

**County of Sacramento
Standard Construction Specifications
January 1, 2008**

TECHNICAL PROVISIONS

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SECTION 37 BORING AND JACKING

37-1 GENERAL

At locations shown or specified in the Contract, conductor pipe and associated carrier pipe shall be jacked into place between the limits shown or specified, in accordance with Section 65-1.05, "Jacking Pipe", of the State Specifications, and these Specifications. All boring and jacking operations shall comply with Cal OSHA Tunnel Safety Orders.

The Contractor shall provide a boring and jacking plan to the Agency prior to beginning the boring and jacking operations. The boring and jacking plan shall describe the equipment, method, and construction sequence for boring and jacking. The Plan shall identify the location of all potential conflicting public and private utilities and address any conflicts with their systems. The Plan shall also identify the location of nearby trees and address any conflicts with their root systems. Work associated with boring and jacking shall not begin until the Agency has reviewed the Contractor's boring and jacking plan.

Excavation of boring and receiving pits shall be the minimum size necessary to complete the Work. Shoring and bracing for the boring and receiving pits shall conform to the requirements in Section 19-1.06, "Shoring and Bracing", of these Specifications. Unless otherwise specified in the Special Provisions, backfill of the area excavated for the boring operation shall conform to the requirements for structure excavation in Section 18-3, "Structure Excavation and Backfill", of these Specifications.

Unless otherwise specified in the Special Provisions, the Contractor may elect to either jack reinforced concrete pipe, vitrified clay microtunneling pipe, or ductile iron pipe, directly or place it in a conductor in conformance with these Specifications. If surface obstructions exist, sanitary sewer pipelines shall be placed within a conductor.

Auger bore and jack, pilot tube (guided bore), or microtunneling may be acceptable methods. If a specific method is not stated in the Contract Documents, the method must be approved by the Agency prior to implementation. Microtunneling shall be used in all areas where tunneling operations may occur below the groundwater table.

37-2 DIRECT JACKING REINFORCED CONCRETE PIPE

Reinforced concrete pipe or reinforced concrete sewer pipe may be jacked directly. Only pipe using double-rubber gasket, fiberglass reinforced collar, or approved equal type joints may be jacked directly. Guide rails shall be accurately set to line and grade to insure installation within permitted tolerances. Unless otherwise shown or specified in the Contract, the maximum length of direct jacking shall be one hundred feet (100'). The diameter of the bored hole shall be not more than one-tenth foot (0.1') greater than the outside diameter of the reinforced concrete pipe or reinforced concrete sewer pipe.

37-3 INSTALLATION OF CONDUCTOR PIPE

The diameter of the bored hole shall be not more than one-tenth foot (0.1') greater than the outside diameter of the conductor pipe. Guide rails shall be accurately set to line and grade to insure installation of the conductor pipe within permitted tolerances. The conductor pipe diameter shall be sufficient to allow adjustment of line and grade of the carrier pipe to meet allowable tolerances and to allow sand to be placed between the conductor pipe and the carrier pipe. Conductor pipe sizes shall be as shown or specified in the Contract, but in no case shall the inside diameter of the conductor pipe be less than six inches (6") greater than the outside diameter of the carrier pipe.

For sanitary sewer pipe installations, cathodic protection shall be installed per Standard Drawing 7-19A.

37-4 INSTALLING CARRIER PIPE INSIDE CONDUCTOR PIPE

Except for water pipe, carrier pipe having any part of a joint larger in diameter than the barrel of the pipe shall be fitted with two (2) twenty-four-inch (24") long polyurethane skids. The polyurethane skids shall be attached to the carrier pipe as recommended by the manufacturer. The polyurethane skids shall be located near the center of each carrier pipe section, and shall be large enough to prevent any part of a joint from bearing on the conductor pipe.

Each joint of carrier pipe for water shall be strapped according to the manufacturer's recommendations to two (2) pairs of twenty-four-inch (24") long polyurethane skids. The polyurethane skids shall be located at approximately one-fifth (1/5) of the pipe length from each end of each carrier pipe section.

Refer to Standard Drawing 7-8 for installation of sanitary sewer pipe in conductor casing.

Carrier pipe with joints not larger than the pipe barrel shall be slid into place on two (2) polyurethane skids which have been securely fastened to the invert of the conductor pipe, or strapped to the barrel of the carrier pipe as specified above.

Carrier pipe sections shall be joined outside the conductor pipe and then slid into place. The space between the carrier pipe and the conductor pipe shall be completely filled with clean, dry sand. The method of placing sand shall be as approved by the Agency. Except for water pipe, necessary adjustments in grade shall be made by adjusting the height of the skids. Adjustment in grades for water pipe shall be as shown or specified in the Contract, or directed by Agency.

37-5 VOIDS

When material tends to cave in from outside the permitted diameter of the bored hole, a shield shall be used ahead of the first section of conductor pipe or the face of excavation shall not extend beyond the end of pipe more than one and one-half feet (1-1/2'), unless permitted by the Agency. The shield shall cover the upper two-thirds (2/3) of the conductor pipe and project not more than one-half inch (1/2") beyond the conductor pipe's outer surface. Excavation shall not project beyond the shield.

Voids larger than those permitted by these Specifications shall be filled with sand or mortar, as directed by the Agency.

To assist in the detection of voids, a settlement monitoring grid will be established by the Agency. A minimum number of monitoring points will be quarter stations along the centerline of the pipe alignment plus wing points twenty-five feet (25') on either side of the centerline points.

The Contractor shall run levels over these points, and record their elevations, before either the boring or receiving pit is constructed, and subsequently each day that material is removed from the excavation. A final set of elevations shall be recorded two (2) weeks after the conductor pipe is filled with sand and the bulkheads are in place. A copy of the elevation records shall be provided to the Agency at the end of each day. Any settlement over one-quarter-inch (1/4") shall be corrected by the Contractor to the satisfaction of the Agency, at the Contractor's expense.

37-6 TOLERANCES

The maximum deviation of conductor pipe from the line and grade shown on the Plans shall be such that line and grade of the carrier pipe can be adjusted within the conductor pipe and maintain the line and grade along its full length.

Unless otherwise shown or specified in the Contract, directly jacked pipe shall not deviate more than three inches (3") per one hundred feet (100') from the line and grade shown on the Plans.

37-7 DRY BORING UNDER CURB, GUTTER AND SIDEWALK

Unless otherwise specified in the Special Provisions, portions of sanitary sewers, service sewers, drainage lines, irrigation lines, water mains, and services that pass beneath curbs, gutters, sidewalks, and other obstructions may be installed by dry boring. For such locations, the bore shall begin at the edge of the street pavement, or as directed by Agency, and continue to six inches (6") beyond the property line. For sewer services, the end of the pipe shall then be capped or plugged and the pipe pushed into the bored hole. To determine final line and grade for a service sewer, and to install the cleanout or the location post, the end of the bore at the property line shall be exposed.

If the pipe material is vitrified clay, the pipe shall be plain end connected with compression-type couplings. The bore shall be just large enough to pass the couplings and need not be backfilled. Unless otherwise shown or specified in the Contract, the maximum length of bore shall be fifteen feet (15').

Boring shall not be used on service sewers when the required slope is such that probable deviation of the bore from the intended line and grade would result in a final slope of less than one-quarter inch per foot (1/4" per 1').

37-8 WET BORING OF SMALL DIAMETER PIPELINES

When specified in the Special Provisions, pipelines that are six inches (6") and smaller may be installed by wet boring. Pipe shall be either ductile iron pipe conforming to Section 50-25, "Ductile Iron Pipe (DIP), and Cast Iron Pipe and Ductile Iron Fittings", of these Specifications or polyvinyl chloride (PVC) pressure Class 200 pipe conforming to the requirements of AWWA Standard C900.

If the diameter of the boring hole is more than one-tenth of a foot (0.1') greater than the outside diameter of the pipe to be installed, the void shall be filled with sand or mortar, as directed by the Agency.

37-9 MEASUREMENT AND PAYMENT

Boring and jacking will be measured by the unit for each location for the size and type of pipe to be placed by boring and jacking as designated in the Contract.

The unit price paid for boring and jacking for each location for the size and type of pipe includes full compensation for furnishing all labor, materials (including conductor pipe when specified), tools, equipment, and incidentals, and for doing all the work involved in boring and jacking pipe, complete in place, including the excavation and backfill, as shown or specified in the Contract, as specified in these Specifications, and directed by the Agency.