fittings:

1. POLY-VINYL CHLORIDE (PVC) PIPE and fittings shall be in accordance with the following:

6" Gravity Sewer Pipe	ASTM D3034	DR 26	
8" Gravity Sewer Pipe	ASTM D3034	DR 26	
10" Gravity Sewer Pipe	ASTM D3034	DR 26	
12" Gravity Sewer Pipe	ASTM D3034	DR 26	
15" Gravity Sewer Pipe	ASTM D3034	DR 26	
18" Gravity Sewer Pipe	ASTM F679	DR 26	
24" Gravity Sewer Pipe	ASTM F679	DR 26	
30" Gravity Sewer Pipe	ASTM F679	DR 26	
36" Gravity Sewer Pipe	ASTM F679	DR 26	PS115
42" Gravity Sewer Pipe	ASTM F679	DR35	PS46
48" Gravity Sewer Pipe	ASTM F679	DR35	PS46

Pipe and fittings shall have push-on compression gasket joints in accordance with ASTM D3212 and shall be a non-blue color.

2. POLY-VINYL CHLORIDE (PVC) PRESSURE PIPE shall be AWWA C900 or C905 integral green (non-blue color) with a minimum pressure rating of not less than 150 psi, made of Class 12454-A or Class 12454-B virgin compounds, as defined in ASTM D1784. One 20' section of PVC pressure pipe, with appropriate adapters or as an encasing pipe over the carrier pipe, shall be used for gravity wastewater lines at all waterline crossings, and shall be centered under/ over the waterline as indicated on the drawings.

Maintain a minimum of 2' vertical clearance between outsides of pipes where a new waterline crosses over a new non-pressurized wastewater line. Maintain a minimum of 6" vertical clearance between outsides of pipes where a new waterline crosses over a pressurized wastewater line. In all instances of water crossing wastewater, center a joint of water pipe over the wastewater pipe such that a minimum of 9' of horizontal offset exists from each water joint to the wastewater carrier pipe. In all instances where the water and wastewater pipe offsets cannot meet TCEQ minimum separation distances, the wastewater pipe shall be SDR 26 ASTM pressure-rated pipe from manhole to manhole when improvements span between manholes.

Alternatively, at waterline crossings, the PVC gravity wastewater pipe may be encased in a 20' joint of pressure pipe with a minimum pressure rating of 150 psi that is at least two nominal sizes larger than the carrier pipe. The carrier pipe shall be supported in the casing at 5' intervals with spacers, or shall be filled to the spring line with clean washed sand. The casing pipe shall be centered under/ over the waterline as indicated on the drawings, and both ends of the casing shall be sealed with cement grout or manufactured seal.

B. Bedding and Backfill Materials:

1. BEDDING AND INITIAL BACKFILL is that material from beneath the pipe to an elevation 12" above the top of the pipe. The bedding and initial backfill material shall be in accordance with Table 1 on Wastewater Standard Details, Sheet 3, unless otherwise specified.
2. FINAL BACKFILL is that material placed on the initial backfill. The material shall be in accordance with City Standard Specification Section 022020 "Excavation and Backfill for Utilities" and as shown on the standard details.

3. CONSTRUCTION METHODS

A. Trench Excavation:

See City Standard Specification Section 022020 "Excavation and Backfill for Utilities."

B. Handling of Materials:

1. HANDLING AND CARE of pipe shall be the responsibility of the Contractor. Pipe shall be unloaded at the point of delivery, hauled to and distributed at the site by the Contractor. Materials shall be handled with care and in accordance with the manufacturer's recommendations.
2. STORAGE AND SECURITY of materials shall be provided by the Contractor. Any material delivered to the site that is not to be incorporated into the work within 10 working days shall be properly stored off the ground. Stacking and handling of materials shall be done as recommended by the manufacturer.
3. REJECTED OR DEFECTIVE materials are those having cracks, flaws or other defects. Rejected materials shall be marked by the Engineer and removed from the job site by the end of the day by the Contractor.
4. DISTRIBUTION OF MATERIALS at the work site shall be allowed provided that they are incorporated into the work within 10 working days. Materials shall not be placed on private property, unless written permission has been obtained from the owner by the Contractor. Materials shall not be placed within five feet of the back of curb or edge of pavement without permission of the Engineer or the designated representative.

C. Alignment and Grade:

1. All pipe shall be laid and maintained to the required line and grade.
2. NO DEVIATIONS from design line and grade shall be allowed, unless authorized by the Engineer.
3. The Contractor shall provide offsets and cut sheets. The Contractor may use batter boards, laser, or other approved methods necessary to construct the wastewater line to design line and grade.

D. Pipe Placement:

1. GENERAL: Proper implements, tools, etc., shall be used by the Contractor for safe and efficient execution of work. All pipes shall be carefully lowered into the trench by suitable equipment in such a manner as to prevent damage. Under no circumstances shall pipe be dropped or dumped into the trench. The Contractor shall not lay pipe in the trench until the bedding and condition of the trench have been approved by the Engineer. The trench shall be free of water and maintained in that condition until the pipe has been laid, the joints have been completed, and the initial backfill has been completed. All pipe markings shall be placed face up for inspection prior to backfill.
2. CLEAN PIPE: All foreign matter or dirt shall be removed from the interior of the pipe before lowering pipe into trench. The interior of pipe shall be maintained free of dirt during the remaining installation operations.

E. Jointing Pipe:

POLY-VINYL CHLORIDE (PVC) PIPE shall have mating surfaces of the gasketed joint wiped clean of dirt and foreign matter. A lubricant recommended by the coupling manufacturer shall be applied to the bell and spigot mating surfaces just prior to joining. The spigot shall then be centered on grade into the bell of the previous pipe and shall be shoved home to compress the joint and to assure a tight fit between the inner surfaces. Pipe shall not be assembled in reverse order by pushing bell onto spigot. When the pipe is being thusly installed, bell holes shall be excavated in the bedding material. When the joint has been made, the bell hole shall be carefully filled with material to provide for adequate support of the pipe. The spigot shall be centered within 1/4 inch of the home line marked on the spigot.

F. Bedding and Initial Backfill:

POLY-VINYL CHLORIDE (PVC) PIPE: Bedding and initial backfill of PVC pipe shall be in accordance with the details provided in the drawings. Bedding shall be well tamped regardless of type. The type of bedding required shall depend upon the depth of cut and ground water condition and shall be as specified below:

BOTTOM OF TRENCH IN GROUNDWATER

<u>Depth of Cut</u>	<u>Required Bedding</u>
Less than 20'	Gravel or Crushed Stone
Over 20'	Crushed Stone

BOTTOM OF TRENCH NOT IN GROUND WATER

<u>Depth of Cut</u>	<u>Required Bedding</u>
Less than 15'	Sand, Gravel, or Crushed Stone
Less than 20'	Gravel or Crushed Stone
Over 20'	Crushed Stone

G. Final Backfill:

See City Standard Specification Section 022020 "Excavation and Backfill for Utilities."

H. Bypass Pumping:

Contractor shall follow operational requirements for bypass pumping as set forth in Specification Section 027200 "Control of Wastewater Flows".

4. TESTING AND CERTIFICATION

A. Leakage Testing: (Required for all types of pipe)

1. EQUIPMENT FOR LEAKAGE TESTING shall be furnished and installed by the Contractor. The Contractor shall test the entire system for leaks. This work shall be witnessed by the OAR.
2. POLY-VINYL CHLORIDE (PVC) PIPE shall be tested in accordance with Uni-Bell Plastic Pipe Association - Standard UNI-B-6 "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe"; the requirements of which are summarized by the following equation:

$$T = 0.00237D^2L \quad [\text{Equation 1}]$$

Where: T = Minimum allowable time (seconds) for a pressure drop of one (1) psi gage pressure
D = Nominal pipe diameter (inches)
L = Length of pipe run (feet)

The test section shall be plugged and subjected to a test pressure not in excess of 5 psi. The time required for a 1 psi pressure drop shall be measured and shall not

exceed the value obtained in Equation 1 above.

B. Deflection Testing: (Required for PVC Pipe)

1. EQUIPMENT FOR DEFLECTION TESTING shall be provided by the Contractor. Mandrels shall be provided by the Contractor and will be of machined rigid corrosion-resistant pipe with a length not less than 1.5 diameters. Mandrels will be sized for SDR 26 PVC pipe at 5% deflection. The outside diameter of the standard mandrels shall be as follows:

<u>Nominal Size (inches)</u>	<u>Mandrel O.D. (inches)</u>
8	7.11
10	8.87
12	10.55
15	12.90
18	15.76
21	18.56
24	20.87
27	23.51
30	27.14

2. TESTING shall be done by the Contractor and witnessed by the Engineer. All pipe shall be tested for deflection no less than 30 days after placement of backfill. The Contractor may wish to check pipe immediately after backfilling for job control. However, this shall not qualify as acceptance testing. No pipe can be tested for formal acceptance until it has been in place, complete with backfill, for at least 30 days.
3. Belly: Pipe shall be rejected if belly exceeds 5% based on the readings from the video inspection.

C. Retesting:

ANY DEFECTIVE WORK OR MATERIALS shall be corrected or replaced by the Contractor and retested. This shall be repeated until all work and materials are acceptable

D. Cleaning and Televising:

All wastewater lines and manholes installed on this project shall be cleaned and televised in accordance with Standard Specification Section 027611 "Cleaning and Televised Inspection of Conduits".

5. SOIL BORINGS

The City does not assume responsibility for subsurface information. Soil data and other subsurface information, if shown on the drawings or in the appendix, are without warranty as to correctness of fact or interpretation.

6. BRACING AND SHORING

Trenching operation shall comply with Worker Safety Requirements for Excavation and Trenching Operations. If, for whatever reason, the trench width at the top of pipe must exceed that width indicated in the bedding details, the Contractor shall modify bedding as required by the OAR to accommodate the additional load on the pipe.

7. MEASUREMENT AND PAYMENT

Unless otherwise specified on the Bid Form, gravity wastewater lines shall be measured by the linear foot for each size and depth of wastewater line installed, as follows:

- A. Between centers of manholes.
- B. From the center of a manhole to the end of the line.
- C. From the end of an existing stub to the end of the line or center of the existing manhole.

Depth shall be measured from flow line of pipe to ground surface over centerline of the pipe at the time of construction. Measurements to be made at manholes, at intervals not to exceed 50', and at breaks in ground profile.

Bedding shall not be measured for pay, but shall be considered subsidiary to pipe, unless included as a separate bid item in the Bid Form.

Unless otherwise specified on the Bid Form, de-watering shall not be measured for pay, but shall be considered subsidiary unless included as a separate bid item in the Bid Form for well-pointing.

Payment shall be full compensation for all labor, materials, equipment, pipe, bedding, de-watering, hauling, trench excavation and backfill, leakage and deflection testing, cleaning, televising, bypass pumping, and all cleaning up and other incidentals necessary to install the pipe complete in-place.