SECTION 19 - TRENCH EXCAVATION, BEDDING AND BACKFILL
TABLE OF CONTENTS

SECTION 19 TRENCH EXCAVATION, BEDDING AND BACKFILL

All sewer facilities constructed within the Sacramento Area Sewer District service area (http://www.sacsewer.com/pdf/map-servicearea.pdf) must be constructed in accordance with the Sacramento Area Sewer District Standards and Specifications available at http://www.sacsewer.com/pdf/ord/2011-SASD-Standards-and-Specifications-v1.pdf

19-1 TRENCH EXCAVATION

Trench excavation includes the removal of all materials and obstructions and the control of water necessary to construct the Work as shown or specified in the Contract. Unless otherwise shown or specified in the Contract, excavation must be by open cut or as directed by the Agency.

Attention is directed to Section 10-5, "Control of Water in the Work", and Section 14, "Restoration of Surfaces", of these Specifications, for additional requirements. Surface water must not be allowed to enter the pipe trench or the existing downstream pipe system. Surface water, groundwater, pipe leakage, or the contents of severed pipe must not be permitted to enter water pipe that is not abandoned.

Section 18-2.03, "Surplus Material" and Section 18-7, "Surplus Material Disposal", of these Specifications applies to excess material from trench excavations.

19-1.01 Exploratory Excavation

An encroachment permit must be obtained from the Agency prior to exploratory excavations within highway rights-of-way or other public easements. Prior to the end of each work day, exploratory excavations made outside of the paved surface during that work day must be backfilled with sand or native excavated materials as directed by Agency and mechanically compacted to prevent settlement. Excavations made within the paved surface must be permanently restored per Standard Drawing 4-64.

19-1.02 Trench Width

Minimum and maximum trench widths at the top of the pipe must be as shown or specified in the Contract Documents or these Specifications. If trench widths at the top of the pipe are exceeded, the Contractor must provide stronger pipe or improved bedding and backfill conditions, as approved by the Agency to meet the changed load requirements. If the trench width is exceeded for any reason within the Contractor's control, the stronger pipe or improved bedding and backfill will be provided at the Contractor's expense.

19-1.02.A Storm Drain Pipe

Unless otherwise shown or specified in the Contract, for storm drain pipe the minimum and maximum trench width must be as shown on Standard Drawing 9-1.

19-1.02.B NOT USED

19-1.02.C Water Pipe

Water pipe minimum and maximum trench widths are shown on Standard Drawing 8-17 unless otherwise shown or specified in the Contract.

19-1.03 Pavement Cutting

When the trench is in an existing paved area, work must be done in accordance with Standard Drawing 4-64. Pavement must be saw cut on neat lines parallel and equidistant from the trench centerline. The width of the saw cut must not be greater than is required to properly install the pipe and not damage the edges of the pavement left in place, or as directed by the

Agency. Pavement between the lines must be broken up and removed as directed by the Agency immediately ahead of the trenching operations.

Pavement must not be cut until the respective utility companies have marked the location of their underground facilities and the Agency has given final approval of the trench alignment.

19-1.04 Maximum Length of Open Trench

Unless otherwise specified in these Specifications or the Special Provisions, or approved by the Agency in writing, at the end of each work day, no more than 300 feet of trench is allowed to remain open at any one location, including excavation, pipe laying and appurtenant construction, backfill, and trench that has not been temporarily resurfaced, but excluding manhole excavations. The remainder of the trench must be backfilled and compacted, and when in streets, opened to traffic as soon as possible. The maximum allowable length of open trench for cast-in-place concrete pipe is specified in Section 36-3, "Trench Excavation", of these Specifications. Failure by the Contractor to comply with these limitations may result in a temporary suspension of work in accordance with Section 5-21, "Temporary Suspension or Delay of Work", of these Specifications.

19-1.05 Control of Water

Control of water must conform to the requirements in Section 10-5, "Control of Water in the Work", of these Specifications.

19-1.06 Shoring and Bracing

The Contractor must furnish and install sufficient shoring and bracing to insure the safety of personnel and public, protect the Work, and protect adjacent improvements. The Contractor must comply with the requirements of Section 12-6, "Excavation and Trench Safety", of these Specifications.

Sheeting must not extend below the bottom of the pipe barrel. The contractor must take care to prevent damage to existing surface or subsurface improvements, both public and private, during drilling and driving operations. Unless otherwise specified in the Special Provisions or required by the Agency, all sheeting, timbering, lagging, and bracing must be removed during backfilling, and in a manner that prevents movement of the ground or damage to the pipe or other structures. When the Agency requires that sheet piling, lagging, and bracing be left in place, it must be cut off where designated and the upper part withdrawn. If steel piling is used, it may be removed as backfill is placed and compacted.

When using movable trench supports, care must be exercised to prevent disturbing the pipe location, jointing, or embedment. Removal of trench protection below the top of the pipe and within 2-1/2 pipe diameters on each side of the pipe will be prohibited after the pipe embedment has been placed and compacted. Movable trench supports will only be allowed in either wide trench construction where supports extend below the top of the pipe or on a shelf above the pipe with the pipe installed in a narrow, vertical wall subditch. Voids left in the trench wall or embedment materials by support removal must be filled with bedding material and compacted. Removal of bracing between sheeting must only be done where backfilling proceeds and bracing is removed in a manner that does not relax trench support.

19-1.07 Special Foundation Treatment

Whenever the bottom of the trench is soft, spongy, unstable, rocky, or, in the opinion of the Agency, otherwise unsuitable as a foundation for pipe bedding, the unsuitable material must be removed to a minimum depth of 6 inches, or to a depth designated by the Agency, and replaced with compacted crushed rock, gravel, or sand as directed by the Agency. When the trench bottom is cobbled or of material that might, in the opinion of the Agency, allow loss of sand backfill, the backfill material must be crushed rock or gravel graduated so that 100 percent will pass the 3/4 inch sieve and not more than 15 percent will pass the number 8 sieve. Crushed rock or gravel must conform to Section 50-16, "Clean Crushed Rock", of these Specifications.

Sand backfill, when permitted or required by the Agency, must conform to the requirements in Section 50-13.01, "River Sand", of these Specifications. The backfill must be compacted to a non-yielding condition. Jetting is not permitted. As an alternate to the bedding materials specified above, the Agency can direct the Contractor to furnish and place geotextile fabric below the bedding materials. The geotextile material must be a woven fabric in accordance with Section 50-10.02, "Woven Geotextile Fabric", of these Specifications. Unless stated otherwise in the Special Provisions, furnishing and placing of geotextile fabric will be paid for as extra work per Section 9, "Changes and Claims", of these Specifications.

If material more than 12 inches below the typical trench bottom is ordered removed by the Agency, the excavation below that point and the imported material required to backfill the trench to that elevation will be paid for as extra work per Section 9, "Changes and Claims", of these Specifications unless otherwise specified in the Special Provisions. Before excavation of the pipe trench in fill areas or roadway embankments, the fill area or embankment must be completed to a height above the pipe invert grade line of not less than 2 times the internal pipe diameter or to final fill or embankment subgrade, whichever is lower, but in no case less than 12 inches above the top of the pipe. The embankment must be compacted to a minimum relative compaction of 90 percent for a distance on each side of the pipe equal to at least 2 pipe diameters. The remainder of the embankment must be compacted to the minimum relative compaction specified elsewhere in these Specifications for the type of construction being done, or as specified in the Special Provisions or on the Plans. Special foundation treatment for cast-in-place concrete pipe must be as specified in Section 36-4, "Cast-In-Place Concrete Pipe (CIPCP) - Special Foundation Treatment", of these Specifications.

19-1.08 Excavation Method

Methods used in excavation must not damage surrounding property, remaining pavement, or existing improvements that are to remain. Outriggers for excavation equipment, and other heavy equipment, must be fitted with street pads to prevent pavement damage.

19-1.09 Payment

Full compensation for trench excavation, including all equipment, labor, materials, control of water, shoring and bracing, and other safety measures required, is included in the prices paid per linear foot of the respective sizes, grades, and types of pipes listed in the Contract, and no additional compensation will be paid.

Additional bedding material used to stabilize the foundation if required, over the amount required by the Contract, will be paid for as provided in the Special Provisions, unless the necessity for the additional bedding material was caused by an act or failure to act on the part of the Contractor or is required for the control of groundwater, in which case the Contractor is responsible for the expense of the additional excavation and material.

19-2 PIPE BEDDING AND BACKFILLING OF TRENCHES

19-2.01 Pipe Bedding

Pipe bedding must be furnished and placed as shown on the Plans and in accordance with the requirements of these Specifications. Pipe must be placed on a firm layer of bedding material, and must be bedded uniformly throughout its length. Pipe bedding material for water distribution systems must conform to the requirements in Section 50-13.02, "Graded Sand", of these Specifications.

19-2.01.A NOT USED

19-2.01.B Storm Drain

Unless otherwise indicated in the Contract, storm drain pipe bedding must be furnished and placed as detailed in Standard Drawing 9-1 and in conformance with these Specifications.

Storm drain pipe bedding material must conform to Section 50-16, "Clean Crushed Rock", of these Specifications.

To achieve uniform placement in the bedding material, shape the bedding or, if approved by the Agency, lightly "bounce" the pipe to set it into the bedding. Pipe bedding material must be placed at a minimum thickness meeting the greater of the following criteria:

1. The minimum bedding thickness is 3 inches for pipe with an internal diameter 10 inches or less, and 4 inches for pipe with an internal diameter 12 inches or greater; or
2. The minimum bedding thickness must be equal to the difference between the outside diameter of the pipe barrel and bell plus 1-1/2 inches; or
3. When soil conditions in the trench bottom are unstable, rocky, or otherwise unsuitable as a foundation for pipe bedding, the minimum bedding thickness must conform to Section 19-1.07, "Trench Excavation - Special Foundation Treatment", in this Section.

19-2.01.C Water Distribution Systems

Water distribution pipes must have 6 inches of sand bedding that conforms to the requirements of Section 50-13.02, “Graded Sand”, of these Specifications. If existing soil is too porous to hold sand, a geotextile fabric approved by the Agency must be placed on the trench bottom. Ductile iron pipe and fittings, copper pipe and fittings, valves, and all other buried metal must be encased in 8 mil polyethylene encasement in accordance with AWWA C105 and Section 41-5.03, “Polyethylene Encasement,” of these Specifications.

19-2.02 Initial Backfill

Initial backfill must be furnished and placed as shown or specified in the Contract and in accordance with the requirements in these Specifications.

19-2.02.A NOT USED

19-2.02.B Storm Drain

Unless otherwise specified in the Special Provisions, the following initial backfill requirements apply.

- For cast-in-place concrete pipe, initial backfill must conform to Section 36-14, “Cast-in-Place Concrete Pipe (CIPCP) – Backfill”, of these Specifications and Standard Drawing 9-1.
- For all other pipes initial backfill for storm drain construction must conform to this Section 19 and Standard Drawing 9-1.
- Granular materials must conform to Section 50-16, "Clean Crushed Rock”, of these Specifications.
- For field conditions requiring control density backfill the material must conform to Section 50-15, "Control Density Backfill", of these Specifications.
- For field conditions requiring portland cement concrete backfill the material must conform to Section 50-5.01, "Portland Cement Concrete - Composition”, Class "B-2”, of these Specifications.

After placement of bedding, the Contractor must place initial backfill material to the spring line of the pipe, thoroughly compacting it by vibratory drum roller, vibrating surface plate, insertion vibrator, shovel slicing, or light tamping to provide proper support under the pipe haunches. The remaining initial backfill material must be placed per Standard Drawing 9-1. To reduce impact damage, there must be at least 12 inches of cover over the pipe before using hand-held or walk-behind compaction equipment, and at least 3 feet of cover before using ride-on equipment. The pipe must not be disturbed or displaced during placement and compaction.

When using control density or concrete backfill, the Contractor must anchor the pipe to prevent floating or displacement of the pipe. The anchors must be spaced to insure a continuous even grade in the flow line of the pipe.

19-2.02.C Water Distribution Systems

Initial backfill for water distribution systems must be placed immediately after pipe joints have been completed and inspected by the Agency and must comply with the requirements of Standard Drawing 8-17. Unless otherwise specified, initial backfill for water distribution systems, including pipes, fire hydrant branch leads, water services, and water appurtenances, must be sand conforming to the requirements in Section 50-13.02, "Graded Sand", of these Specifications. Initial backfill must be placed and compacted to a height of 8 inches above the top of the pipe.

Initial backfill must be placed immediately after pipe joints have been completed and inspected by the Agency. The material must be carefully placed and compacted so as not to disturb or damage the pipe, and must be brought up evenly on both sides. Initial backfill material must be placed in layers not exceeding 8 inches in depth before compaction at or near optimum moisture content. Compaction must be by mechanical pneumatic or vibratory compaction equipment approved by the Agency. Ponding or jetting is not permitted, although water may be sprayed from a 2-inch truck hose onto initial and final sand backfill. The compacted material must achieve a relative compaction of at least 90 percent as determined by ASTM D-1557. Trench jacks must not be removed prior to completion of initial backfill. If a trench shield or rolling shoring system is used, it must be raised as backfill lifts are compacted so that the bottom of the shoring is not within the lift being compacted. The method of raising must not allow loose soil from the trench walls to contaminate the initial backfill zone.

19-2.03 Trench Backfill

Trench backfill must consist of material placed between the initial backfill and subgrade in paved areas or to the top of the trench in unpaved areas, unless otherwise shown or specified in the Contract.

The trench backfill material can be native material excavated at the work site if the trench depth is greater than 4 feet measured from the top pipe to the finished road surface. The native material is subject to approval by the Agency, and must be free of organic or other unsuitable materials that can cause voids or depressions to develop during or after placement of the backfill. Rocks, stones and solid earth chunks exceeding 3 inches in greatest dimension are not allowed in trench backfill material.

Trench backfill material must be placed in layers not exceeding 8 inches in depth before compaction at or near optimum moisture content. Until the total backfill above the top of the pipe exceeds 3 feet, machine-placed backfill material must not be allowed to "freefall" more than 2 feet. Compaction effort must be applied parallel to the pipeline starting at the trench wall and proceeding to the center of the trench. If a trench shield or rolling shoring system is used, it must be raised as backfill lifts are compacted so that the bottom of the shoring is above the lift being compacted, without allowing the trench walls to collapse or otherwise contaminate the backfill.

The backfill material for trench depths less than 4 feet measured from the top pipe to the finished road surface must be imported granular material, uniformly graded Class 2 aggregate base conforming to the requirements in Section 50-7, "Aggregate Bases", of these Specifications. The imported granular material must be placed in lifts not to exceed 6 inches after compaction. Compaction requirements for imported granular material are the same as compaction requirements for job-excavated native material.

Unless otherwise shown or specified in the Contract, compaction of backfill material must be by mechanical pneumatic or vibratory compaction equipment appropriate to the existing conditions that will not result in damage to adjacent ground, existing improvements or the Work. Ponding and jetting methods will not be permitted, except by written permission of the Agency.

Unless otherwise shown or specified in the Contract, trench backfill material must be compacted to a relative compaction of not less than 90 percent, as determined by ASTM

D1557. The top 6 inches below the subgrade must be compacted to a relative compaction of 95 percent, except that trenches in easements outside the street rights-of-way must be compacted to 90 percent relative compaction throughout the depth. Compaction testing will be performed by the Owner and the cost thereof will be borne by the Agency, except that retests of areas that fail to meet the required compaction will be charged to the Contractor and deducted from payment due the Contractor.

Unless otherwise specified in the Special Provisions, the Contractor has the option to use imported granular material for trench backfill in place of native material excavated at the work site. The imported granular material must be uniformly graded Class 2 aggregate base conforming to the requirements in Section 50-7, "Aggregate Bases", of these Specifications. The imported granular material must be placed in lifts not to exceed 6 inches after compaction. Compaction requirements for imported granular material are the same as compaction requirement for job-excavated native material. Unless otherwise specified in the Special Provisions, the optional use of imported granular material for trench backfill is at the Contractor's expense.

No warranty is made or otherwise implied as to the suitability of native material excavated at the work site for use as trench backfill material. Costs for processing native materials for use as trench backfill materials must be at the Contractor's sole expense and are not reimbursable by the Agency.

19-2.04 Payment

Full compensation for furnishing, placing, and compacting pipe bedding and trench backfill materials is included in the prices paid per linear foot of the respective sizes, grades, and types of pipes listed in the Contract, and no additional compensation will be paid.

Actual excavation quantities to be paid for will be calculated based on the maximum width of trench shown on the plan and measured at the top of the pipe.

Actual trench resurfacing quantities to be paid for will be calculated based upon the maximum width of trench specified herein.