623 TRENCHLESS TECHNOLOGIES

Bore & Jack / Horizontal Directional Drilling / Micro-Tunneling / Pipe Ramming / Pipe Bursting

Permit Code UJ

The establishment of a "Survey Grid Line" is required on installations with diameters > 30", and may be required on installations with diameters < 30" if warranted. All transverse-crossings of State Highway right-of-way require encasement.

623.0 Introduction

Utility installations and service installations are not permitted within culverts or drainage structures within State highway right-of-way.

The installation of underground utilities within State highway right-of-way shall be performed by the use of a trenchless technology, in most cases. Open-cut installations will only be allowed as a last resort, by issuance of a "UT" permit. The requirement for encasement of utility installations is for the protection of the traveling public and to minimize the amount of disturbance to the structural integrity of the roadbed.

In specific cases encasement may cause a reduction in cathodic protection to the carrier pipe, which may result in corrosion to the pipeline. In these specific cases when authenticated and warranted, encasement of said facility may be waived. Encasement requirements are shown in Table 6.8.

Encasement may be required for longitudinal utility installations within city or county roadways that cross within State highway right-of-way.

623.1 Bore & Jack

Utility installations placed by the bore & jack method shall be monitored to ensure that the integrity of the existing roadway elevations are maintained.

Bore & Jack consists of cutting of the soil, generally 6" to 8" ahead of the pipe being jacked simultaneously, by an auger placed within the encasement. The encasement should generally support the integrity of the hole. When the encasement is also to serve as the carrier facility for hazardous materials, the use of another trenchless installation is recommended. Potential damage could occur during the jacking process, rendering the use of that facility as the carrier.

Table 6.8
Encasement Considerations

Encasement Requirements based on: Installation Method, Type of Highway Facility, and Material Transported in Carrier						
	Bore and Jack		Directional Drilling		Trenching	
Facility Type	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**	**Frwy/Expwy**	**Conventional**
High Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Encase
Low Risk (Section 605)	Encase	Encase	Encase	Encase	Encase	Optional
Exempt Facilities (Section 605)	Encase	Encase	Optional	Optional	Optional	Optional
Pressurized Fluids	Encase	Encase	Encase	Encase	Encase	Encase
Natural Gas Lines Minimum 7.5' Depth (Appendix H)	Optional	Optional	Encase	Encase	Optional	Optional
Gravity Flows	Encase	Encase	Encase	Encase	Optional	Optional

Note: "Optional" means at the option of the District Permit Engineer. **Transverse crossings require encasement.**

623.1A Encasements

Encasements that house carrier pipes under pressure shall be steel pipe with a minimum inside diameter sufficiently larger than the outside diameter of the pipe or duct to accommodate placement and removal and shall conform to Caltrans' Standard Specifications. The steel encasement can be either new or used, or of the approved connector system. Used steel casing shall be pre-approved by a Caltrans' representative prior installation.

When the method of Horizontal Directional Drilling is used to install the encasement, the use of High Density Polyethylene Pipe (HDPE) as the encasement is acceptable. In specific instances the approval of Headquarters Office of Encroachment Permits, may be required.

Reinforced Concrete Pipe (RCP) in compliance of State Standard Specifications is an acceptable carrier for storm drain gravity flow or non-pressure flow. RCP when installed by Bore & Jack shall have rubber gaskets at the joints, and holes for the grouting of voids left by jacking operations (see grouting requirements in # 4 below).

Encasement requirements:

1. All transverse crossings, single ducts or pipes 6" or greater (150 mm) in diameter shall be encased. Installation of multiple ducts or pipes, regardless of diameters, shall require encasement (for exceptions see Appendix H).

2. The minimum wall thickness required for steel encasements is based on lengths and diameters of pipes is shown in Table 6.9.

3. Encasement ends shall be plugged with un-grouted bricks or other suitable material approved by the Caltrans' representative.

4. The Caltrans' representative may require the permittee to pressure grout, filling any voids generated in the course of the permitted work. Grouting shall be at the expense of the permittee. Grout holes when placed inside the of the pipe, generally on diameters of 36” or greater, shall be on 8' (2.43 m) centers, longitudinally and offset 22 degrees from vertical, and staggered to the left and right of the top longitudinal axis of the pipe. Grout pressure shall not exceed five (5) psig (34.5 kPa) for a duration sufficient to fill all voids.

5. There is a spacing requirement when placement of multiple encasements is requested. The distance between multiple encasements shall be the greater of either 24” (610mm) or twice that of the diameter of the larger pipe being installed.

6. Wing cutters when used shall only add a maximum of 1" (25.4 mm) in diameter to the outside diameter of the encasement pipe. Voids in excess of the Standard Specifications shall be grouted.

7. A band welded to the leading edge of the encasement pipe should be placed square to the alignment and not on the bottom edge of pipe. A flared lead section on bores over 100' (30.48 m) shall not be permitted.

8. The length of the auger strand shall be equal to that of the section of encasement pipe.

9. Encasements placed within conventional highway right-of-way shall extend 5' (1.52 m) beyond the edge of the paved shoulder, back of curb, or to the highway right-of-way line.

10. Encasements placed across controlled access right-of-way shall extend to the highway right-of-way lines.

Table 6.9
Required Thickness for Steel Pipe Casings

	Minimum Wall Thickness	
Casing Diameter	**Up to 150' (45.7 m) Length**	**Over 150' (45.7 m) Length**
6" to 28" (152 mm to 711 mm)	1/4" (6 mm)	1/4" (6 mm)
30" to 38" (762 mm to 965 mm)	3/8" (10 mm)	1/2" (13 mm)
40" to 60" (102 mm to 152 mm)	1/2" (13 mm)	3/4" (19 mm)
62" to 72" (1575 mm to 1829 mm)	3/4" (19 mm)	3/4" (19 mm)

623.1B Bore and Receiving Pits

Requirements:

1. Shall be located a minimum of 10' (3.04 m) from the edge of pavement in rural areas, or at least 5' (1.52 m) beyond the concrete curb and gutter or AC dike in urban areas, or at least 5' (1.52 m) beyond the toe of slope of embankments.

2. Shall be located outside of controlled access highway right-of-way. EXCEPT, when approved by the district for direct crossings that are excessively long, or there is restricted space available for placement, outside of the right-of-way. Those portions of the installation not placed by Bore & Jack shall be encased by the open trench method.

3. Protected by placement of 6' (1.82 m) chain link fence or Type-K barrier around them.

4. Shored in accordance to Cal-OSHA requirements. Shoring of pits located within 15' (4.57 m) of lanes within State highway right-of-way shall not extend more than 36" (914 mm) in height above the pavement grade, unless authorized by a Caltrans' representative.

5. Reflectors shall be affixed to the shoring on all sides facing traffic.

6. Pits shall not affect any State facilities, or create a hazard to the traveling public. Damaged State facilities shall be replaced in-kind or repaired to their original state.

7. All pits should have crushed-rock and sump areas to clear groundwater and water used to clean the casings. Pits shall be lined with filter fabric when groundwater is found and pumping is required.

8. Temporary Type-K railing shall be placed at a 20:1 taper or as otherwise directed by the Caltrans' representative to maintain the integrity of the adjacent travel lane.

A tunnel is defined as any installation that is 30" (762 mm) or larger in diameter (see Section 518, and Table 5.24 - Permit Code TN).

623.2 HORIZONTAL DIRECTIONAL DRILLING

Horizontal Directional Drilling is another trenchless method for the placement of encasement or carrier pipe under, across or within existing highway right-of-way.

623.2A BACKREAMER DETECTION

JANUARY 1, 2000, sonde detection on the backreamer is required. **(see Appendix "E".)**

623.2B DOCUMENTATION OF PROJECTED PATH

The permittee shall provide a copy of the bore-log showing horizontal and vertical alignment (depth). A bore-log shall be kept for both the pilot bore and the reaming process. These records shall be provided to the Department's representative daily. The bore-log shall depict a plan profile of the actual bore path.

623.2C SAFETY REQUIREMENTS

All drilling units **should be equipped with** an electrical strike safety package. This package at minimal **should contain** a warning sound alarm and shall be tested upon setup of the job.

Protective safety gear IS REQUIRED for all members of the contractor's crew, (Die-Electric boots are required. At all HDD operation sites, Safety electric overshoes **shall** be worn by all member's of the crew and by the inspector, at all times.

623.2D PERMIT APPLICATION SUBMITTAL

All utilities that are installed by HDD shall provide "As-Builts" upon completion of the job.

The permit application package should contain the following information in support of the permit application; construction plan, site layout plan, project schedule, communication plan, safety procedures, emergency procedures, company experience record, contingency plan and a drilling fluid management plan in support of the permit application.

1. Location of entry and exit point.
2. Equipment and pipe layout areas.
3. Proposed drill path alignment (both plan & profile view).
4. Location, elevations and proposed clearances of all utility crossings and structures.
5. Proposed Depth of cover.