

ATTACHMENT “C”

**TRENCH EXCAVATION
CONSTRUCTION STANDARDS**

SECTION CS-2.

TRENCH EXCAVATION CONSTRUCTION STANDARDS

- CS-2-01. GENERAL:** Trench excavation shall conform with the City Standard Specifications. In general a trench is defined as an excavation in which the depth is greater than the width of the bottom of the excavation. Additionally, for the purpose of the City Standard Specifications, a trench shall include excavation for appurtenant structures including but not limited to, manholes, transition structures, junction structures, vaults, valve boxes, catch basins, thrust blocks, and boring pits. The Contractor's attention is directed to the rules, orders, and regulations of the California Division of Occupational Safety and Health (CAL/OSHA) for a more specific definition.
- A.** The requirements specified in this section of the City Standard Specifications apply to all trench excavations. Nothing in these City Standard Specifications shall relieve the Contractor from conforming to the requirements of CAL/OSHA. If there is a conflict between the two aforementioned standards, the more stringent requirement shall apply.
 - B.** Trench excavation shall include the removal of all water and materials of any nature which interfere with the construction work.
 - D.** The method for installation of pipe or conduit (open trench, tunnel, or bore and jack) shall be shown on the Project Plans.
 - E.** Open trenching shall be prohibited on paved streets for a period of not less than five (5) years from the date the asphalt concrete pavement was placed or one (1) year from the date any slurry seal was placed unless the Contractor receives written approval from the Director of Public Works.
 - F.** Where pipe is to be installed in new embankment, the embankment shall be first constructed to the following dimensions and compacted prior to any excavation for placement of pipe:
 - 1.** a height of 12 inches above the top of pipe.
 - 2.** a width of not less than 5 times the diameter of the pipe on each side of the pipe, after which the trench shall be excavated.
 - G.** Excavated material from trenches located within paved areas shall be immediately loaded into trucks and hauled off and disposed of outside the public right of way. No excavated material shall be placed or stored within the public right of way unless otherwise allowed by the Director of Public Works.

CS-2-02. EXISTING UNDERGROUND UTILITIES:

- A.** The Contractor shall contact Underground Services Alert (U.S.A.), at least 48 hours in advance of any excavation.
 - 1.** The Contractor shall not commence excavation in a location prior to U.S.A. members marking the location of their utilities or indicating that none exist within the excavation limits outlined by the Contractor.
 - 2.** The Contractor shall notify the Inspector of any conflict discovered as a result of the USA marking prior to commencing excavation at that location.
- B.** It is the Contractor's responsibility to verify the location and elevation of all existing utilities within the limits of excavation.
- C.** All existing pipes within the trench zone and any other facilities adjacent to the trench shall be carefully supported and protected from damage as a result of the Contractor's operations.

CS-2-03. EXCAVATION METHOD: Methods used in excavation shall be such as not to cause damage to surrounding property or to unnecessarily damage pavement. Street pads for backhoe outriggers and other equipment shall be utilized to prevent unnecessary damage.

CS-2-04. MINIMUM AND MAXIMUM TRENCH WIDTH: All trench widths shall be in compliance with the Standard Drawings. In the event that unsuitable materials or unstable trench walls are encountered, the trench width shall be modified in accordance with the applicable ASTM standard.

- A.** The pipe or conduit shall be positioned in the center of the trench.
- B.** The trench width for utility company owned facilities shall conform to the utility company standards.
- C.** The minimum trench width for City owned facilities shall conform to the requirements of Table CS-2-1, with the exception of Rock Wheel trench excavation specified elsewhere in the City Standard Specifications:

Table CS-2-1

| <i>Pipe Material</i> | <i>Pipe Size (nominal diameter)</i> | <i>Minimum Trench Width</i> |
|---|---|---------------------------------|
| All Pipes | 6-Inches and less | O.D. ^a + 12-inches |
| Ductile Iron Pipe | Greater than 6-inches | O.D + 24-inches |
| Polyvinyl Chloride and High Density Polyethylene Pipes ^b | Greater than 6-inches | O.D. + 16 inches ^c |
| Cast-in-Place Concrete Pipe | Greater than 36-inches | O.D. |
| Reinforced Concrete and Vitrified Clay Pipes | Greater than 6-inches | O.D. + 16-inches |

- a. -O.D. – Outside Diameter
- b. -High Density Polyethylene Pipe shall be used only when approved.
- c. -Where trench walls can not sustain a vertical cut, trench width shall be three times O.D.

D. If the maximum trench width specified on the Project Plans is exceeded, the Contractor shall be required to provide a higher strength bedding class or a higher strength pipe as approved by the Director of Public Works.

E. The minimum trench width for installation of water service, street light, or traffic signal conduit of two inches in diameter or less, shall be in accordance with the manufacturer’s recommendation for the conduit.

F. Rock Wheel trench excavation for trench depths up to twenty-four (24) inches for street light, traffic signal, or utility company conduit installations shall only be permitted when approved by the Director of Public Works. Where allowed, rock wheel excavation shall be performed in accordance with Section 86 of the Caltrans Standard Specifications. The minimum trench width shall be two (2) inches wider than the conduit being placed in the trench. The maximum rock wheel trench width shall be six (6) inches.

CS-2-05. SHORING, SHEETING, AND BRACING: The Contractor shall furnish and install sufficient shoring, sheeting, and bracing to insure the safety of workmen and the public, protect the work, and protect existing facilities.

A. Shoring, sheeting, and bracing shall comply with the rules, orders and regulations of CAL/OSHA.

B. Each Contractor shall submit to the Inspector a copy of its current Annual Excavation Permit issued by CAL/OSHA along with the Contractor’s own Trench Safety Plan prior to the start of construction.

- C. The Contractor shall be required to provide drawings and/or calculations by a registered engineer to the Director of Public Works a minimum of five (5) working days prior to beginning excavation for specially designed bracing and shoring of an excavation where required by CAL/OSHA or the Contractor's Trench Safety Plan.
- D. Failure to comply with any of the rules, orders or regulations mentioned herein shall be sufficient cause for the Inspector to immediately suspend the work. The Contractor shall be responsible for the adequacy of all shoring and bracing and compliance with the law. Failure of the Inspector to suspend the work or notify the Contractor of any inadequacy of shoring and bracing or noncompliance with the law shall not relieve the Contractor of this responsibility.
- E. The Contractor shall furnish and maintain shoring, sheeting and bracing until after the pipeline has been installed and sufficiently backfilled and the Inspector has approved the placement of backfill. The Contractor shall provide adequate safety measures to allow for access by the Inspector or testing personnel to perform compaction testing and inspection of the lifts of backfill placed.

CS-2-06. CONTROL OF WATER: When either ground water or surface run-off is encountered, the Contractor shall furnish, install, maintain, and operate all necessary pumps, materials and equipment to keep excavation reasonably free from water until the laying and jointing of the pipe, pouring of concrete and placing of bedding material has been completed, inspected and approved, and all danger of flotation and other damage is removed. Water pumped from the trench excavation shall be disposed of in a manner subject to the approval of the Director of Public Works.

CS-2-07. FOUNDATION:

- A. All loose material shall be removed from the new trench bottom before placing the bedding material.
- B. Special Foundation Treatment:
 - 1. Whenever the bottom of the trench is soft or rocky, or, otherwise unsuitable as a foundation for the pipe in the opinion of the Director of the Public Works, the unsuitable material shall be removed as directed by the Director of Public Works to provide a stable and satisfactory foundation.

CS-2-08. MAXIMUM LENGTH OF OPEN TRENCH:

- A. The maximum length of open trench where prefabricated pipe is to be laid shall be the distance necessary to accommodate that amount of pipe which can be installed and backfilled in that same day, but in no case shall exceed 400 feet except as allowed for with storm drain installation under Section CS-10B, CAST-IN-PLACE CONCRETE PIPE (CIPCP) of the Construction Standards.

- B.** At the end of each working day, there shall be no open trench in paved or improved areas unless it is plated in accordance with these City Standard Specifications. Improved areas are defined as any areas within 300' of any existing housing or commercial structure or paved area whether paved with asphalt concrete or Portland cement concrete.

The maximum length of trench in unimproved areas that may be left open for CIPCP is defined in Section CS-10B. A maximum of 300 feet of trench may be left open in unimproved areas if barricaded for all other piping material installations.

CS-2-09. TRENCH PLATES: Trench plates shall be used for temporary cover of trenches and other excavations.

- A.** When the backfilling of trenches and excavations can not be completed in the same day within a paved street section or within the concrete curb and gutter and sidewalk area, trench plates shall be required and the following conditions shall apply:
1. The plates shall be of steel construction capable of supporting H20 loading
 2. The plates shall have a skid resistant surface.
 3. The plates must extend beyond the edge of the trench wall to adequately support the traffic loads on it. In no case shall the plates extend less than twelve (12) inches beyond the trench wall.
 4. Each plate must be fully supported around the perimeter to prevent wobbling or rocking.
 5. The plates shall be secured to prevent any movement.
 6. Trenches and excavations shall be adequately shored and braced to withstand highway traffic loads.
 7. Temporary paving or cold-mix asphalt concrete (cutback) shall be placed and continuously maintained around all outside edges of the trench plates until removal of the plates.