

ITEM 15

OPEN-CUT PIPE INSTALLATION

1.0 DESCRIPTION. This specification covers the requirements for furnishing all labor, equipment, and materials associated with the installation of pipe by open-cut excavation method. The pipe shall meet project requirements as PVC or other applicable materials referenced herein.

2.0 SUBMITTALS. The contractor shall submit the following information:

A. Reference Standards. Latest revisions:

1. ASTM C1173.
2. ASTM A167.

B. Shop Drawings.

1. All shop drawings submitted electronically for review and approval shall be returned within two weeks either approved or marked up for further design.
2. After examination of such drawings by the Engineer and the return thereof, the Contractor shall make such correction to the shop drawings as have been indicated and shall furnish the Engineer with electronic corrections.
3. Shop drawings shall be complete in details and indicate all materials as specified herein.
4. Manufacturer's catalog or general web-site information will not be sufficient to fulfill shop-drawing requirements.
5. Pipe and appurtenances:
 - a. Refer to material specifications for applicable items.
6. Prior to beginning work, the Contractor must submit to the Engineer a general Work Plan outlining the procedure and schedule to be used to execute the project.
 - a. The Plan should document the thoughtful planning required to successfully complete the project.

C. Calculations. This section is not applicable.

D. Certifications. This section is not applicable.

3.0 MATERIALS. Only materials approved by the Stark County Metropolitan Sewer District may be used for this project. Materials indicated below shall be in accordance with this specification or as referenced within SCSE Specification Items 14, 17, 18, 49 & Item 60 respectively.

A. Pipe and Appurtenances.

1. Ductile iron pipe shall follow Item 11- Ductile Iron Pipe and Fittings.
2. PVC pipe shall follow Item 14- PVC Pipe.
3. Other pipe only as approved by the SCMSD.

4.0 EXECUTION. The Contractor shall provide all labor, materials, equipment, and tools necessary to provide and install the main as shown on all detailed Drawings and specified as below.

A. General Installation.

1. Installation of pipe, fittings, and appurtenances shall be in accordance with the trench excavation and backfill specifications Items 1, 6, and 7 and the details in the contract Drawings.
2. PVC Installation shall be in accordance with ASTM D-2321, Underground Installation of Flexible Thermoplastic Sewer Pipe, except bedding shall be Stark County Type B Bedding.
3. All trenches, when pipe laying is in progress, shall be kept dry and all pipes and specials shall be laid accurately to the required lines and grades and shall be uniformly supported along their entire lengths with Type B bedding as shown on the drawings unless otherwise specified or ordered by the Engineer. For unsuitable subgrade conditions, see Detail Drawings 3 & 3A. Pipe shall be pushed "home" and kept in that position.
4. The material used for Type B bedding shall be 100% crushed limestone or engineering approved equal. Material submitted for "equal" status must be preapproved by the Stark County Metropolitan Sewer District. A representative sample and data sheets shall be made available to the county for approval prior to use. The county will test approved substitute material samples throughout the project at its discretion. The material shall be free from dirt and shall be graded as follows:
 - a. 100% - Shall pass 1 1/2" square opening
 - 95% - 100% Shall pass 1" square opening
 - 25% - 60% Shall pass 1/2" square opening
 - 0% - 10% Shall pass #4 sieve opening
 - 0% - 5% Shall pass #8 sieve opening
5. Bedding material below the pipe and that under and around the pipe to spring line shall be well tamped; that above spring line shall be placed in six (6) inch layers and be well tamped. See details Nos. 1 and 2 for bedding limits.
6. When pipes enter or pass through concrete walls or other sections, holes shall be cored through and the pipes properly centered in the cored hole using a modular seal such as Link Seal® or approved equal.
7. All trenches shall be drained so that pipe shall be laid under dry conditions.
8. In all cases the open ends of pipe shall be securely closed with carefully fitted stoppers, so as to prevent any earth or other substance from entering them.

9. The Contractor shall use a laser beam for establishing line and grade. The method used shall be as recommended by the manufacturer of the laser equipment and must be satisfactory to the Engineer. The alignment laser shall be a class 3a laser or less. A continual visual check shall be provided by the laser equipment.
10. No PVC sewer pipe shall be laid until a sufficient length of trench has been properly prepared to permit laying of pipe. No pipes shall be laid except in the presence of the Engineer or County Project Representative, and no pipes shall be covered or backfilled until they have been examined and directions given to cover the same.
11. The contractor is responsible for complete and satisfactory installation of the sanitary sewer as depicted on the contract drawings and as detailed in these specifications. This means absence of all defects in both material and workmanship. Pipe slopes shall be as shown on the contract drawings. The contractor shall use his/her own quality control system to ascertain the quality of the project during construction and shall keep this in mind as defects found during the final testing stages will require re-excavation of the pipe for repair and retesting as per these contract documents.
12. All pipe shall be laid to conform to the prescribed line and grade shown on the approved drawings within $\pm 0.01\%$ (Slope discrepancies between manholes/cleanouts of $\pm 0.01\%$)
13. Any "bellies"/pipe sags are not to be more than 0.25" in an 8-inch pipe.
14. No joint defects will be tolerated.
15. The cost of any preliminary line and grade check shall be included under other items and all other specified testing shall be performed to include Item 40 – Internal Inspection.
16. All dust control on this project shall be done in accordance with the General Provisions as part of the pipe installation.
17. Payment for all dust control shall be paid as part of the sewer installation under this pay item. NO additional payment shall be made.

B. Cutting Pipe.

1. Whenever pipes require cutting to fit into the lines, it is essential that a square cut is made to insure proper fit. This is accomplished by using either a tubing cutter or a miter box and fine-toothed hand saw or hacksaw. For beveling, use a factory finished beveled end as a guide. The cut end may be beveled using a "pilot" beveling tool, or a thin, steel hand tool, such as a "Stanley Surform No. 399".
2. After cutting a pipe, place a reference mark at the proper distance from the bevel end. This is accomplished by using a factory marked end of the same size pipe as a guide.
3. When couplings are required for repairs or field installing connections, they shall be solid-wall PVC meeting all ASTM material and joint standards herein.
4. If PVC pipe is connected to a main of dissimilar material, it shall be done with stainless steel shielded sewer couplings. Gaskets shall meet ASTM C1173 (latest edition), 300 series stainless steel shear ring with a minimum thickness of 0.012", 316 grade stainless steel nut and bolt tightening clamps, shear ring, and clamps to meet all requirements of ASTM A167 (latest edition).

5. Transitional sizes shall utilize a one piece gasket. Acceptable products are:
 - a. Flex Seal® MR Series Stainless steel sewer coupling manufactured by Mission Rubber Company.
 - b. Fernco Strong Back® RC Series.
 - c. SCMSD approved equal.
- C. Joints.** All joints shall conform to ASTM D3212. Before assembly, the inside of the bell, the gasket and the outside of the spigot end are to be cleaned of all dirt or foreign material.
1. Apply manufacturer's specified lubricant as instructed by the pipe manufacturer. Align spigot to bell and insert spigot until it contacts uniformly with gasket. A completed joint will be made when the reference mark on the spigot is flush with the end of the bell.
 2. If undue resistance to insertion is encountered, or if the reference mark does not reach the flush position, disassemble and check the position of the ring gasket. If it is twisted or pushed out of its seat, clean the ring, bell and spigot end and repeat assembly. If the gasket was not out of position, check the reference mark location on the spigot end.
- D. Connections.**
1. Tees and wyes for service connections shall be factory made whenever possible.
 2. When circumstances warrant, field installed service connections shall be used and shall be gasketed, watertight meeting ASTM D3212.
 3. Installation of connections is to be in accordance with the manufacturing recommendations and the applicable ASTM Designation.
- E. Polyethylene Tape Marker Installation.**
1. The Contractor shall install during backfill operation 3" wide printed polyethylene, blue "SEWER" tape above the bedding material, three (3) feet above the crown of the pipe.
- F. House Service Assemblies.**
1. Each Y-branch or T-branch for standard service sewer indicated as House Assembly Short & Long, shall include but not be limited to: furnishing and placing of a Y-branch or a T-branch in the main line sewer, complete with lateral service pipe, stopper, joint materials, lateral piping, transitions, required excavation, bedding, backfill and location marker etc. as indicated on the detail drawing.
 2. Service stack assemblies where specified or directed by the SCMSD.
 - a. Each service stack for a standard service sewer, or sewers indicated in the project specifications above shall consist of the furnishing and placing of a straight ductile iron or SCMSD approved PVC pipe riser kit and pertinent fittings and appurtenances to the 90-degree bend.
 3. The flowline elevation at the end of each service sewer shall be an adequate distance below the lowest basement elevation of the particular building to be served (unless otherwise specified or directed). The flowline elevation at the end of

each service sewer running to vacant property shall be a minimum of (8) eight feet below ground elevation.

4. In those instances where it is impossible to maintain the above minimums or where the ground elevation at the building setback line is lower than the ground elevation at the right-of-way line, the Contractor shall obtain approval of the Engineer for depth and location of the service sewer. The minimum grade for 6" service sewer shall be 1.00%.
5. The Contractor shall furnish flowline elevations at each manhole, and at the end of all sewers. This information shall be submitted to the Engineer at the completion of each sewer reach between manholes. The information shall be supplied on the "Flowline Elevation Form" (wye sheet). The Flowline Elevation Form will be supplied by the Engineer.
6. Reconnecting of existing service sewers shall consist of the furnishing and installing of the Y-branch or T-branch and all curved and straight pipe as required, the removal of such existing service sewer as is necessary, and the furnishing and placing of all materials to securely plug the discontinued service to the old sewer and make proper connection to the new sewer. All excavation required to complete the reconnection shall be included.
7. The Contractor shall furnish and place all pipe, specials, joint materials, bedding, and concrete encasement or supports for all service connections as shown on the drawings. All pipe and specials shall be new and no salvaged materials shall be used.
8. Service stacks, Y-branches or T-branches, service sewers and reconnections, shall be constructed at the location shown on the drawings or where ordered by the Engineer.
9. The location of Y-branches, or T-branches, stacks and the ends of the service connections shall, unless otherwise ordered, be marked by a vertical oak strip two (2) inches in cross-section, extending from the end of the branch to the bottom of the pavement or to within one (1) foot of the surface of the ground.
10. Where curbs are available the location of the end of each service connection shall be marked by a two (2) inch cross cut into the top of the curb on the side of the street to be served by the connection.
11. All House Service Assembly and Stack Assembly shall be in accordance with all Detail Contract Drawings.
12. In all cases, the open ends of pipe shall be securely closed with carefully fitted stoppers and sealed to prevent the entrance of water, earth or other substance into the sewer.

G. Tracer Wire Installation (Non-Ferrous pipe installation).

1. All tracer wire installations shall comply with SCSE Item 60.

H. Polyethylene Encasement Installation (for lined ductile iron where allowed/specified).

1. Contractor shall remove all lumps of clay, mud, cinders, etc. on the pipe surface before installation of the polyethylene encasement.

2. During installation, soil or embedment material shall not be trapped between the pipe and the polyethylene.
3. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings and to prevent damage to the polyethylene caused by backfilling operations.
 - a. Overlaps shall be secured with adhesive tape.
4. The initial length of pipe will require the polyethylene tube to be securely attached to the spigot end of the pipe barrel using an appropriate tape.
 - a. The tape should be applied directly, attaching the polyethylene to the barrel of the pipe.
 - b. Several circumferential wraps of tape should be provided to secure the encasement along the length of pipe.
 - c. This will help control any tendency for drilling fluids or cuttings to get under the polyethylene tube.
 - d. When applying polyethylene encasement to the assembled joint, the polyethylene overlap should be placed so that the forward pipe's polyethylene tube overlaps the polyethylene installed on the next adjacent pipe.
 - e. This is to ensure that drilling fluid and cuttings are not forced under the polyethylene tube during the pull-back.
5. Installation on ductile iron pipes shall be in accordance with methods A or B as specified in AWWA-C105 and below:
 - a. Method A:
 - i. Cut polyethylene tube to a length approximately 2 feet longer than the pipe section.
 - ii. Slip the tube around the pipe, centering it to provide 1-foot overlay on each adjacent pipe section and bunching it accordion-fashion lengthwise until it clears the pipe ends.
 - iii. Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe.
 - iv. A shallow bell hole must be made at the joints to facilitate installation of the polyethylene tube.
 - v. After assembling the pipe joint, make the overlap of the polyethylene tube.
 - vi. Pull the bunched polyethylene from the preceding length of pipe, slip it over the length of the new length of pipe, and secure it in place.
 - vii. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe.
 - viii. Secure the overlap in place.
 - ix. Take up the slack along the barrel of the pipe, securing the fold at quarter points.
 - x. Proceed to the next section of pipe in the same manner.
 - b. Method B:
 - i. Cut polyethylene tube to a length approximately 1 foot shorter than that of the pipe section.

- ii. Slip the tube around the pipe, centering it to provide 6-inch of bare pipe at each end.
 - iii. Take up the slack width at the top to the pipe for a snug but not tight fit along the barrel of the pipe securing the fold at quarter points.
 - iv. Secure the ends with polyethylene tape.
 - v. Before making up a joint, slip a 3-foot length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise.
 - vi. Alternatively, place a 3-foot length of polyethylene sheet in the trench under the joint to be made.
 - vii. After completing the joint, pull the 3-foot length of polyethylene over or around the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1-foot.
 - viii. Make each end snug and secure with polyethylene tape.
 - ix. A shallow bell hole is necessary and shall be made at joints to facilitate the installation of the polyethylene tube or sheet.
- 6. Care shall be taken when installing backfill to prevent damage to the wrapping.
 - 7. Repair cuts, tears, punctures, or damage to polyethylene with adhesive tape or with a short length of polyethylene sheet, or with a tube cut open, wrapped around the pipe to cover the damaged area, and secured in place.
 - 8. Where polyethylene wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 3 foot.
 - a. Secure the end with circumferential turns of adhesive tape.

5.0 ELECTRICAL. This section is not applicable.

6.0 QUALITY ASSURANCE. The work covered under this section of the Specification is intended to be the work, materials, labor, and equipment required to install the sewer main as described above. All material used on this project shall be new and unused unless otherwise specified and all workmanship shall be of the best quality. Only qualified and skilled workmen/women shall be employed for all phases of this project. All workmen/women shall be trained in trench safety.

A. Testing.

- 1. Upon completion of force main installation, the tracer wire system shall be tested for system integrity.
 - a. Continuity testing in lieu of actual line testing shall not be allowed.
 - b. Contractor shall be responsible to repair or replace any system failures discovered at this time at no additional cost to the County.
- 2. Hydrostatic testing, deflection testing and Post CCTV shall be in accordance with this specification or as referenced within SCSE Specification Items 14, 17, 18 or Item 49 respectively.

3. Continuity testing required for the tracer wire system shall be done in accordance with SCSE Item 60 specifications.

B. Observation.

1. SCMSD designated representative will visually observe the work performed. The representative will notify the Engineer of any discrepancies with the contract documents in the course of the contractor performing the work. The progress observations by the SCMSD do not waive any rights or remedies, nor divest the Contractor of any responsibility for contract compliance or liability for damage.

C. Warranty.

1. Refer to project General Conditions and individual Specification Items for warranty requirements.

7.0 MEASUREMENT. This section is not applicable.

8.0 PAYMENT. The cost for all labor, equipment, tools and any other necessary or incidental work herein shall be included in other applicable material items.

END OF SECTION