

STANDARD SPECIFICATIONS

SECTION 02701

INSTALLATION OF GRAVITY SEWER PIPELINES

PART 1 - GENERAL

A. Description

This section describes the installation of gravity sewer pipelines fabricated of vitrified clay pipe (VCP) and polyvinyl chloride (PVC).

B. Related Work Described Elsewhere

1.	Trenching, Backfilling and Compacting:	02223
2.	Jacked Casing:	02315
3.	Vitrified Clay Pipe:	02710
4.	PVC Gravity Sewer Pipe:	02715
5.	Concrete:	03300
6.	Precast Concrete Manholes and Manhole Bases:	03461
7.	Leakage and Infiltration Testing:	15043
8.	Ductile Iron Pipe and Fittings:	15056

C. Submittals

1. An installation schedule (tabulated layout) shall be submitted which includes:
 - a. Order of installation and closures
 - b. Pipe centerline station and elevation at each change of grade and alignment
 - c. Locations of manholes

PART 2 - MATERIALS

A. Installation Material

Refer to Section 02710, Vitrified Clay Pipe and Section 02715, PVC Gravity Sewer Pipe for material requirements.

B. Piping Schedule

Unless noted otherwise on the plans or in the specifications, pipe shall be furnished in accordance with the following materials schedule.

DIAMETER	GRAVITY SEWER
2-inch and smaller	--
4-inch through 12-inch	VCP PVC SDR-35
14-inch through 36-inch	VCP DIP with polyethylene lining
Notes: PVC SDR-35 - PVC gravity sewer pipe per Section 02715. VCP - Vitrified clay pipe per Section 02710. DIP - Ductile iron pipe per Section 15056.	

PART 3 - EXECUTION

A. Delivery and Temporary Storage of Pipe at Site

1. Onsite Storage Limitation: Onsite pipe storage shall be limited to a maximum of one week, unless exception is approved by District.
2. Care of Pipe: At times when the pipe laying is not in progress, the open end of the pipe shall be closed with a tight-fitting cap or plug to prevent the entrance of foreign matter into the pipe. These provisions shall apply during the noon hours as well as overnight. In no event shall the sewers be used as drains for removing water which has infiltrated into the construction trenches.

B. Handling of Pipe

1. Moving Pipe: Pipes shall be lifted with handling beams or wide belt slings as recommended by the pipe manufacturer. Cable slings shall not be used. Pipe shall be handled in a manner to avoid damage to the pipe. Pipe shall not be dropped or dumped from trucks or into trenches under any circumstances.
2. Inspection Pipe: The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench.

C. Placement of Pipe in Trench

1. General: All pipe shall be laid without a break, upgrade from structure to structure, with the bell ends of the pipe upgrade. Pipe shall be laid to the line and grade given so as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the flow line.

2. Trench Excavation: Dewatering, excavation, shoring, sheeting, bracing, backfill material placement, material compaction, compaction testing, and pipe laying requirements and limitations shall be in accordance with Section 02223, Trenching, Backfilling, and Compacting.
3. Pipe Bedding Thickness: Unless shown otherwise on the drawings, pipe bedding material shall be 3/4-inch crushed rock for PVC pipe and imported sand for VCP specified in Section 02223, Trenching, Backfilling, and Compacting.
4. Subgrade at Joints: At each joint in the pipe, the pipe subgrade shall be recessed in firm bedding material so as to relieve the bell of the pipe of all load and to ensure continuous bearing along the pipe barrel.
5. Cleaning: The interior of the sewer pipe shall be cleaned of all dirt and superfluous materials as the work progresses.
6. Joints: The mating surfaces of the pipe to be joined shall be wiped clean of all dirt and foreign matter and a lubricant applied that is approved by the pipe manufacturer. Then, with the surfaces properly lubricated, the spigot end of the pipe shall be positioned inside the bell and the joint shoved home.

For larger diameter pipe where a lever attachment is required, the necessary precautions shall be taken to insure an undamaged pipe installation.

7. Pipe Alignment: Unless specified otherwise, pipeline line and grade shall be as shown on the plans. Grade shall be measured along the pipe invert.
8. PVC Pipe Curvature: Construction of curved reaches of PVC pipe shall not be accomplished by deflecting joints or by beveling pipe ends. Bending of PVC pipe to achieve vertical or horizontal curves without using deflection fittings shall be limited as follows:

<u>Diameter (Inches)</u>	<u>Minimum Radius (Feet)</u>
6	210
8	280
10	350
12	420

9. Short Lengths of VCP Pipe: When using VCP, two 1-foot lengths of sewer pipe shall be used to provide curve flexibility and prevent cracking or shearing failures as shown on the plans or as may be required by the District representative during construction. The use of short lengths of pipe is particularly required, but not necessarily limited to these locations: (1) inlets and outlets to all manholes; (2) ends of steel casing pipe; (3) ends of concrete encasement; (4) vertical and horizontal curvilinear sewers; and (5) deep lateral connections.
10. Laterals: VCP and PVC wyes, and other types of branches shall be furnished and installed along with the VCP or PVC sewer. Wyes sized as specified on the plans shall be installed for all sewer house connections and for future sewer house connections as shown on the plans. The longitudinal barrel of branch fittings, to be placed in line and grade with the sewer mains, shall be of the same diameter, quality, and type as specified herein for sewer installations. Earthwork and bedding for branches and shall conform to

the applicable provisions set forth for in the specification for each pipe material. Unless otherwise specified, the branch of wye fittings shall be inclined upward at an angle not greater than 45 degrees from a horizontal line. No wye for sewer house connection branch shall be placed closer than 5 feet downstream of the centerline of any structure. The contractor shall place a support of graded crushed rock or imported sand under every wye branch when installed. The support shall be placed in accordance with MNWD standard drawing S-6, the detail on the plans, or as specified in Section 02223, Trenching, Backfilling, and Compacting.

11. Backfill: Backfill shall be placed and compacted in accordance with the requirements of Section 02223, Trenching, Backfilling and Compacting, and as shown on MNWD standard drawing Nos. S-5 and S-8. Backfill within the pipe zone shall be ¾-inch crushed rock for PVC pipe and imported sand for VCP.

D. Manholes and Manhole Bases

Precast concrete manholes and manhole bases shall be constructed in accordance with Section 03461, Precast Concrete Manholes and Manhole Bases, as shown in the plans or on MNWD standard drawings S-1 and S-2

E. House Laterals

1. Locations: House laterals and wye branch fittings of the size indicated on the plans shall be installed at the locations shown on the plans or at the location furnished by the District representative.
2. Plugged Branches: All branch fittings that are to be left unconnected shall be plugged.
3. Fittings: House laterals shall be joined to wye branch fittings at the sanitary sewer main as set forth above by eighth bends. All eighth bends and sixteenth bends are a part of house lateral sewerline.
4. Alignment: Where possible, all house laterals shall run perpendicular to the sewer main from the main to the property line, and all house laterals shall be bedded the same as the sewer main into which they connect.
5. Plugged House Laterals: All house laterals shall be plugged with an approved stopper in the socket of the last joint of each house lateral so that it will withstand the internal pressure during the test for leakage, but also in such a manner that it may be removed without injury to the socket.
6. Marking: The contractor shall mark the location of each house lateral at its upper end by chiseling a letter "S" 1-1/2-inches high on the face of the curb.
7. Chimney Connections: Chimney connections are not allowed.
8. Mainline Testing: The mainline sewer shall have passed final testing per Section 15043 before the laterals may be connected to the main.

F. Cleanouts

Cleanouts are not permitted. All sewer mains shall terminate at a manhole.

G. Saddle Connections

1. General: All saddle connections into existing sewerlines shall be made with a wye saddle.
2. Scoring and Tapping: The sewerline to be saddled shall be scored to the approximate shape of wye or tee and shall be cut with a hole cutter. The tap holes shall be cleanly machined and may be further worked by hand to provide a true and neat opening for the collar wye or tee saddle. Pipe damaged during this operation shall be repaired or replaced. The District representative shall be the sole judge as to the method of repair or replacement.
3. Securement: The collar wye shall be secured to the VCP sewer main with a catalytic epoxy resin. The saddle shall be tied to the main with wire of sufficient strength that no movement will occur during the setting of the epoxy resin.
4. Encasement: After the connection has set sufficiently long for the epoxy resin to cure, the District will inspect the connection and, if satisfactory, the contractor shall encase the fitting with Class B portland cement concrete to the limits indicated on MNWD standard drawing S-7.
5. Cleaning: The saddling operation shall be carried out in a workmanlike manner. Chips, dirt, epoxy mortar, and concrete shall be kept out of the sewer line being saddled. If directed by the District representative, the reach of sewer main saddled shall be flushed and cleaned using a hydrocleaner or vacuum truck.
6. Alternative Connection: In lieu of a saddle connection, a wye connection may be made by cutting the sewer and installing a wye as detailed on MNWD standard drawing S-7.

H. Installation Within Jacked Casing

1. General: Vitrified clay sewer pipe shall be installed within the casing pipe to the lines and grades shown on the plans and in accordance with Section 02315, Jacked Casing.
2. Pipe Support: The carrier pipe shall be supported on cradles such as "PSI" spacers, Model C8G-2, or approved equal before backfilling, in such a manner as to relieve the pipe bells from any bearing loads.
3. Fill Within the Casing: The annular space between the casing and the VCP carrier pipe shall be backfilled per Section 02315, Jacked Casing.
4. Testing: Before backfilling as specified above, the sewer carrier pipe shall pass an initial test for leakage as provided in Section 15043, Leakage and Infiltration Testing.

I. Pipe Anchorage (For Pipelines Having a Diameter of 10-Inches or Less)

1. General: Concrete slope anchors shall be installed where shown on the plans in accordance with Section 03300 and MNWD standard drawings S-10, wherever the profile of the ground surface above the sewer main exceeds 20 percent, and where no pavement or other surfacing is to be laid over the facility.

2. Dimensions: Anchors shall be a minimum of 12-inches thick and shall extend at least 12-inches into undisturbed material on each side of the trench as excavated.
3. Slope Protection: Cemented rubble and concrete surface slope protection shall be a minimum of 4-inches thick.
4. Spacing: Spacing between pipe anchors shall not exceed the distances shown on MNWD standard drawing S-11.
5. Reinforcement for Concrete Anchors: Anchors constructed of cast-in-place reinforced concrete shall have No. 4 reinforcing bars placed at 6-inches on center each way in the center of the anchor thickness. The bars shall extend full length and height of the anchor.
6. Reinforcement for Concrete Masonry Unit Anchors: Reinforced hollow masonry units shall have all cells filled solidly with grout. A No. 4 reinforcing bar shall be placed vertically in each row of cells and No. 9 gage wall mesh shall be placed in each horizontal joint. In addition, a bond beam shall be placed at the top with two No. 4 bars.

J. Concrete Encasement

Unless shown otherwise, concrete for encasement shall be reinforced or unformed or rough formed, and of the class as designated on the plans. Concrete shall be in accordance with Section 03300, Concrete. Concrete used for encasing, cradling, bedding, cover for pipe, or other objects shall be used as shown on the Plans, on MNWD standard drawing S-9, or as directed by the District representative.

K. Cleaning

Before testing, each pipe shall be thoroughly cleaned from manhole to manhole with a sewer scrubbing ball, and all debris and trash shall be removed from each manhole.

L. Mandrel Test for PVC Gravity Sewers 10-inch in Diameter and Smaller

Following placement and compaction of backfill for all utilities, and prior to the placement of permanent pavement, all sewer mains shall be cleaned and mandrelled to verify that the pipeline is free from obstructions (deflections, joint offsets, lateral pipe intrusions, etc.). A rigid mandrel, with a circular cross section having a diameter of at least 95 percent of the specified inside pipe diameter, shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Obstructions encountered by the mandrel shall be repaired and the pipeline section retested.

M. Leakage and Infiltration Test

The pipe, manholes, and other appurtenances shall be tested for leakage and infiltration per Section 15043, Leakage and Infiltration Testing.

N. Closed-Circuit Television Inspection

1. General: In addition to the regular leakage and infiltration test, the entire length of all new sewer lines shall be inspected using closed-circuit television equipment. The inspection shall be conducted after the line has been successfully tested and prior to paving. The inspection shall be conducted in the presence of the District representative.

2. Responsibility: All labor and equipment necessary to conduct this inspection shall be furnished by the contractor.
3. Notification: Requests for sewer line inspection shall be made to the District representative a minimum of two working days in advance of the requested inspection date.
4. Flushing: Each sewer section shall be flushed with water being introduced at the upstream manhole of each section prior to video recording.
5. Stationing: The video shall show stationing corresponding to sewer stationing shown on plans for each manholes and Wye location.
6. Submittal: The videotape shall be VHS format and be submitted to the District with two (2) of the computer printouts showing manhole numbers and stationing, wye stationing and distance between manholes prior to occupancy release for the dwelling units being served by the sewer. The tape and printout shall be labeled with the project name, tract number, street names, and contractor's name and shall list the station of any defects, dirt, low spots, etc. in the pipe.
7. Repair of Defects: Even though the sewer line may have successfully passed the leakage and infiltration tests, any defects or low spots in the line shall be repaired to the satisfaction of the District.
8. Acceptance: Sewer section having standing water or defects shall be repaired by the contractor prior to District acceptance and prior to occupancy release for the dwelling units or commercial site being served by the sewer. Standing water in the system will not be allowed.

O. Final Inspection

After paving has been completed and all manholes raised to grade, a final visual inspection shall be made. The necessary labor shall be furnished to assist the District representative in making the final inspection. Additional balling may be required if the lines are dirty, even though lines were previously balled. The contractor shall furnish a responsible person or supervisor for the final inspection to remove manhole covers and to note any corrections required by the District representative in order to obtain final approval. Final District inspection shall be requested through the District representative by giving at least two day's notice.

END OF SECTION