

**SECTION 33 31 00.13****ABANDONMENT OF SEWER MAINS****PART 1: GENERAL****1.01 SECTION INCLUDES**

- A. Abandonment in place, by cutting and capping, of existing sewers, junction structures, manholes, service lines, and force mains.
- B. Abandonment in place of existing sewers and force mains using flowable fill. Flowable fill will be utilized when abandoning existing sewers and force mains underneath roadways and paved areas and at the direction of the AW Project Manager as field conditions dictate, or as specified on the Drawings.

**1.02 SUBMITTALS**

- A. Conform to requirements of Section 01 33 00 - Submittals.
- B. Submit product data for proposed plugs for approval.
- C. Technical information for equipment and operational procedures including projected slurry injection rate, grout pressure, method of controlling grout pressure, bulkhead and vent design, and number of stages of grout application.
- D. At least 15 days prior to commencing abandonment activities, submit plan for abandonment, describing proposed grouting sequence, bypass pumping requirements and plugging, if any, and other information pertinent to completion of work.

**PART 2: PRODUCTS****2.01 PLUGS**

- A. Grout Plugs: Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.
- B. Manufactured Plug: Commercially available plug or cap specifically designed and manufactured to be used with pipe being abandoned.

**2.02 FLOWABLE FILL REQUIREMENTS**

- A. Unconfined compressive strength: minimum 75 psi and maximum 150 psi at 56 days as determined based on an average of three tests for same placement. Present at least three acceptable strength tests for proposed mix design in mix design report.
- B. Placement characteristics: self-leveling.
- C. Shrinkage characteristics: non-shrink.

- D. Water bleeding for fill to be placed by grouting method in sewers: not to exceed 2 percent according to ASTM C940.
- E. Minimum wet density: 90 pounds per cubic foot.

### 2.03 BALLAST

- A. Ballast Material: Natural rock or concrete pieces with minimum size equal to at least 10 times maximum aggregate size of flowable fill and maximum size of 24 inches. Maximum dimension shall not be more than 20 percent of minimum dimension of space to be filled.
- B. Ballast Composition: Free of regulated waste material.

## **PART 3: EXECUTION**

### 3.01 DEMOLITION OF SEWER MANHOLES, PIPELINE STRUCTURES, AND FORCE MAINS PRIOR TO ABANDONMENT

- A. Remove manhole frames and covers and castings from other existing pipeline structures. Deliver castings to nearest AW maintenance facility for future use. Alternatively, salvaged castings may be used upon approval by the AW Project Manager, for constructing new manholes on this project.
- B. Demolish and remove precast concrete adjustment rings and corbel section, or brick and mortar corbel and chimney, or other pipeline structures, to minimum depth of 4 feet below finished grade. Structure may be removed to greater depth, but not deeper than 18 inches above crown of abandoned sewer.
- C. Drain manholes and poke holes in manhole floors and walls prior to filling.
- D. When adjacent sewer lines are not to be filled, place temporary plugs in each line connecting to manhole, in preparation for filling manhole.
- E. Excavate overburden from force mains to be abandoned at locations indicated on Drawings, conforming to the specification section for Excavation and Backfill for Utilities. Cut existing force main, when necessary, to provide an end surface perpendicular to axis of pipe and suitable for plug to be installed. Remove force main piping material remaining outside of segment to be abandoned.

### 3.02 CUTTING AND CAPPING OF MAINS

- A. Do not begin cut, plug, and abandonment operations until replacement sewer or force main, has been constructed and tested, all service connections have been installed, and main has been approved for use.
- B. Install plug, clamp, and concrete reaction block and make cut at location shown on Drawings and/or as directed by AW project Manager.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on Drawings.

- D. After main to be abandoned has been cut and capped, check for other sources feeding abandoned sewer main. When sources are found, notify AW Project Manager immediately. Cut and cap abandoned main at point of other feed as directed by AW Project Manager.
- E. Plug or cap ends or opening in abandoned main in manner approved by AW Project Manager. Install concrete around cap and over pipe to ensure it is not penetratable by groundwater.
- F. Remove and dispose of surface identifications such as cleanouts. Clean-outs in improved streets, shall be filled with concrete.
- G. Backfill excavations in accordance with Section 31 23 33 – Excavation and Backfill for Utilities.
- H. Repair street surfaces in accordance with local base and DPW regulations.
- I. Mark location of abandoned sewer laterals on Drawings and provide to AW.

### 3.03 CUTTING AND CAPPING OF SERVICES

- A. Do not begin cut, plug, and abandonment operations until replacement service, if necessary, has been constructed and tested, and all service connections have been installed.
- B. Service lines shall be cut and capped at the sewer main and/or as directed by AW project Manager.
- C. Before backfilling of a capped service line is started, the capping must be observed by a representative of AW.
- D. After service to be abandoned has been cut and capped, check for any other sources feeding abandoned sewer service. When sources are found, notify AW Project Manager immediately. Cut and cap abandoned main at point of other feed as directed by AW Project Manager.
- E. Plug or cap ends or opening in abandoned service in manner approved by AW Project Manager. Install concrete around cap and over pipe to ensure it is not penetratable by groundwater.
- F. Remove and dispose of surface identifications such as cleanouts. Cleanouts in improved streets, shall be filled with concrete.
- G. Backfill excavations in accordance with Section 31 23 33 – Excavation and Backfill for Utilities.
- H. Repair paved surfaces in accordance with local base and DPW regulations.
- I. Mark location of abandoned sewer laterals on Drawings and provide to AW.

### 3.04 ABANDONMENT OF FORCE MAINS

- A. Do not begin cut, plug, and abandonment operations until replacement force main has been constructed and tested, and all service connections have been installed.

- B. Install plug, clamp, and concrete reaction block and make cut at location shown on Drawings.
- C. Main to be abandoned shall not be valved off and shall not be cut or plugged other than as shown on Drawings.
- D. After force main to be abandoned has been cut and plugged, check for other sources feeding abandoned force main. When sources are found, notify AW Project Manager immediately. Cut and plug abandoned force main at point of other feed as directed by AW Project Manager.
- E. Plug or cap ends or openings in abandoned force main in manner approved by AW Project Manager.
- F. Remove surface identifications and appurtenances such as valve boxes.
- G. Backfill excavations in accordance with Section 31 23 33 - Excavation and Backfill for Utilities.
- H. Repair street surfaces in accordance with local base and DPW regulations.

### 3.05 PREPARATION FOR ABANDONMENT VIA FLOWABLE FILL

- A. Have fill mix design reports and other submittals required by Paragraph 2.02 accepted by the AW Project Manager prior to start of placement. Notify the AW Project Manager at least 24 hours in advance of grouting with flowable fill.
- B. Select fill placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portion of work, new or existing.
- C. Clean sewer lines and video with closed circuit television to identify connections, locate obstructions, and assess condition of pipe. Locate previously unidentified connections, which have not been redirected and reconnected as part of this project, and report them to the AW Project Manager. During placement of fill, compensate for irregularities in sewer pipe, such as obstructions, open joints, or broken pipe to ensure no voids remain unfilled.
- D. Perform demolition work prior to starting fill placement. Clean placement areas of sewers and manholes of debris that may hinder fill placement. Remove excessive amounts of sludge and other substances that may degrade performance of fill. Do not leave sludge or other debris in place if filling more than 2 percent of placement volume.
- E. Remove free water prior to starting fill placement.

### 3.06 EQUIPMENT FOR FLOWABLE FILL

- A. Mix flowable fill in automated batch plant and deliver it to site in ready-mix trucks. Performance additives may be added at placement site if required by mix design.
- B. Use concrete or grout pumps capable of continuous delivery at planned placement rate.

### 3.07 INSTALLATION OF FLOWABLE FILL

- A. Abandon existing sewer lines and force mains underneath roadways and paved areas by completely filling sewer line with flowable fill. Abandon manholes and other structures by filling with flowable fill, together with ballast as applicable, within depth of structures left in place.
- B. Place flowable fill to fill volume between manholes. Continuously place flowable fill from manhole to manhole with no intermediate pour points, but not exceeding 500 feet in length.
- C. Have filling operation performed by experienced crews with equipment to monitor density of flowable fill and to control pressure.
- D. Temporarily plug sewer lines which are to remain in operation during pouring/pumping to keep lines free of flowable fill.
- E. Pump flowable fill through bulkheads constructed for placement of two 2-inch PVC pipes or use other suitable construction methods to contain flowable fill in lines to be abandoned. These pipes will act as injection points or vents for placement of flowable fill.
- F. Place flowable fill under pressure flow conditions into properly vented open system until flowable fill emerges from vent pipes. Pump flowable fill with sufficient pressure to overcome friction and to fill sewer from downstream end, to discharge at upstream end.
- G. Inject flowable fill through replaced ballast using grouting equipment and series of grout pipes discharging at bottom of placement, allowing fill to rise through ballast effectively filling all voids. Alternatively, sequentially place individual pieces of ballast at same time as flowable fill is placed. Do not fill with ballast more than 50 percent of volume at any level, to prevent nesting and void formation.
- H. Remediate placement of flowable fill which does not fill voids in sewer, in force main, and in manhole or other structures, or where voids develop due to excessive shrinkage or bleeding of fill, by using pressure grouting either from inside sewer or from surface.
- I. Plug each end of force main being abandoned, if not filled with flowable fill.
- J. Clean inside surface of force main at least 12 inches from ends to achieve firm bond and seal grout plug or manufactured plug to pipe surface. Similarly, clean and prepare exterior pipe surface if manufactured cap is to be used.
- K. When using grout plug, place temporary plug or bulkhead approximately 12 inches inside pipe. Fill pipe end completely with dry-pack grout mixture.

- L. When using manufactured plug or cap, install fitting as recommended by manufacture's instructions, to form water tight seal.
- M. Backfill to surface, above pipe or structures left in place, with flowable fill in restricted areas, compacted bank run sand in unrestricted areas to be paved or select fill in unrestricted areas outside of pavement. Place and compact backfill, other than flowable fill, in compliance with Section 31 23 33 - Excavation and Backfill for Utilities.
- N. Collect and dispose of excess flowable fill material and other debris in accordance with local requirements or as directed by the AW Project Manager.

### 3.08 PROTECTION OF PERSONS AND PROPERTY

- A. Provide safe working conditions as required by OSHA and applicable State and local laws for employees throughout demolition and removal operations. Observe safety requirements for work below grade.
- B. Maintain safe access to adjacent property and buildings. Do not obstruct roadways, sidewalks or passageways adjacent to Work.

**END OF SECTION 33 31 00.13**