

## SECTION 5: INSTALLATION

### 5.01 Sanitary Sewer System Construction Standards:

- A. These construction criteria shall govern the installation of sanitary sewer projects located within the South Placer Municipal Utility District.

### 5.02 Start of Construction:

- A. No construction shall begin until the following items have been complied with:
  - 1. Two sets of approved plans and specifications (if applicable) signed by the District.
  - 2. All fees shall have been paid and necessary permits, rights-of-way, and easements obtained.
  - 3. A pre-construction meeting between the concerned parties and the District shall have taken place.
    - a) The Contractor shall submit his planned regular work schedule and any changes thereof.
  - 4. The Contractor shall notify the District 48 hours prior to start of the project.
    - a) Should the work be delayed for any reason, the District shall be notified again prior to starting work.
  - 5. The regional notification center (USA) and other owners of non-member facilities shall be notified no less than 48 hours prior to excavation.
  - 6. The contractor shall be responsible for locating existing utilities. The scope of this work shall include potholing, backfill and surface restoration per the agency having jurisdiction. Where connecting to or crossing over existing District facilities, the Contractor shall uncover these facilities and verify the locations and elevations prior to performing any installation work.
  - 7. The Contractor shall be properly licensed to perform this type of work and shall have at the project site the most current set of approved plans, with District signature, and all labor, materials, tools, equipment and incidentals to complete all work in accordance with the approved plans and these specifications.

### 5.03 Safety:

- A. All construction shall be in strict compliance with the latest edition of the California Code of Regulations, Title 8, Division 1, Chapter 4, subchapter 4, Construction Safety Orders including, but not limited to the following items:
  - 1. Approved hard hats and other required personal safety devices shall be worn in construction areas at all times.

2. All shoring utilized in any trench shall be no less effective than that required by the above referenced Construction Safety Orders.
  - a) As required, the Contractor shall obtain the appropriate permit from the Division of Industrial Safety.
3. Ladders shall be used in all trenches and manholes as required in said Construction Safety Orders.
4. Temporary manhole covers, 3/8-inch minimum steel plate with a diameter equal to, or larger than the outside diameter of the structure it is covering, shall be placed on the cone until the pavement is completed.
  - a) Suitable locating ribs shall be welded to the underside of the cover to hold it in place during the grading and paving operations.
5. All excavations shall be adequately guarded with barricades, lights and other means as required by the governing agency and the District.
6. Spoil piles from any excavation shall be a minimum of 2-feet from the edge of trench or greater as required by the referenced Construction Safety Orders.
7. Air test equipment including gauges shall be located outside the manhole.
  - a) No personnel shall be in manholes during air pressure testing of the lines or while air pressure is in the lines.
8. The Contractor shall maintain approved traffic control at all times as required by the governing agency.
  - a) Traffic control shall, at a minimum, meet the requirements of Construction Safety Orders and Cal Trans "Manual of Traffic Control", latest edition.
9. No blasting shall be done unless a competent blaster (having a current, valid California "Blaster License") is physically present on the site to accomplish the blasting operation and/or direct and supervise others in such operation.
  - a) All blasting, handling, storage and transporting of explosives shall be in strict conformance to the California Code of Regulations, Division of Industrial Relations, Construction Safety Orders and local governing agency.
10. Confined Space entry shall be in strict compliance with California Code of Regulations, Title 8, chapter 4, subchapter 7, General Industry Safety Orders. SPMUD considers all active manholes to be "Permit Required" confined spaces.

#### **5.04 Inspection:**

- A. All work done and all materials and equipment furnished and installed shall be subject to the inspection and approval of the District.

- B. Any work done without proper inspection is subject to rejection.
  - 1. No work shall be covered until inspected and approved by the District.
  - 2. Inspection of the work shall not relieve the Contractor of the obligation to fulfill all conditions of the contract as prescribed.
- C. Inspections will not be done by the District on Sundays or holidays or other times as may be specified by the District.
  - 1. For inspections performed after regular District business hours, on Saturdays or as 'night work,' the District's overtime policy shall be in effect. A formal request in writing shall be submitted 24 hours prior to work outside of regular District business hours and is subject to approval by the District Engineer.
- D. Any work, materials or equipment not meeting the requirements and intent of the plans and specifications may be rejected, and unsuitable work or materials shall be made good, notwithstanding the fact that such work or materials may have previously been inspected.
- E. Inspection of facilities will not be performed where, in the opinion of the District, an unsafe condition exists.

#### **5.05 Sewer System Plugs:**

- A. Temporary plugs of the mechanical type or as approved by the District, shall be installed with proper size tie line and/or braced on all sewer projects at points of connection to existing facilities and shall be installed and removed in the presence of and under the direct supervision of the District.
  - 1. District may require that plugs be mortared in place if contractor fails to comply or if deemed necessary.

#### **5.06 Construction Stakes:**

- A. The Contractor shall be responsible for all stakes set and shall verify all stakes to his satisfaction prior to installing pipe.
  - 1. Construction stakes for sewer pipe grade and location shall be verified after any blasting.

#### **5.07 Existing Utilities:**

- A. All utility, service, or other conflicting lines that are not in direct physical conflict with the sewer facility under construction, shall be worked around by the Contractor.
- B. Existing sewer/new utility crossings with less than 6-inches of clearance shall be constructed as per Standard Drawing No. 17, or as otherwise required by the District.

1. Sewer/water crossings shall conform to the State Health Department and local water purveyor requirements.
- C. Utility or other lines which are in direct physical conflict with the facility or appurtenance being constructed which cannot be avoided and which relocation is not provided for in the plans and specifications, are to be relocated by the owner of the utility prior to or during construction of the project.
  1. If these relocations have not been accomplished at the time the contract is awarded, the Contractor shall schedule his work and cooperate with the owner of the utility for the relocation of the conflicting utility.

#### **5.08 Trench Excavation:**

- A. Trench excavation shall include the removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water, necessary to construct the work as shown.
- B. Unless otherwise indicated on the drawings or permitted by the District, excavation shall be by open cut.
- C. In areas requiring rock excavation, blasting or other conditions as determined by the District, the area within a 5-foot radius of the end of the pipe, or other sewer facility, shall be excavated and backfilled with native material less than 3-inches in diameter.
- D. Trenches shall be excavated to provide for the bedding hereafter specified.
- E. Collector sewers and building sewer lower laterals shall not be placed in any joint trench with other utilities.

##### **1. Trench Width**

- a) Minimum trench width shall be the outside diameter of the pipe plus 6-inches on either side of the pipe.
- b) Maximum trench width at the top of the pipe shall be as shown on the plans for the designated type bedding.
- c) If no maximum is shown, the contractor shall conduct his operations to limit top trench width to pipe outside diameter plus 16-inches for pipe 33-inches or smaller, and pipe outside diameter plus 24-inches for pipe 36-inches and larger, except with the specific approval of the District.
- d) If trench widths at the top of the pipe as shown on the plans, or specified above, are exceeded by any amount, for any reason, the contractor shall provide, at his own expense, stronger pipe or improved bedding and backfill conditions, as approved by the District, to meet the load requirement of the changed condition.

- e) Where the plans call for the installation of sewer pipe on a curved alignment, the trench shall be excavated wider than normal as may be necessary to allow for straight-line assembly before deflecting the pipe.
  - 1) Inserting the plain end of a length of pipe into a socket and/or a fitting under deflected conditions is not permitted.

## 2. Bracing and Shoring

- a) To ensure the safety of everyone at the work site and to protect and facilitate the work, sufficient bracing and shoring shall be installed in all excavations as required.
  - 1) The bracing and shoring shall comply with the rules, orders, and regulations of the California Code of Regulations, Division of Industrial Safety.
  - b) Failure to comply with any of the rules, orders, or regulations mentioned herein shall be sufficient cause for the District to immediately suspend the work.
  - c) The contractor shall be responsible for the adequacy of all shoring and bracing and compliance with the law.
    - 1) No compensation for losses incurred by the contractor for any such suspension will be provided by the District.

## 3. Maximum Length of Open Trench

- a) At the end of each working day, there shall be no more than 300-feet of open trench in unimproved areas or 100-feet in paved areas or less as may otherwise be required by the governing agency, excluding manhole excavations, for each operation, unless otherwise authorized by the District.
  - 1) The remainder of the trench shall be backfilled and compacted and, when in streets, opened to traffic as soon as possible.

## 4. Control of Water

- a) When any water from any source is encountered, the Contractor shall furnish, install, maintain and operate all necessary machinery, appliances, and equipment to keep excavation free from water until the placing of the bedding material, laying and jointing of the pipe, pouring of concrete, and placing of the shading material has been completed, inspected and approved and all danger of flotation and other damage is eliminated.
- b) Water pumped from the trench shall be disposed of in accordance with local governing agency.
- c) Water entering any pipe as a result of ground conditions, the Contractor's use in flushing operations, storm water, broken water pipes, or from any other condition or source is prohibited.

- d) Trench plugs (cutoff collars, cutoff walls) shall be two-sack sand-cement slurry and shall be 4-feet long, shall key 18-inches into the trench walls and bottom, and shall extend 18-inches above the pipe crown. Trench plugs shall be installed at crossings of streams, ditches, canals, or other sources of groundwater, or as requested by the District, and shall include drains.

5. Special Foundation Treatment

- a) Whenever the bottom of the trench is soft or rocky or in the opinion of the District, otherwise unsuitable as a foundation for the pipe, the unsuitable material shall be removed and replaced with crushed rock or other material as directed by the District, so as to provide a stable and satisfactory base.
- b) Bedding shall be as described in Standard Drawing No. 4 of these specifications or as prescribed by a certified Geotechnical Engineer and approved by the District.
- c) Where solid rock is encountered and blasting is required near the pipe bottom, the rock shall be removed to a minimum depth of 12-inches below the bottom of the pipe, and the trench backfilled with materials as specified above.

**5.09 Explosives and Blasting:**

- A. No blasting operation shall be conducted unless a blaster having a current, valid California “Blaster’s License” is physically present on site to accomplish the blasting operation and/or direct and supervise others in such operation.
- B. Blaster’s performing work for South Placer Municipal Utility District shall furnish satisfactory evidence of competency in the use and handling of explosive materials and have the necessary qualifications to safely perform the type of blasting required for the specific worksite.
- C. It is the Contractor’s responsibility to obtain all permits to possess, store, use and transport blasting materials as may be required by any State, County or local regulatory agency.

**5.10 Pipe Laying:**

- A. The pipe shall be laid in strict conformity to the prescribed line and grade.
  - 1. Three consecutive points on the same rate of slope shall be used at all times to detect any variation from a straight grade.
  - 2. In case any discrepancy exists, the work shall be stopped, and the discrepancy immediately reported to the District.
  - 3. In addition, when requested by the District, a string line shall be used in the bottom of the trench to insure a straight alignment of the pipe between manholes.

- B. Pipe laying shall proceed upgrade without sags or offset joints with the bell ends of the pipe placed upstream.
  - 1. Each section of pipe shall be laid true to line and grade and in such a manner as to form a watertight, concentric joint with the adjoining pipe.
  - 2. The interior of the sewer shall be cleared of all dirt, debris and excess joint sealing material as the work progresses.
  - 3. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.
  - 4. All open ends of pipe and fittings shall be adequately and securely closed whenever the work is discontinued for more than one-half hour.
- C. All pipe jointing, including the deflection of joints in curved alignment, shall be in accordance with these specifications and as recommended by the pipe manufacturer.
  - 1. Care shall be used to prevent damage to the pipe during installation.
  - 2. Both joint surfaces shall be clean before the joints are made.

#### **5.11 Relative Compaction:**

- A. Whenever relative compaction is specified in these specifications, the relative compaction will be determined by California Test Method No. 216 or 231 or the latest State test method.

#### **5.12 Bedding and Initial Backfill:**

- A. All loose material shall be removed from the new trench bottom before placing the bedding material.
  - 1. The pipe shall be placed on a firm, prepared bed of imported material unless otherwise approved by the District.
  - 2. Bedding shall be adequately consolidated and shall extend below the pipe barrel at least 4-inches or 1/8 of the outside diameter of the pipe, whichever is greater.
- B. The Contractor shall not place backfill over the top of the pipe without inspection and approval by the District.
- C. No compaction of trenches by "whacking" shall be done below the plane 12-inches above the top of the pipe bell.
- D. Pipe shall not bear on bells or joints.
  - 1. The trench shall be excavated at the pipe joints as necessary to provide at least 1-1/2-inches of bedding material below the bell.

2. Pinning, wedging, blocking or alternative methods to support the pipe shall not be permitted.
- E. Initial backfill shall be the material placed between the top of the bedding and a point 12-inches above the top of the pipe.
- F. Pipe bedding and initial backfill shall be Type II, as shown on Standard Drawing No. 4, and used as indicated on the plans or as directed by the District.
1. If trench conditions vary from that shown on the plans, see Section 5.08, "Trench Excavation."
  2. The types of bedding and initial backfill are described as follows:
    - a) Type I
      - 1) When approved, bedding material shall be imported crushed rock, of which 100 percent shall pass the 3/4-inch sieve.
      - 2) Initial backfill may be selected from job excavated material so as to be finely divided and free from debris, organic matter, and pieces larger than one inch.
        - (a) The material shall be placed immediately after pipe joints have been completed, inspected, and passed by the District.
        - (b) The material shall be carefully placed so as not to disturb or damage the pipe and shall be brought up evenly on both sides so that the material fills and supports the haunch area.
        - (c) No special compaction need be provided.
      - 3) Job excavated material used as initial backfill may be required to be screened prior to placement.
    - b) Type II
      - 1) Bedding material shall be imported crushed rock of which 100 percent shall pass the 3/4-inch sieve and not more than 10 percent shall pass the No. 8 sieve.
      - 2) Initial backfill shall consist of material as specified for Type II bedding placed to at least the spring line of the pipe, taking care to completely fill all spaces under the haunches.
        - (a) Compaction shall be obtained by shovel slicing, using care not to disturb the pipe.
        - (b) The remainder of the initial backfill shall be carefully placed evenly on both sides of the pipe, so as not to disturb or damage the pipe and



compacted by shovel slicing or light tamping to a density of at least 90 percent.

c) Type III, Type IV

- 1) Type III and Type IV, as shown on Standard Drawing No. 4, are not permitted without the specific approval of the District.

**5.13 Intermediate Backfill (outside of City/County rights-of-way):**

- A. In areas outside of city and county streets or other improved rights-of-way, trench backfill above the initial backfill and to a point 2-feet below the top of the trench may be of job excavated material, free from debris or organic material, placed in any careful manner determined by the Contractor.
- B. No rock over 3-inches in size shall be in the backfill material for a distance of one foot above the top of the initial backfill.
- C. For the remainder of the backfill the maximum rock size shall not be greater than 6-inches.
- D. Until the total backfill above the top of the pipe exceeds 3-feet, machine-placed backfill material shall not be allowed to "free-fall" more than 2-feet.
- E. The District may designate the use of "Imported Select Backfill" (Section 5.17) in lieu of job excavated material.

**5.14 Intermediate Backfill (in City/County Street rights-of-way):**

- A. Intermediate backfill in city or county street rights-of-way shall conform to the standards of the governing agency.

**5.15 Top Backfill (outside of City/County rights-of-way):**

- A. In areas outside of city and county street rights-of-way, the top 2-feet of backfill shall be placed and compacted to a density of not less than 90 percent.
- B. If the excavation is through an open area or area used for horticulture, the final 12-inches of backfill shall be essentially the original topsoil which shall have been removed and stockpiled separately.
  1. The top backfill shall be thoroughly compacted by wheel rolling, then refilled with topsoil as necessary to bring the trench up to the level of the surrounding ground.

**5.16 Top Backfill (in of City/County rights-of-way):**

- A. Top backfill in city or county street rights-of-way shall conform to the standards of the governing agency.

### **5.17 Imported Select Backfill:**

- A. Imported select backfill shall be crushed rock, with 100 percent passing the 3/4-inch sieve and not more than 10 percent passing the No. 8 sieve, or sand having a minimum sand equivalent of 50, as determined by California Test Method No. 217.

### **5.18 Other Backfill Requirements:**

- A. In no circumstances shall jetting be allowed in any backfilling operation.
- B. Where cribbing is used in the trench, the fill shall be carried to a height sufficient to prevent the surrounding ground from cracking or caving into the trench before the cribbing is removed.
- C. Backfill around manholes and the pit excavated for boring operations shall be made in the same manner as above specified for trenches
  - 1. However, whenever the excavated space between the outer wall of a manhole and the undisturbed earth is 12-inches or less, the backfill shall be sand, well compacted.
- D. Surfaces disturbed during construction of sewer facilities shall be restored equal to or better than pre-construction condition.
- E. If, at any time during a period of 5 years dating from the date of final acceptance of the project, there is any settlement of the trenches requiring repairs to be made, the District may notify the contractor to immediately make such repairs at the Contractor's expense.

### **5.19 Surplus Material Disposal:**

- A. Surplus materials, resulting from excavations or trenching operations that are not required for backfill or embankment construction or to satisfy right-of-way agreements as set forth on the plans and in the Special Provisions, shall become the property of the Contractor, and he shall dispose of the surplus materials off the rights-of-way or easements unless permitted by the District to be disposed of otherwise.
- B. When any materials are to be disposed of outside the rights-of-way or easements, the contractor shall obtain written permission from the owner upon whose property the disposal is to be made before any materials are deposited thereon.
  - 1. The agreement shall contain provisions to relieve the District of any obligation to the property owner for any injury or damage to persons or property.
  - 2. The agreement shall also include a sketch showing the location where the material will be deposited.
  - 3. A copy of the agreement, signed by the owner or his representative, shall be furnished to the District prior to placing the materials.

- C. Excess materials shall not be deposited in any location that will block or restrict a natural or artificial drain.

#### **5.20 Existing Street Construction:**

- A. Upon completion of the backfilling operation, the street shall be restored in accordance with the governing agency's requirements.

#### **5.21 Boring and Jacking:**

- A. Boring and Jacking shall conform to the following:

##### **1. General**

- a) Unless otherwise specified on the plans, the design, engineering methods and equipment used in boring and jacking casing or conduit shall be optional with the Contractor, provided that the proposed method is approved by the appropriate entities either by supplemental drawings or permit.
- b) The equipment, method and sequence of operation and conductor pipe grades shall be approved by the District before proceeding with the work.
- c) Excavation for the boring operation shall be the minimum necessary to satisfactorily complete the work.
  - 1) Bracing and shoring shall be adequate to protect workers and any adjacent structure or roadbed.
  - 2) Special backfill requirements may be specified for pipe installed in the area excavated for the boring operations.

##### **2. Boring under Curb, Gutter and Sidewalk**

- a) Portions of sanitary sewer and building sewers that pass beneath curbs and gutters, sidewalks and other obstructions may be placed by boring if approved by the District.
  - 1) If under the curb, gutter and sidewalk, the bore shall begin at the lip of the gutter and continue to slightly past the property line.
  - 2) The end of the pipe shall then be capped or plugged, and the pipe pushed into the hole.
- b) If the building sewer is vitrified clay pipe, it shall be plain end pipe connected with compression type couplings as described in Section 2 of these specifications.
  - 1) The bore shall be just large enough to pass the couplings and need not be backfilled.

- 2) The maximum length of bore shall be 15-feet unless otherwise specified.
- c) Boring shall not be used on building sewers when the required slope is such that probable deviation of the bore from the intended line would result in a final slope of less than 1/4 inch per foot.

## 5.22 Manholes:

- A. All manholes shall be of concrete construction and shall conform to Standard Drawings No. 5 and No. 6 as to size, shape and details, unless otherwise specified. Elevations shall be as shown on the plans.
- B. Manhole bases may be either precast or cast-in-place (unless specifically directed by the District).
  1. If precast, bases shall conform to ASTM Designation: C478 and be placed on a minimum of 8-inches of 3/4-inch crushed rock.
  2. Elevation differentials of inlets and outlets shall conform to Section 3 of these specifications and to the plans.
  3. To prevent pipe shearing, short stubs (12" to 24" in length) shall be used at all pipe-to-manhole connection points with flexible joint (bell and spigot or approved coupling) at the manhole walls and at the pipe stub ends.
  4. Compression couplings used at shear joints shall be as described in Section 2 of these specifications and be installed per manufacturers recommendations.
  5. Water stops shall be used for all cast in place manholes and all field modified manholes.
- C. Manhole bases constructed on existing sewer lines shall be formed around the perimeter by the use of an impression ring to receive the manhole barrel.
  1. The pipe inside the manhole shall not be cut out until directed by the District.
  2. All work shall be done in the presence of the District.
  3. Cast in place manhole bases shall not be constructed on rainy days unless approved by the District.
- D. Pipe stubs for future sewer extensions shall be installed into the structures as shown on Standard Drawing No. 5.
  1. The outer ends of the stubs shall be sealed securely by an approved cap.
  2. Stubs greater than 5' in length shall have flushing branch installed per Standard Drawing No. 9.

- E. Unless otherwise indicated, flow channels shall be constructed in the manhole base by fillets as shown on Standard Drawing No. 5.
  - 1. Special care shall be taken to form smooth transitions between inlets and outlets, with good hydraulic properties.
  - 2. Any sharp corners or departure from the dimensions indicated shall be cause for rejection.
  - 3. Pipe may be laid continuously through straight run manholes and the top half of the pipe subsequently cut out inside the manhole.
  
- F. Any channel not intended to be used shall be filled with concrete. No deflections, fittings or reducers shall be used outside of manholes except as specified for drop connections.
  
- G. When constructing manholes, sealing compound (per Section 2 of these specifications) shall be placed between all joints per manufacturer's recommendations.
  - 1. In addition, mortar shall be squeezed into all joints in the barrel, cone, and grade rings and the joint areas troweled smooth on the inside of the manhole.
  - 2. Outside joints shall be primed and wrapped with an external concrete joint wrap as described in Section 2 of these specifications.
  
- H. Manhole frames and covers shall be set flush with the finish grade unless otherwise shown on the plans.
  - 1. Manholes in unimproved or backyard easement areas shall have bolt down covers, with a minimum of four (4) stainless steel socket head cap screws per cover and shall be set 6-inches above existing ground level, with a concrete collar.
  - 2. Manhole frames and covers in unimproved areas subject to flooding shall be fitted with 1/4" O-ring secured with adhesive and shall be set 12-inches above any designated 100-year flood plain.
  - 3. The area adjacent to the manhole shall be graded to drain away from the manhole.
  - 4. The District may require a concrete pad, per Standard Drawing 19, in areas where the terrain is such that it inhibits entry into the manhole.
  - 5. The adjustment of new and/or existing manhole frames and covers to finish grade in any roadway, or in other locations as required by the District, shall conform to the following:
    - a) The maximum amount of grade rings shall not exceed 11-inches per Standard Drawing No. 5.

- 1) If the amount of grade rings will exceed 11-inches, the cone shall be excavated and removed, and an additional manhole barrel section shall be installed with the cone then reinstalled, and the manhole vacuum tested in accordance with Section 5.34 of these specifications.
  - (a) If the cone is damaged during excavation and removal, a new cone shall be installed.
- I. Unless otherwise directed by the District, manhole rims shall be set to grade in all access road areas and the covers shall be bolt down type.
- J. Raised manholes outside of public right-of-way shall require a composite frame and cover.
- K. Prior to backfill of any manhole, the manhole must be vacuum tested, and all leaks shall be repaired by the Contractor.

### **5.23 Connections to Structures:**

- A. Pipe connections to existing manholes and other structures shall be made by smooth bore cutting.
  1. Connections shall be made using flexible watertight pipe-to-manhole connectors or other connection methods approved by the District.
- B. Channelizing of the flow through the manhole shall conform to the details shown on the Standard Drawing No. 5 for new manholes.
- C. The Contractor shall notify the District 48 hours before a connection is made to an existing structure.
  1. The Contractor shall schedule his work so that interruption of flow is held to a minimum.
- D. Every effort shall be made to avoid coring at a manhole seam unless otherwise approved by the District.

### **5.24 Drop Connection:**

- A. Inside Drop connections as detailed on Standard Drawing No. 7 shall be constructed at manholes where the plans specifically indicate an inside drop connection for a 6-inch or 8-inch sewer.
- B. Outside drop connections as detailed on Standard Drawing No. 8 shall not be used unless otherwise approved by the District.
- C. For all drop connections, the top of the inlet pipe shall be a minimum of two 2-feet below the bottom of the manhole cone, unless otherwise approved by the District.

- D. Inside drop connections shall be constructed using all ABS or PVC pipe, fittings, primer and cement.
- E. Pipe joints and fittings shall be primed and joined with cement as recommended by the pipe manufacturer.
- F. Manholes with drop connections shall have a lining to protect against hydrogen sulfide corrosion in accordance with Section 2.11 of these Specifications.

#### **5.25 Flushing Branches:**

- A. Flushing branches shall be constructed as shown on Standard Drawing No. 9 at the locations shown on the plans.
- B. Size and type of pipe and fittings shall be the same as the sewer to which the flushing branch connects.

#### **5.26 Connections to Existing Facilities:**

- A. The Contractor shall notify the District 48 hours in advance to schedule a field meeting before a connection is to be made to existing sewer facilities.
  - 1. The District will make all connections to sewer facilities upon payment of fees unless the Contractor is otherwise directed to make the connection.
- B. When directed by the District, the Contractor shall make the sewer connection and shall schedule his work so that interruption of flows is held to a minimum.
- C. The contractor shall expose the end of existing pipe to be extended, for verification of alignment, elevation, material, and size and shall pressure test and TV inspect existing pipe in the presence of the District.
  - 1. All defects shall be corrected by the contractor prior to connecting.

#### **5.27 Building Sewer Lower Laterals:**

- A. Residential building sewer lower laterals installed normal to the collector system and as part of an improvement project shall be constructed as shown on Standard Drawing No. 10 and at the locations shown on the plans.
  - 1. Unless otherwise specified, they shall be 4-inch diameter, conform to these Standard Specifications, and constructed to the property line or as indicated on the improvement plans.
  - 2. A regularly manufactured wye fitting shall be used in the collector sewer for each lower lateral and shall be inclined upwards at a minimum angle of 10 degrees from the horizontal. Refer to Standard Drawing No. 10.
- B. Normal residential lower lateral size shall be 4-inches.

1. Lower laterals for schools and commercial and industrial developments shall be 6-inches unless otherwise noted on the plans.
  2. A 6-inch lower lateral shall enter a 6-inch collector sewer by means of a manhole but may enter an 8-inch or larger collector sewer by means of a factory wye.
  3. Eight-inch and larger lower laterals shall be connected to the sewer by use of a manhole.
- C. Unless otherwise noted on the plans, the depth of cover of the lower lateral at the easement or property line shall be not less than 4-feet nor greater than 7-feet below existing ground or edge of adjacent roadway, unless otherwise approved by the District.
- D. An elevation given on the plans with a lower lateral represents the invert elevation at the easement or property line.
1. The elevation given shall be the maximum allowable elevation, and the minimum slope of the lower lateral shall be 1/4-inch per foot unless otherwise noted.
- E. Lower laterals entering a manhole shall be set to an invert to crown match with the outgoing pipe unless inside drops are approved to be used.
- F. Connection to Existing Sewer
1. When a lower lateral is to be connected to an existing sewer facility, the work shall be done only by a Contractor licensed to perform such work.
  2. The District will retain the right to use its own forces to make such a connection.
  3. Application shall be made to the South Placer Municipal Utility District and the required fees paid at least 48 hours in advance of when the tap is desired.
  4. All excavation and backfill and the installation of the remainder of the lower lateral shall be done by the Contractor.

(Note: The above applies when the lower lateral is constructed as a part of an improvement contract. For requirements regarding the installation of an individual lower lateral, see Section 7 of these Standard Specifications and contact the South Placer Municipal Utility District.)

G. Curb Mark

1. When curb and gutter exists or is to be constructed concurrently with the sewer facilities, the location of each lower lateral shall be permanently indicated by inscribing or stamping the letter "S" in the face of the curb directly above the line when the lower lateral is perpendicular to the street centerline.
2. The "S" mark for a skewed or angling lower lateral shall be placed at a right angle to the end of the lower lateral.



3. When lower laterals are installed in an existing street, the curb mark shall be placed at the time the lower lateral is installed to assure proper location.
4. In new subdivisions when the lower laterals are installed before the curb is constructed, it shall be the Contractor's responsibility to establish the exact location of each lower lateral and the curb and gutter Contractor's responsibility to place the "S" in the curb after it is poured.

#### H. Property Line Cleanout

1. A Property Line Cleanout (PLCO) and building sewer upper lateral extension shall be constructed as shown on Standard Drawing No. 12 and shall be installed when called for on improvement plans or as directed by the District.
2. An Inspection Cleanout shall be installed on lower laterals and sewer stubs when called for on improvement plans or as directed by the District. Inspection Cleanouts are to be constructed as shown on Standard Drawing No. 11.

### **5.28 Force Main and Pump Station:**

- A. Pump stations shall conform to the applicable requirements of Section 4, "WASTEWATER PUMP STATION" of these specifications, as specified in and as shown on the plans, and as specified in Section 74, "Pumping Plant Equipment" of the State Specifications.

### **5.29 Adjusting to Grade:**

- A. All new and existing sewer appurtenances including, but not limited to, manholes, cleanouts and flushing branches within the project boundaries shall be adjusted to grade by the Contractor and shall be completed prior to acceptance of the project, whether the work is done by City or County forces or by a private Contractor.
- B. Project boundaries shall include areas on and off roadways.

### **5.30 Abandon Existing Facilities:**

- A. Existing sewer pipes and facilities, where shown to be abandoned, shall be completely removed and disposed of and the trench backfilled in accordance with these specifications as directed by the District.
- B. Abandonment in place shall require specific approval by the District.
- C. Abandoning sewer pipes and facilities in place shall conform to the following:
  1. Sewer pipes shall be completely filled with sand or other material approved by the District.
    - a) Sand backfill material shall be clean, free draining and free from roots and other substances.

2. All openings into existing structures, that are to be abandoned in place, shall be closed with a 6-inch thick, non-shrink concrete plug.
3. At the option of the District, the sewer pipe shall be completely crushed in place and the trench backfilled in accordance with these specifications.
4. Asbestos Cement Pipe is a hazardous material and shall be treated in accordance with OSHA guidelines,
5. Manholes shall have the upper sections (including all cone sections), removed to a minimum depth of 18-inches below surface grade.
  - a) The bottom of the manhole shall be perforated or broken to prevent the entrapment of water and filled with sand or other material approved by the District.
  - b) Salvaged frames and covers are the property of the District and shall be delivered to the District upon removal from the system or disposed of as directed by the District.

### **5.31 Access Roads:**

- A. Access roads shall be constructed in conformance with these Standard Specifications, the applicable Sections of the State Specifications (excluding Measurement and Payment sections), or as shown on the plans.
  1. Access roads shall have a minimum drivable surface width of 12-feet on straight sections.
  2. Turns and curved sections shall conform to the turning requirements detailed in Standard Drawing No. 13 of these specifications.
- B. Access roads shall be constructed at the locations shown on the plans.
  1. Aggregate base shall be Class 2, 3/4-inch maximum.
  2. Asphalt concrete shall be type B, 3/4-inch maximum, and medium grading.
- C. Relative compaction of not less than 95 percent shall be obtained for a minimum depth of 0.5-foot below the grading plane for the width between the outer edges of the access road, whether in excavation or embankment.
- D. Compaction test results shall be provided to the District.
- E. Any alternative surface treatment approved by the District shall be constructed and tested in accordance with manufactures recommendations.

### **5.32 Grease Control Devices and Sand Oil Separators:**

- A. Grease control devices shall generally be installed in accordance with manufacturer's recommendations and as required by the District.
  - 1. Manufacturer's installation specifications shall be provided to the District upon request.
- B. All loose material shall be removed from the excavation bottom before placing the bedding material.
  - 1. Bedding shall be a minimum of 8-inches of properly consolidated 3/4-inch crushed rock upon stable ground or as prescribed by a Geotechnical Engineer.
- C. Grade rings used for access points shall not exceed 36-inches (measured vertically) unless approved by the District.
- D. Prior to backfill, all outside joints shall on gravity grease interceptors be filled with an approved non-shrink grout or as specified by the manufacturer and grease interceptor shall be tested for leaks in the presence of the District.
- E. Hydromechanical grease control devices shall be tested per manufacturers recommendations.
- F. Gravity grease control devices shall be tested hydrostatically per manufacturers recommendations.
- G. All grease control devices shall be cleaned, pumped out, and empty prior to final inspection.
- H. Venting to be approved by the governing building department.

### **5.33 Clean-up:**

- A. During the progress of the work, the Contractor shall keep the entire job site in a clean and orderly condition.
- B. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the Contractor.
- C. The Contractor shall govern his operations and methods at all time to minimize dust problems within the area of the work or along adjacent properties.
- D. Water or dust palliative shall be applied as required to provide adequate control of dust to the complete satisfaction of the District or other governing agency.

### **5.34 Acceptance Tests:**

- A. All sewers shall be tested in the presence of the District.

B. The Contractor shall notify the District 5 days prior to scheduled tests.

C. Order of Acceptance Tests

1. Unless otherwise directed by the District the following order of testing shall be followed:
  - a) Manhole Vacuum Test
  - b) Visual (CCTV) Test
  - c) Air Test
  - d) Deflection Test
  - e) Force Main and Pump Station Testing
  - f) Final Cleaning
  - g) Final Walk-Through Inspection

D. ACCEPTANCE TESTS:

1. MANHOLE VACUUM TEST

- a) All sewer manholes shall be vacuum tested for leakage after assembly but prior to backfilling around the manhole.
  - 1) The Contractor shall furnish all labor, tools, and equipment necessary to make the test and perform any work incidental thereto.
  - 2) The Contractor shall correct any excess leakage, and repair any damage to the manhole and its appurtenances at his expense.
- b) Prior to testing, all lift holes shall be plugged with an approved non-shrink grout.
  - 1) All outside joints shall be primed and wrapped with approved external concrete joint wrap.
  - 2) All channels in precast bases that are not intended to be used shall be abandoned by installing a mechanical, water-tight plug and filling the channel with concrete prior to performing the vacuum test.
  - 3) Boots for inside drops shall be installed prior to performing the vacuum test.
- c) All pipes entering the manhole shall be plugged, taking care to securely brace the plug(s) from being drawn inside the manhole.

- 1) The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendation.
- 2) A vacuum of 10-inches of mercury shall be drawn and the vacuum pump shut off.
- 3) With the valves closed, the time shall be measured for the vacuum to drop to 9-inches.
- 4) The manhole shall pass if the time is greater than:

60	seconds for a	48	inch diameter manhole
75	seconds for a	60	inch diameter manhole
90	seconds for a	72	inch diameter manhole
120	seconds for a	84	inch diameter manhole
- d) If the manhole fails the initial test, necessary repairs shall be made with a non-shrink grout while the test is still being drawn.
  - 1) Retesting shall proceed until a satisfactory test is obtained.

## 2. VISUAL (CCTV) TEST

- a) Visual internal inspection of all sewer pipes and laterals installed by the Contractor shall be performed in the presence of the District using Contractor furnished and operated closed circuit television (CCTV) survey equipment, all at the expense of the Contractor.
  - 1) The sewer pipe shall be cleaned using a combination high pressure vacuum unit in accordance with Section 5.34D.3.k)2)(a) of these specifications prior to CCTV.
  - 2) The television test shall be done after compacting sub-grade, after all other utilities and subsurface structures have been installed.
  - 3) Immediately prior to CCTV, under the direction and in the presence of the District, an ample amount of water to fill all low spots or sags shall be introduced into the line.
  - 4) A target shall be pulled in front of the camera during CCTV inspection test to determine the depth of standing water in sags. A ½-inch target shall be used in 6 to 10-inch diameter pipes. A one-inch target shall be used in pipes 12-inches in diameter and larger.
  - 5) Any defects observed shall be repaired in the presence of the District.

- b) The District may require the Contractor to perform pre- and post-CCTV inspections on projects requiring repairs, new construction or street improvements over or adjacent to existing public and private sewer pipes to check for any damage done to the sewer pipe.
  - 1) The pre-CCTV test will be completed prior to construction to document existing conditions.
  - 2) The post-CCTV test will be completed after placing and compacting base rock, but prior to placing the final course.
  - 3) Any damage observed during the post-CCTV test shall be repaired by the Contractor at their expense in the presence of the District.
  - 4) Repairs shall again be CCTV inspected to the satisfaction of the District.
  - 5) Closed circuit television inspection of existing lines shall be done only after cleaning the system using a combination high pressure vacuum unit in accordance with Section 5.34D.3.k)2)(a) of these specifications.
- c) CCTV equipment shall be specifically designed and constructed for operation in connection with inspection of sewer pipes and laterals.
  - 1) The CCTV system shall include all equipment necessary for color monitoring. The equipment shall allow for the export of videos and reports of data collected during inspections in digital/electronic format.
  - 2) CCTV equipment shall include footage counter equipment that communicates with the video capture to allow for the distance to be displayed on the screen overlay.
  - 3) Lighting and camera quality shall be suitable to provide a clear, in-focus picture of the inside periphery of the pipe.
  - 4) The camera shall be mounted on a transporter or skids suitable for the size pipe under investigation.
  - 5) CCTV shall be performed using either 'Rotating Head' or 'Pan & Tilt' or any other camera capable of providing an undistorted full view inspection up sewer laterals, services and manholes. Push cameras used to inspect laterals shall have a self-leveling head. The camera shall provide a 360-degree undistorted wall view perpendicular to the camera.
  - 6) An accurate water depth gauge, satisfactory to the District, shall be an integral part of the system.
- d) The camera shall travel with the flow, from manhole to manhole in one continuous pull unless directed otherwise by the District.

- 1) In no case shall the camera move at a speed greater than 30-feet per minute.
- e) The screen overlays shall indicate: Report or Job Number; Facility Identification; Date of Inspection; and Distances.
  - 1) Color digital recordings of the TV monitor shall be made of each entire stretch and provided to the District, immediately upon completion of the work, in digital/electronic format, acceptable to the District.
  - 2) The Disk shall be labeled indicating the project name, the date of the inspection and, if more than one disk is required for a project, each disk shall be numbered indicating Disk 1 of 2, Disk 2 of 2, etc.
- f) Written or digital reports of the CCTV inspection shall be kept on each stretch inspected with CCTV.
  - 1) Reports shall be on forms provided or approved by the District.
  - 2) Each report shall include the project name, the date of the inspection, the manhole ID's, the pipe diameter and the pipe type.
  - 3) Each log shall be filled out completely and contain remarks indicating, the inspection starting and ending points; all damaged or defective pipe, changed conditions, lower lateral locations and the corresponding footages and other information as required by the District.

### 3. AIR TEST

- a) After aggregate base “rock grade” has been placed and compacted and just prior to the final surface being applied, all sewers shall be air tested for leakage.
  - 1) Sewer pipes may require additional air testing as directed by the District.
- b) When the air test is performed, the air pressure gauge shall remain outside the manhole.
  - 1) Personnel performing the test shall remain outside the manhole after they have inserted plugs and necessary equipment.
  - 2) Any plugs requiring extra bracing to keep them in the line shall be braced mechanically.
  - 3) The air gauge shall be disconnected from the compressor after inflating and for the duration of the test.
- c) When sewer lines are installed in areas where the road will be built in the future under a separate contract, an acceptance test shall be performed at final grade.

- 1) Immediately prior to any future roadwork or extensions to the line or service laterals installed in the line, another test shall be performed by the road Contractor to demonstrate the then current, acceptable condition of the sewer.
  - 2) At the completion of the roadwork, another acceptance test shall be performed by the road Contractor to demonstrate to the District that the roadwork has not disturbed the integrity of the sewer line.
- d) The Contractor shall furnish all labor, materials, tools, equipment and appurtenances necessary to make the air tests and to perform any work incidental thereto.
- 1) The Contractor shall, at his own expense, correct any excess leakage and repair any damage to the pipe and its appurtenances or to any structures indicated by or resulting from these tests.
  - 2) All repairs shall be made in the presence of the District.
- e) Testing of vitrified clay pipe shall be in conformance with ASTM C828, latest edition “LOW PRESSURE AIR TEST OF VITRIFIED CLAY PIPE”.
- f) Air Test
- 1) The Contractor shall test all sewer pipes by means of the air test specified herein unless otherwise directed by the District. Length of line tested at one time shall be limited to the length between adjacent manholes.
  - 2) All lower laterals shall be tested to the satisfaction of the District.
  - 3) Air test procedure shall be as follows:
    - (a) Pressurize the test section to approximately 4 psi.
    - (b) Allow up to 5 minutes for the pressure to stabilize.
    - (c) Add air if necessary to keep the pressure above 3.5 psi.
    - (d) At the end of this 5-minute saturation period, note the starting pressure (shall be 3.5 psi minimum) and begin the timed period.
    - (e) If the pressure drops more than 1.0 psi in less than the time given in the following table, the section of pipe has failed the test.
    - (f) Pressure in the line shall not be allowed to exceed 5 psi gauge pressure.



Minimum Test Time for Various Pipe Sizes

Nominal Pipe Size (in.)	T (time), (min / 100 ft)	Nominal Pipe Size (in.)	T (time), (min / 100 ft)
4	0.3	21	3.0
6	0.7	24	3.6
8	1.2	27	4.2
10	1.5	30	4.8
12	1.8	33	5.4
15	2.1	36	6.0
18	2.4	39	6.6
		42	7.3

- 4) For larger diameter pipe use the following formula:
  - (a) Min. time in seconds = 370 x pipe diameter in feet.
- 5) When the prevailing ground water is above the sewer pipe being tested, air pressure shall be increased 0.43 psi for each foot the water table is above the invert of the sewer pipe.
- 6) For 8-inch or smaller pipe only, if during the 5-minute saturation period, pressure drops less than 0.5 psi after the initial pressurization and air is not added, the section undergoing test shall have passed.
- 7) If the test is not passed, the leaks shall be located, repaired and retested.
- 8) The pressure gauge used shall be supplied by the Contractor, shall be graduated to 15.0 psi (maximum) in increments of 0.5 psi, shall be liquid filled and shall have an accuracy of 0.05 psi.
  - (a) Accuracy and calibration of the gauge shall be certified by a reliable testing firm at 6-month intervals or when requested by the District.
  - (b) In addition, the District may compare the Contractor's gauge with a District owned gauge at any time.
- g) Infiltration Test
  - 1) In lieu of an air test, at the direction of the District, the District may require an infiltration test.

- (a) The water infiltration test shall be in accordance with the latest edition of the Standard Specifications for Public Works Construction, "GREENBOOK", Section 306-1.4.3.

h) Hydrostatic Test

- 1) The hydrostatic test may be used in lieu of the air test for building sewers only, with the approval of the District.
- 2) Hydrostatic testing may be permitted by the District for other sewer facilities.
- 3) When any leaks occur in a tested sewer facility the contractor shall locate, repair and retest it before the sewer facility is accepted.

i) Deflection Test

- 1) All flexible mainline sewer pipe shall be tested for excessive deflection. This shall be performed after aggregate base "rock grade" has been placed and compacted and just prior to the final surface being applied, but in no case sooner than 30 days after the pipe backfilling/compaction operation.
- 2) Testing shall be conducted from manhole to manhole and shall be done after the line has been completely cleaned and flushed. If the test section fails the test it shall be excavated and repaired or realigned, and retested. The use of re-rounding devices are prohibited.
- 3) Deflection gauges (mandrels) shall be used to test flexible sewer pipe for out-of-roundness or deflection per ASTM specifications D3034 and F679.
  - (a) The mandrel shall be rigid, nonadjustable, odd-numbered-leg (9 legs minimum) with an effective length not less than its nominal diameter.
  - (b) Outside dimension shall be sized to permit no more than 5.0 percent deflection.
  - (c) The percent deflection shall be established from the base inside diameter of the pipe.
  - (d) The mandrel shall be approved by the District prior to use.

j) PUMP STATION AND FORCE MAIN

- 1) The pump station and force main shall be tested as follows:
  - (a) Pump Station Testing
    - (1) The pump station shall be tested for operation in all phases to the requirements and satisfaction of the District.
  - (b) Pressure Testing of Force Main

- (1) Pressure testing of the force mains shall be made on all completed pipelines.
  - (i) When applicable, testing shall be performed prior to paving.
  - (ii) The tests shall be a water pressure test at 120 percent of the maximum operating pressure.
- (2) When leakage exceeds the amount allowed by these specifications, the Contractor shall locate and make necessary repairs or replacements to reduce the leakage to the specified limits.
  - (i) Any individually detectable leaks shall be repaired, regardless of the results of the test.
- (3) The pipeline to be tested shall be filled with water for at least 48 hours prior to the pressure test.
  - (i) The pipeline shall then be brought up to the test pressure and maintained for a minimum of 4 hours.
- (4) The Contractor shall provide accurate means to measure the quantity of water required to maintain full pressure on the line.
  - (i) The gallons used shall not exceed the following:

$$L = (CND \sqrt{P})/1850$$

Where:

L	=	Maximum allowable leakage in gallons per hour
N	=	Number of joints in test
D	=	Diameter of pipe in inches
P	=	Test pressure in psi
C	=	0.50

- (ii) No leakage is allowed for welded steel pipe or all glued PVC pipe.

k) FINAL CLEANING

- 1) All sewer pipes and laterals shall be cleaned prior to acceptance.
- 2) Acceptable methods for cleaning sewer pipes and laterals include the use of combination high pressure vacuum cleaners.

(a) Combination High Pressure/Vacuum Cleaners

- (1) Only combination high pressure/vacuum cleaning units specifically designed for cleaning sewer mains and manholes shall be used.

- (i) The unit shall deliver adequate water pressure, using the appropriate nozzle, to provide a scouring action in all sizes of pipe to be cleaned and the operator shall control the travel speed to the satisfaction of the District.
- (ii) The quality of the cleaning operation shall be adequate to remove all debris from the pipe.
- (2) The vacuum system must be capable of removing all dirt, grease, rocks, sand, and other materials and debris from the sewer line and manholes.
- (3) All solids or semisolids resulting from the cleaning operation shall be removed from the site and disposed of at an approved sanitary site at the end of each day.
- (4) The Contractor shall be responsible and repair or replace, at no cost to the District, any damage to lines, facilities or property caused as a result of the cleaning operations.
- (5) No water or debris shall be allowed to enter District maintained sewer lines.

**5.35 Final Walk-Through Inspection:**

- A. The Contractor shall notify the District of the completion of the work, and the District shall inspect the work.
  - 1. The Contractor or his representative may be present at the final inspection.
  - 2. The Contractor shall be notified by the District of any defects or deficiencies to be remedied.
  - 3. Within 10 days of the notification, the Contractor shall proceed to correct such deficiencies or defects.
  - 4. Upon notification that this work has been completed, the District shall again inspect the work for compliance with the intent of the contract and with the plans and specifications.

**5.36 Field Acceptance of Project:**

- A. No project will be field accepted by the District until all testing has been performed and completed and records of all testing submitted to the District.

**5.37 District Acceptance of Project:**

- A. No project will be accepted by the District Board of Directors until Field Acceptance and the submittal of the following completed items.

1. One PDF version of the original improvement plans plotted to full size scale showing all changes made during construction and labeled “Record Drawings” or “As-Built Plans”.
2. A full digital version (complete with all layers) of the original improvement plan drawings in AutoCAD 2016 format as either .DWG or .DXF files, showing all changes made during construction and labeled “Record Drawings” or “As-Built Plans”.
  - a) AutoCAD files shall have the improvements drawn in the SPMUD coordinate system (see Section 1.11).
3. A fully executed Bill of Sale from the project owner(s)/developer(s) to the District transferring title to all sewer lines and appurtenances (those required to be dedicated to the District) free and clear of all liens and encumbrances.
4. One PDF version of the recorded Final Map of the development or other instrument evidencing the creation of easements and Rights-of-Ways for the public sewers.
5. Payment of all fees due to the District.
6. Pump stations acceptance shall require submittal of 3 bound copies and one PDF copy of the pump station plans, specifications, parts breakdown, and operation and maintenance manuals.

### **5.38 Guarantee:**

- A. Should any failure of the work occur within a period of one year after acceptance of the project “Bill-of-Sale” by the District Board of Directors, which can be attributed to faulty materials, poor workmanship, or defective equipment, the Contractor shall promptly make the needed repairs at his expense.
- B. The District is hereby authorized to make such repairs if the Contractor fails to make or undertake with due diligence the aforesaid repairs within 10 days after they are given written notice of such failure; provided, however, that in case of emergency where, in the opinion of the District, delay would cause serious loss or damage, or a serious hazard to the public, the repairs may be made or lights, signs and barricades erected without prior notice to the Contractor and the Contractor shall pay the entire costs thereof.
- C. Warranty CCTV inspection will be performed within 12 months of District acceptance of the project.

### **5.39 Repairing Installed Improvements:**

#### **A. REPAIRING INSTALLED IMPROVEMENTS**

1. Sewer mains, manholes, lower laterals, and appurtenances shall be repaired per these Construction Standards and by the following procedures.

2. The use of clamps or couplings will not be allowed as a means of repair.
  - a) Method of Repair
    - 1) Vitriified Clay Pipe
      - (a) Damaged pipe shall be exposed and replaced in-kind by “bridging” new pipe into place.
      - (b) Sagging or misaligned pipe shall be exposed and corrected in place.
        - (1) Defective pipe shall be replaced as described in “a.” above.
    - 2) Ductile Iron Pipe
      - (a) Damaged pipe shall be removed and replaced in kind by “bridging” new pipe into place.
      - (b) Damaged protective lining and exposed metal shall be repaired in strict accordance with manufacturer’s recommendations.
      - (c) Sagging or misaligned pipe shall be exposed and corrected in place.
        - (1) Defective pipe shall be replaced as described in “a.” above.
    - 3) PVC Pipe
      - (a) Damaged pipe shall be removed and replaced in kind by “bridging” new pipe into place.
      - (b) Sagging or misaligned pipe shall be exposed and corrected in place.
        - (1) Defective pipe shall be replaced as described in “a.” above.
    - b) Any excavation for repairs shall be backfilled and compacted as described in the special provisions and these specifications.
    - c) All repairs shall be tested as described in Section 5.34 of these specifications.

#### **5.40 Controlled Low Strength Material:**

##### **A. Placement**

1. Thoroughly settle and consolidate CLSM as the material is placed in excavations. Fill the entire depth of the layer that is being consolidated, into a dense, homogeneous mass, filling all spaces and voids and brining only a slight excess of water to the exposed surface. Place and consolidate CLSM by means that will not cause segregation of the mix.

2. Do not place CLSM under the following conditions:
    - a) When the air temperature is below 40 degrees Fahrenheit.
    - b) When the excavation contains water or when the bottom or walls of the excavation are frozen or contain frozen material.
  3. Prevent flotation of pipes by placing CLSM in two or more lifts, with each lift reaching an initial set before the succeeding lift is placed. Correct any flotation and displacement of pipelines.
  4. In cases where another utility crosses underneath a District sewer pipe:
    - a) CLSM can be used in cases where the trench width in the area of the exposed sewer pipe is in accordance with District Standards (Sections 3.06 and 5.08, and Standard Drawing No. 3).
    - b) CLSM shall be placed above the other utility up to a point 0.2 d (diameter) to 0.3 d up the sewer pipe to create a cradle. The District shall inspect and approve the placement of the CLS I prior to it being covered.
    - c) 3/4-inch crushed rock shall be placed and properly consolidated up to the springline of the sewer pipe. The District shall inspect and approve the placement of the crushed rock prior to initial backfill.
    - d) Intermediate fill and subgrade material shall be in accordance with the local governing authority.
- B. Protection of CLSM:
1. Protect CLSM from equipment, traffic, and backfilling operations for 24 hours after placement or until the surface has achieved an initial set and has hardened enough to develop a minimum penetration number of 650 when tested in accordance with ASTM C403.
- C. Testing:
1. Demonstrate that the CLSM mix meets the specified requirements, including compressive strength.
  2. Enlist the services of a testing laboratory to prepare test cylinders and to transport cylinders to the laboratory for testing.
  3. Testing expenses shall be borne by the Contractor.

4. Test Cylinders:

- a) Procedure: Make 6-inch diameter by 12-inch high test cylinders in accordance with ASTM C31.
  - b) Required Number: Not less than 3 cylinders for each 200 cubic yards of CLSM placed, with a minimum of 3 cylinders for each location where CLSM is used.
  - c) Test two cylinders at 28 days, third cylinder is spare.
5. Field Testing: Furnish slump testing equipment and test slump in accordance with ASTM C143.