## 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. All boring and jacking operations shall comply with Cal OSHA Tunnel Safety Orders.

The Contractor shall provide a boring and jacking plan to the City 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 City 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, or reinforced concrete sewer pipe, directly or place it in a conductor in conformance with these Specifications.

Directional boring shall comply with Section 49-2.05, "Conduit" of the Standard Construction Specifications.

No directional bore drilling shall occur on Fridays, weekends, or City Holidays.

## 37-2 DAILY CALIBRATION LOG AND BORE PROFILE SHEET

The Contractor shall submit the Daily Calibration Log and Bore Profile sheet completed by all Contractors, Subcontractors, drill operators/locators with no exceptions. The daily document will be provided by the City and shall include:

Before drilling, prepare a directional bore profile showing all verified utility depths with utility required clearances and the projected bore path (elevation). Submit daily to the City prior to start of drilling Work. Submission of a time stamped photo of the Daily Calibration Log and Bore Profile sheet to the satisfaction of the City is sufficient. If the daily calibration and profile sheet is not received prior to drilling, all Work will be shut down for the day.

## 37-3 DIRECT JACKING REINFORCED CONCRETE PIPE

Reinforced concrete 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.

## 37-4 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. In place elevations are to be recorded on the conductor pipe and submitted to the City in writing.

## 37-5 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.

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 City. 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 City.

## 37-6 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 City. 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 City.

To assist in the detection of voids, a settlement monitoring grid will be established by the City. 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 City 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 City, at the Contractor's expense.

## 37-7 DIRECTIONAL BORE DEPTHS WITHIN PAVEMENT & SIDEWALK AREAS

Directional bore depths start at a minimum of 42 inches below pavement grade.

| Diameter of Bore Hole | Minimum Depth of Cover |
|---|---|
| 2 inches to 6 inches | 42 inches = 3.5 feet |
| 8 inches to 14 inches | 72 inches = 6 feet |
| 15 inches to 24 inches | 120 inches = 10 feet |
| 25 inches to 48 inches | 192 inches = 15 feet |

Upon completion of the Work, the Contractor shall provide an accurate as-built drawing of the installed pipe.

## 37-8 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 reinforced concrete pipe shall not deviate more than three inches (3") per one hundred feet (100') from the line and grade shown on the Plans.

## 37-9 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 City, and continue to six inches (6") beyond the property line.

## 37-10 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 50-23, "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 City.

## 37-11 DRILLING FLUID – COLLECTION AND DISPOSAL PRACTICES

Drilling equipment shall be contained within a lined pit or containment pond, until removed from the Site.

When an area of contaminated ground is encountered, the slurry shall be tested for contamination and be legally disposed of at the Contractor's sole expense.

Precautions shall be taken to keep drilling fluids out of the streets, manholes, storm and sanitary sewers, and other drainage systems, including creeks, streams, and rivers.

The Contractor shall make all diligent efforts to minimize the amount of drilling fluids and cuttings spilled during the drilling operation and shall provide complete clean-up of all drilling mud overflows or spills immediately. The Contractor shall prepare a contingency plan to address the containment and removal, of an inadvertent return, frack outs or spill (e.g., drilling fluids, and hydraulic fluids).

## 37-12 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 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 City.

## 37-13 PROTECTION OF EXISTING SURFACES

The Contractor shall use appropriate equipment, construction methods and effort/care to prevent damage to existing pavement. The Contractor shall also document the pre-existing pavement conditions in a manner that will allow construction damage to be identified. The Contractor shall prepare a post construction evaluation of the pavement surface upon completion of the Work and will be responsible for repairing all damage to the pavement surface resulting from construction activities at the Contractor's sole expense. The Contractor shall also be responsible for repairing any damaged pavement that cannot be identified as pre-existing at the Contractor's sole expense.

Excavations within sidewalk areas, when not active, must be covered with a material suitable for pedestrian use and secured to avoid shifting. Excavation shall not be covered for more than 7 days. The excavation shall be backfilled and the surface restored within 7 days of initial excavation. Sidewalk repairs shall conform to the Standard Construction Specifications.

## 37-14 BACKFILLING OF POTHOLES WITHIN PAVEMENT AREA

Backfilling of potholes shall include a full depth base slurry backfill. After minimum of 48 hours of cure, the slurry backfill, and surrounding pavement shall be ground a minimum of 3" per Standard Drawing ST-6A. Edges of pothole repairs shall be aligned when distance between 3 consecutive potholes are 100' or less. Edges of pothole repairs shall be placed along pavement stripes, gutter lines, or mid-lane, and shall not be placed in wheel path. Pothole repairs shall be joined if spacing between holes is 15' or less unless approved by the City.

## 37-15 EXCESSIVE POTHOLING AND EXCAVATING

Surface incisions on pavement surfaces shall not exceed industry bore pit standards as determined by the City. In the event of excessive incisions, additional pavement restoration will be required at the Contractor's sole expense. Additional pavement restoration shall include a Type II

slurry seal placed over the entire width and length of the roadway to encompass the area of restored pavement. Surface incisions located within 50 feet shall be included in the same slurry seal area. Slurry seal shall extend 26 feet beyond the outermost surface incisions and USA markings.

## 37-16 CONCRETE RESTORATION

Repairs to concrete curbs, gutters, sidewalks, driveways, and other concrete surfaces shall be made by removing and replacing the entire portions between joints or scores, except as follows:

- Curb and gutter shall be replaced between saw cuts so that the remaining or new curb and gutter will not be less than four feet (4') in length, measured from the saw cut to the nearest score mark, expansion joint, construction joint or weakened plane joint.

- Tying into existing unsuitable concrete sidewalk, driveways, curbs, gutters will not be allowed. The existing concrete is unsuitable if it is cracking, separating, spalling, or raised. Contractor shall remove unsuitable concrete to the nearest section of concrete suitable to tie into.

## 37-17 STORAGE OF EQUIPMENT OR MATERIALS WITHIN THE RIGHT-OF-WAY

No equipment or materials shall be parked or stored within any traffic lane or within the public right-of-way at any time without written consent from the City.

## 37-18 MAINTAINING AND PROTECTING TRAFFIC CONTROL FACILITIES

Potholes or metal objects, such as manhole frames and lids, valve boxes, bore casings, and similar items shall not be installed within 72 inches of a traffic detector loop. Any traffic signal or detector operation disruption shall be immediately reported to the City. Damage to any traffic signal or detector loop shall be repaired at the Contractor's sole expense. The Contractor shall restore the traffic system to normal operation within eight hours of initial damage at the Contractor's sole expense. Should the City elect to provide repair or replacement services, the Contractor shall be required to reimburse the City for all repair costs.