

## Chapter 600 – Utility Permits

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# Chapter 600

## Utility Permits

### 600 INTRODUCTION (Rev. 06/20)

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Caltrans policy is to allow utilities within conventional highway right-of-way subject to reasonable conditions and to exclude them from within access-controlled right-of-way to the extent practicable with few exceptions. Requests for utility encroachments that are not allowed by Caltrans policy or utility access within access-controlled right-of-way require an approved encroachment policy exception.

The primary purpose of these policies is to protect both the public and highway workers from the hazards of a damaged, exposed, cut, or penetrated utility. The secondary purpose is to protect the public's investment in the highway system (see Project Development Procedures Manual [PDPM] Chapter 17). In the event of there being a discrepancy between this manual and the PDPM, the PDPM shall govern.

Caltrans policy does not allow the installation of septic tanks, leach fields, or any other facility that may lead to future costs for the State.

When Caltrans issues a permit for installation of public utility facilities, it does not inspect the installation for compliance with the utility or public corporation standard. Compliance with industry standards is the responsibility of the public utility or public corporation.

Although statutes do not require Caltrans to inspect encroachment permit projects, inspectors may be assigned to provide inspection. The District Permit Engineer may require inspections to be performed by other Caltrans units, utility companies, local agencies, or private engineers hired by the permittee at the permittee's expense. The District Permit Engineer retains the authority to approve any non-Caltrans inspector prior to the commencement of work

Registered Engineer's Seal and Signature requirements on utility plans are discussed in section 202.5A.

The most common utility and franchise facilities are:

- Water
- Sewer
- Broadband
- Cable Television
- Electrical
- Natural Gas

- Telephone - Cellular
- Telephone - Landline
- Common-carrier petroleum pipelines

Services, products, and commodities, such as those mentioned above, that are provided as a service to the public are called public utilities. Public corporations and private companies may own and operate facilities for the transmission and distribution of utilities. Public corporations are owned by the local governing body, e.g., the Sacramento Municipal Utility District (SMUD) and are governed by State law and the regulations of the California Public Utilities Commission (CPUC). Privately owned companies providing service to the public, such as, Pacific Gas and Electric (PG&E) and Southern California Edison are regulated by the State law and CPUC regulations. Also, privately owned companies that do not generally provide utility service to the public and are not regulated by the CPUC, may service the public under a franchise by the local governing body (e.g. city or county).

Before a privately-owned utility company can offer its services to the public it must, in most cases, first obtain a Certificate of Public Convenience and Necessity (CPCN) from the CPUC. After the CPCN is granted, the utility company must file its tariffs (rates) with the CPUC. Upon approval and under CPUC regulation, the utility company can sell its services to the public. Qualifying utility companies are issued a User Fee Number by the CPUC.

In some cases, only certain segments of a company's facilities may be public utilities, while other segments are used exclusively by the company. If there is any question regarding the status of a permit applicant or a specific facility segment as to a public utility, contact the appropriate Branch (Energy, Telecommunication, or Water Utilities) of the CPUC's Advisory and Compliance Division. They will verify the status of the company or facility.

Streets and Highways Code Section 117 grants Caltrans the authority to issue permits, under Chapter 3 (commencing with Section 660), for the location in the right-of-way of any structures or fixtures necessary to telegraph, telephone, or electric power lines or of any ditches, pipes, drains, sewers, or underground structures.

Caltrans has developed minimum utility construction standards for the occupancy and use of the State highway right-of-way for utility facilities. Additional construction standards may be required by District Policies or Highway Design Policies.

This chapter addresses requirements for the initial placement and subsequent adjustment, relocation, and replacement of utility facilities within State highway right-of-way. It also describes specific requirements associated with these permit codes:

**Table 6.0A**  
**Administrative Utility Permit Codes**

SECTION	CODE	TITLE
601.1	UR	State required relocation
601.2	AS	Utility wireless installations
601.3	US	SAFE telephones

**Table 6.0B**  
**Utility Permit Codes**

SECTION	CODE	TITLE
603.2A	BB	Telecommunications (including broadband)
602.7A	UB	Utilities Within or on Bridges and other Structures
603.4A	UC	Conventional Aerial
604	UE	Utility Annual Maintenance
603.4B	UF	Access-controlled Aerial
602.4B 602.5A	UJ	Utility Crossing Encroachments
602.4C 602.5B	UL	Longitudinal Encroachments
603.5	US	Service Connections, Potholing, Modifications and Miscellaneous Utility Work
603.6B	UT	Open-cut road

### **600.1 Utility Permitting and Billing Process** (Rev. 06/20)

Procedures for determining and collecting permit fees for utility facility encroachments owned by utility companies differ from those encroachments owned by private companies or developers. Usually, utility companies providing utility facility service to the public are billed for application and inspection fees whereas other companies pay fees at the time of application. For example, cable television systems holding city or county franchises are eligible for the same encroachment privileges that are available to public utility corporations. Cable television companies are not regulated by the CPUC but are set up as a franchise by the local agency.

Cellular telephone companies are communication-type public utilities that are regulated by the CPUC. They are entitled to the same considerations granted to all communication utility companies for use of State highway right-of-way.

A permit must be issued to the owner of the encroachment. A utility facility encroachment may be constructed or installed by someone other than the owner. Double-permitting is not usually needed for private utilities and requiring a Double Permit (DP) is at the discretion of the District Permit Engineer. However, for public utilities using a contractor, a DP will be needed to recover inspection charges for the project.

The installer or contractor may be required to apply for and secure an encroachment permit (DP) if prior contractor performance was poor. In this situation, the DP provides Caltrans with direct control over the authorized work. DPs, when required, are issued at a two-hour minimum fee, but inspection costs are billed directly to the utility owner.

Utility companies or franchisees that have been non-compliant, failed to pay bills in a timely manner or have any violations of laws, regulations or standards may face adverse actions.

Adverse actions may include but are not necessarily limited to:

1. Payment of estimated fees prior to the processing of the encroachment permit submittal,
2. Require bonding in accordance with Standard Specification 3-1.05,
3. Require their contractors to obtain a DP and to furnish bonds,
4. Revocation of encroachment permits except for emergency work.

## 601 ADMINISTRATIVE UTILITY PERMITS

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### 601.1 State Required Relocation (Rev. 06/20)

#### *Permit Code UR*

UR permits authorize the relocation of utility facilities or pot-holing for the exact horizontal and vertical alignment of the utility when such relocation or design information is required by State highway improvement projects.

When highway construction occurs either by a State contract or an Oversight Project in lieu of a State contract (e.g., projects programmed in STIP or SHOPP) that requires identification and/or relocation of an existing utility facility encroachment, arrangements for the identification and/or relocation are initiated by the State or approved local program. All request for information or relocated installations must be covered by an encroachment permit regardless of who finances or constructs the highway project. When information is requested, the utility must supply the exact horizontal and vertical alignment of their utility facilities.

A complete Encroachment Permit Application Package including but not limited to, a copy of the “Notice to Owner” (form RW-13-04), copies of the final approved relocation plans, a completed “Standard Encroachment Permit Application (form TR-0100), and a completed “Encroachment Permits Administrative Route Slip” (form TR-0154) must be submitted by the Right-of-Way Utility Coordinator to the District Encroachment Permits Office requesting the issuance of the UR permit. The permit should be issued in a timely manner since all applicable reviews and approvals have already been obtained as signified by the signed “Encroachment Permit Administrative Route Slip” (form TR-0154). The District Encroachment Permits Office issues the UR permit to the Right of Way Utility Coordinator for issuance to the utility owner. The Project Delivery representative is responsible for monitoring the project construction, ensuring the permit does not expire, and submitting as-built plans to the District Encroachment Permits Office. The District Encroachment Permits Office has no other involvement except to archive the permit when closed. Utility work that is ordered under a Notice to Owner is exempt from encroachment permit fees.

The text of the permit must contain:

- Utility Notice number
- A reference to the State contract and Project Code,
- A brief description of the work,
- The construction inspector's name and contact information.

The attachments of the permit must contain:

- Encroachment Permit General Provisions (TR-0045),
- A copy of the “Notice to Owner” (RW-13-04)
- A copy of the approved relocation plans.

This information is provided on the face of the notice, and the issued permit may mimic the notice to simplify procedures and avoid conflicting statements. The District Encroachment Permits Office sends copies to Maintenance, Construction, and the area permit inspector for information. Construction is responsible for inspection and permit completion including the “Progress Billing/Permit Closure” (form TR-0129).

The law governing liability for the cost of relocating utility facilities encroachments is complex and must be interpreted uniformly and fairly. The Right of Way Utilities section is responsible for the cost sharing decisions.

All permits for local agency projects constructed by encroachment permit without a cooperative agreement must contain this clause:

“If existing public or private utilities conflict with the construction PROJECT, PERMITTEE will make necessary arrangements with the owners of such utilities for their protection, relocation, or removal. PERMITTEE must inspect the protection, relocation, or removal of such facilities. Total costs of such protection, relocation, or removal which STATE or PERMITTEE must legally pay, will be borne by PERMITTEE. If any protection, relocation, or removal of utilities is required, including determination of liability for cost, such work must be performed in accordance with STATE policy and procedure. PERMITTEE must require any utility company performing relocation work within the STATE's right-of-way to obtain a State Encroachment Permit before the performance of said relocation work. Any relocated utilities must be correctly located and identified on the as-built plans.”

Encroachment permits for developer projects being constructed without a highway improvement agreement must contain the following clause:

“If existing public or private utilities conflict with the construction PROJECT, PERMITTEE will make necessary arrangements with the owners of such utilities for their protection, relocation, or removal. PERMITTEE must inspect the protection,

relocation, or removal of such facilities. Total costs of such protection, relocation, or removal must be borne by PERMITTEE in compliance with the terms of the Highway Encroachment Permits, Case Law, Public Utility Regulations, and Property Rights. PERMITTEE must require any utility company performing relocation work within the STATE's right-of-way to obtain a State Encroachment Permit before the performance of said relocation work. Any relocated utilities must be correctly located and identified on the as-built plans. The PERMITTEE must ensure that relocated utilities are located and identified on the as-built plans prior to submittal to and before the District Encroachment Permits Office closes the permit.”

State highway projects constructed under cooperative or highway improvement agreements do not require the above clauses in the permit provisions because similar provisions must be included in the respective agreements.

### **601.1A Performing Relocation Work**

Whenever possible, utility facility relocation or protection work that is required by highway improvement or construction must be performed by the owner before the highway work begins. Arrangements for such work must be made with the owners by the District Right of Way Utility Coordinator.

### **601.2 Utility Wireless Installations** (Rev. 04/18)

#### ***Permit Code AS***

All wireless utility installations that occupy parcel of land in Caltrans right-of-way require “right-of-way use agreement”. All such requests must be directed to District Airspace manager. District Encroachment Permits Office will support with issuing administrative permit. See section 500.3 for further details, requirements and process, related to airspace lease or right-of-way use for wireless utility installations.

### **601.3 SAFE Telephones**

#### ***Permit Code US***

Streets and Highways Code Section 2550 authorizes county and regional government bodies to establish “Service Authority for Freeway Emergencies (SAFE)” agencies. SAFE agencies are ratified by a majority of the cities encompassed by the SAFE jurisdiction.

They function as the administrative body to develop, implement, operate, and fund access-controlled right-of-way emergency telephone systems. Systems are installed by locally administered contract under encroachment permit. SAFE funding comes from a one-dollar assessment by the Department of Motor Vehicles on each registered vehicle in the jurisdiction.

SAFE telephones are acceptable within access-controlled right-of-way and connecting highways under jurisdiction of the California Highway Patrol (see Streets and Highways Code 131.1).

They also are acceptable in park-and-ride lots as provided in SAFE guidelines. SAFE systems must connect directly to a California Highway Patrol dispatch.

Only local authorities may propose SAFE systems. Site selection and design are determined by SAFE and the District SAFE Coordinator and are reviewed by appropriate Caltrans functional units. Upon acceptance of the plans as complete, a copy of the plans, the cooperative agreement, and completed “Encroachment Permits Administrative Route Slip” (form TR-0154) are sent to the permit engineer for permit issuance. No additional review is required by the permit engineer. Any Caltrans' costs attributed to the project are reimbursed according to the SAFE/Caltrans cooperative agreement.

The encroachment permits issued to SAFE for construction and subsequent maintenance of the project are fee exempt. However, SAFE’s contractor must be charged permit issuance and inspection fees under the double permit process. For additional information on SAFE call boxes, see the Publication Titled, “CHP/Caltrans Call Box, and Motorist Aid Guidelines.”

“Certification of Compliance with the Americans with Disabilities Act” (form TR-0405) is required for the installation of SAFE phones.

## 602 UTILITY ACCOMODATION POLICY

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### 602.1 Conditions of Occupancy within State Highway

#### Right-of-way (Rev. 04/18)

All utility encroachments within the State highway right-of-way must be designed, installed, and maintained so that traffic disruption and other hazards to highway users are minimized. The design must comply with Caltrans standards and specifically Topic 309 of the Highway Design Manual.

Encroachments must not be constructed, installed, or maintained if they adversely affect the safety, design, construction, operation, maintenance, stability of the highway or any proposed/existing highway appurtenance, or limit the use of the right-of-way or increase the cost of future improvements.

Permittees understand and agree to relocate a permitted installation upon notice by Caltrans. Unless under prior property right or agreement, the permittee must comply with said notice at the permittee’s sole expense (Encroachment Permit General Provision # 25). District Right of Way Utilities initiates the Notice to Owner.

Damaged plants or landscaped areas must be replaced or restored, and surface structures must be consistent with aesthetic values of the highway, Caltrans standards and economic feasibility. Access to utility facilities on conventional highways is permitted from the right-of-way or roadway.

Access to utility facilities located within the access-controlled right-of-way normally is permitted only from frontage roads, public roads and streets, trails, or auxiliary roads. In some situations, the installation of a locked gate by a utility company in an access-control right-of-way fence is permitted only with an approved encroachment policy exception (see Chapter 17 of the PDPM). For sites within the right-of-way leased for wireless telecommunications facilities, the District Airspace Review Committee (DARC) approves gate installations under the right-of-way use agreement (see Section 500.3F).

Utility support structures, manholes, or other appurtenances that are proposed to be located within interchanges, median areas, or within any other access-controlled area when access for servicing is not possible by the means described above require an approved encroachment policy exception. To ensure safety, terms and conditions may be imposed on the utility company limiting access to such facilities from ramps or through traffic lanes.

## 602.2 Utility Owner Prior Rights

A fee exempt permit is issued for utility encroachment activities involving utility work wherein the utility owner has prior rights (utility facility in place before highway right-of-way purchase), i.e., a Consent to Common Use Agreement (CCUA) or a Joint Use Agreement (JUA). The permit can be issued for all the purposes for which the owner's original easement was acquired. These activities could include: modification, relocation, replacement, upgrade, and maintenance.

Utility owners with prior rights must submit an encroachment permit application package that includes prior rights identified for verification (CCUA or JUA number if available). District Permit Engineer may request for additional documentation if needed. If a number is not available, the application should be reviewed by District Right of Way Engineering and Right of Way Utilities to ensure that the proposed work is authorized under a prior property right.

The District Right of Way Utilities Branch must determine when the encroachment permit will be stamped "For Record Purposes Only." These types of encroachment permits must contain the following clause:

“It is understood that the Owner's easement(s) within the area of common use within the highway or at a new location within the highway may be used for the purpose for which the original easement(s) was acquired subject to Permittee providing advance notification of planned work and adherence to traffic safety and highway integrity requirements as contained elsewhere in this permit.”

When a contractor's double permit is required, it is also a fee exempt permit.

## 602.3 Encroachments No Longer in Use (Rev. 06/20)

Permittees must remove their facilities at their expense from the highway right-of-way when they are no longer in use. **Underground facilities may be allowed to remain in place when the**

highway segment is also being abandoned or portions may be allowed to remain if removing that portion of the facility would cause significant impacts to infrastructure or traffic.

Exception requests may be approved at the discretion of the District Permit Engineer if the facilities or the work involved to remove them:

1. create a hazard,
2. seriously disrupt traffic,
3. have the potential to damage adjacent facilities.

Exception requests must include the proper justification and supporting documents such as alternatives explored etc.

Facilities made of or containing hazardous materials (such as asbestos) must be removed in accordance with the “Hazardous Materials and Hazardous Waste Management Special Provisions” (TR-0408).

Filling abandoned pipes with sand, two-sack slurry cement, or Controlled Low Strength Material (see Appendix H) is required to protect the highway.

## **602.4 Utility Encroachments within access-controlled right-of-way**

See PDPM, Chapter 17, Section 2, Article 2 for Caltrans’ policies related to utility encroachments within access-controlled right-of-way.

As identified in the above reference from the PDPM, utility encroachments are restricted within access-controlled right-of-way with few exceptions. This section describes requirements for crossings and longitudinal utility encroachments that are allowed within access-controlled right-of-way.

When prior rights within access-controlled right-of-way are substantiated by the utility owner (see Section 602.2), any associated encroachment permits must be stamped "For Record Purposes Only" or "Freeway Permit."

Utility service connections for State facilities along access-controlled right-of-way should have all disconnects, meters, or shut-offs outside access control lines. The utility is required to obtain a NUS (No fee Utility Service) permit for the connection.

### **602.4A Access Encroachments**

Breaks in access are restricted on access-controlled right-of-way. See PDPM, Chapter 17, Section 2, Article 3 “Access Restrictions”, for Caltrans policies related to access to encroachments or for maintaining existing encroachments in access-controlled right-of-way.

## 602.4B Utility Crossing Encroachments within access-controlled right-of-way (Rev. 06/20)

### Permit Code UJ

Public utility facilities must be granted permission to cross State highways, as well as facilities that are not dedicated to public use but are used for the same purposes as public utility facilities.

Table 6.1 lists the restrictions that apply to utility crossing encroachments within access-controlled right-of-way. Privately owned water, power, or communication facilities that are used for private purposes are allowed to cross State access-controlled right-of-way only when property or easements are under the same ownership on both sides of the highway and there are no utility maintenance points inside the State right-of-way.

**Table 6.1 (Rev. 06/20)**  
**Utility Crossing Encroachments within access-controlled right-of-way**

<p>The following restrictions apply to utility crossing encroachments within access-controlled right-of-way:</p> <ol style="list-style-type: none"> <li>1. The number of crossings must be minimized to the extent practical.</li> <li>2. Service connections generally are not allowed to cross.</li> <li>3. When feasible, multiple installations should cross in a single conduit or structure.</li> <li>4. Crossings should be normal (90 degrees) to the highway alignment where practical.</li> <li>5. Clearances of overhead crossings must conform to regulations of the CPUC.</li> <li>6. New installations under an existing roadbed and median must be made by trenchless technology methods approved by the District.</li> <li>7. Underground encroachments in a depressed section should be avoided.</li> <li>8. Sag pipes (inverted siphons) should be avoided whenever there is a possibility of sedimentation in the sag. Air vents and provisions for draining the sag must be required when sag pipes are unavoidable.</li> <li>9. Overhead pipeline crossings in a depressed section must be made at street overcrossings or by a separate structure of suitable appearance. Except for pipelines in box girders, the pipeline must be placed in a watertight sleeve. A common structure should be used for multiple pipes.</li> <li>10. Tunneling under access-controlled right-of-way is considered under the following conditions: <ul style="list-style-type: none"> <li>• Studies establish that the soil structure is sufficiently stable.</li> <li>• Permanent tunnel portals must be located outside the right-of-way line or the access control line (if those do not coincide). Consideration may be given to a location within the access control limits if it will not adversely affect highway operation, it is beyond the toe of slope of embankments. Any deviations require an approved encroachment policy exception.</li> </ul> </li> <li>11. See Table 6.7 for encasement requirements.</li> <li>12. Fixed objects higher than 4 inches above the surrounding terrain are not allowed closer than 52 feet of the traveled way of the operating highway.</li> <li>13. Supports for <b>overhead</b> lines crossing access-controlled right-of-way: <ul style="list-style-type: none"> <li>• Must be located outside the access-controlled right-of-way. Any deviations require an approved encroachment policy exception.</li> </ul> <p>If approved as an exception to be installed within Caltrans right-of-way:</p> <ul style="list-style-type: none"> <li>• Should not be permitted in median areas except when required for temporary guard poles to support netting for overhead line installation.</li> <li>• Should not be permitted on cut or fill slopes.</li> <li>• Must not impair sight distances.</li> </ul> <p>Consideration should be given to underground facilities when spanning roadways is not feasible.</p> </li> <li>14. Traffic always must be protected, and barriers or protective devices are required as necessary.</li> <li>15. Open trenching is not permitted unless approval is granted by the District Permit Engineer.</li> </ol>
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## **602.4C Longitudinal Utility Encroachments within access-controlled right-of-way** (Rev. 06/20)

### *Permit Code UL*

Placement of longitudinal utility encroachments within access-controlled right-of-way is prohibited under Caltrans' policy (except for Broadband installations, telecommunication facilities and temporary wells). Maintenance access points such as pull boxes and controller cabinets are not allowed within access-controlled right-of-way. Any deviations require an approved encroachment policy exception.

## **602.5 Utility Encroachments within conventional highway right-of-way**

This section describes requirements for utility crossing and longitudinal utility encroachments within conventional highway right-of-way.

Districts are delegated authority to issue permits for the placement and maintenance of utility facilities within the conventional highway right-of-way. Applications for encroachments by publicly or privately-owned utility companies (regulated by the CPUC) dedicated for public use are reviewed and approved at the District level. The Districts may also approve encroachments by privately-owned utility companies dedicated for public use and franchised by the local governing body.

Privately-owned utility companies that use the utility for their sole purpose may be granted an encroachment permit for reasonable utility crossing of conventional highways, but longitudinal encroachments are not approved. Requests by companies for placement of longitudinal encroachment utilities for their sole purpose that are not dedicated for public use and franchised by the local governing body require an approved encroachment policy exception.

## **602.5A Utility Crossing Encroachments within conventional highway right-of-way**

### *Permit Code UJ*

Table 6.2 lists the restrictions that apply to utility crossing encroachments within conventional highway right-of-way. The Reclamation Board, in maintaining the integrity of the State's levee system, issues permits for construction of facilities within the levee prism. Caltrans and the Reclamation Board cooperatively agreed to authorize Reclamation Board construction methods provided that Caltrans' minimum depth requirements are met. Encroachment permits to install underground facilities where a State highway is on or crosses a levee must indicate approval and inspection by the Reclamation Board.

**Table 6.2**  
**Utility Crossing Encroachments within conventional highway right-of-way (Rev. 06/20)**

<p>The following restrictions apply to utility crossing encroachments within conventional highway right-of-way:</p> <ol style="list-style-type: none"> <li>1. The number of crossings must be minimized.</li> <li>2. Underground distribution facilities on each side of the highway should be considered to avoid numerous crossings by service connections.</li> <li>3. Crossings should be normal (90 degrees) to the highway alignment where practical.</li> <li>4. Clearances of overhead crossings must conform to regulations of the California Public Utilities Commission.</li> <li>5. An existing authorized encroachment that will not affect new highway construction may be left in place at the District's discretion, provided the District determines that it will not constitute a safety hazard or obstruction to construction.</li> <li>6. New installations under an existing roadbed must be made by boring and jacking, directional drilling or other methods approved by the District.</li> <li>7. Sag pipes (inverted siphons) must be avoided whenever sedimentation in the sag is a possibility. Air vents and provisions for draining the sag must be required when sag pipes are unavoidable.</li> <li>8. Tunneling under conventional highways must conform to the requirements for access-controlled right-of-way.</li> <li>9. Bore pits or manholes at street intersections should be located behind the State highway curb line where possible.</li> <li>10. Poles or other utility appurtenances in conventional highway right-of-way must be as close to the right-of-way line as possible, with a desirable minimum clear recovery zone identified in Topic 309 of Highway Design Manual and meet the requirements of Design Information Bulletin 82 (DIB-82).</li> <li>11. Traffic must always be protected, and barriers or protective devices are required as necessary.</li> <li>12. New encroachments should not adversely affect the safety, design, construction, operation, maintenance, stability of the highway or any proposed/existing appurtenance or limit the use of the right-of-way or increase the cost of future improvements.</li> </ol>
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## **602.5B Longitudinal Utility Encroachments within conventional highway right-of-way**

### ***Permit Code UL***

New publicly owned utility facilities and privately-owned utility facilities that are regulated by the CPUC and dedicated to public use may be placed within the right-of-way of conventional highways when approved by the District. Generally, such encroachments including poles must be located as close as possible to the right-of-way line, outside of the Clear Recovery Zone (CRZ) when applicable. On conventional highways with curbs, typically in urban conditions, a minimum horizontal clearance of 1 foot 6 inches should be provided beyond the face of curbs to any obstruction (see Highway Design Manual Topic 309 Clearances). The installation must meet the requirements of the current Design Information Bulletin 82 (DIB 82). Permissible locations are shown in Table 6.3 in order of preference. Justifications for lower preference locations may be required by the DPE.

**Table 6.3 (Rev. 04/18)**  
**Permissible Locations for Installations in conventional highway right-of-way**

<b>Above ground Installations*</b>	<b>Underground Installations</b>
<ol style="list-style-type: none"> <li>1. as close to the right-of-way line as possible</li> <li>2. back of sidewalk</li> <li>3. 1 foot 6 inches clearance to from back of curb</li> </ol>	<ol style="list-style-type: none"> <li>1. as close to the right-of-way line as possible</li> <li>2. under sidewalk</li> <li>3. under parking lane/shoulder</li> </ol>

\* Must meet CRZ requirements established in Topic 309 of Highway Design Manual

Requests for longitudinal encroachments by privately owned companies for their own use are not allowed. Any deviations require an approved encroachment policy exception.

When highways are widened, existing and new installations should adhere to setback limits or should be protected. Consideration should be given to allow utility owners to place such encroachments underground in parking areas.

In urban areas, manholes should not be located where there is a break in grade between the pavement and gutter or in major traffic lanes of a cross street. In areas where snow removal equipment is used, consideration should be given to slightly depressing the manhole.

Any existing underground facility located under the roadbed of a new unconstructed highway may be permitted to remain in place during its useful life provided its depth complies with current standards and does not require relocation (as determined by the District Right of Way Utility Coordinator and Project Development) resulting from highway construction.

If the encroachment is a public utility facility, consideration must be given to the likelihood and extent of future service connections that will require cutting the pavement. Rules governing new installations will determine whether existing facilities must be relocated, or may be replaced in the same location, after expiration of their useful life.

High priority pipelines (see section 603.1) are not permitted within the right-of-way unless they are dedicated to public use (for example, the pipeline carries products of more than one owner and is under CPUC jurisdiction). Companies having franchise rights from local agencies may place their facilities within the right-of-way with an approved encroachment policy exception.

Existing legally-placed service facilities may be permitted to remain in place if they do not interfere with highway construction, operations, or maintenance.

See PDPM, Chapter 17, Section 2, Article 2 for Caltrans' policies related to utility encroachments within conventional highway right-of-way for additional information.

## 602.5C Temporary Steel Plate Bridging - With a Non-Skid Surface (Rev. 04/18)

Highway encroachment work involving excavations shall be identified during the review process of the permit application package. To accommodate excavation work, steel plate bridging may be necessary. All permit conditions for use of steel plate bridging should be set forth in the special provisions of the permit.

Consideration of steel plate bridging in the review process should take into account the following factors:

1. Traffic speed.
2. Traffic volume and composition.
3. Duration and dimensions (width & daily estimated lengths) of the proposed excavation.
4. Weather conditions.

When it is determined in the review process that shoring will be a part of the permitted operation, the shoring shall conform to Caltrans standards.

When backfilling operations of an excavation in the roadway including bike lanes and parking strip, whether crossing or longitudinal, cannot be properly completed within a work day, steel plate bridging with a non-skid surface and shoring may be required to preserve unobstructed traffic flow. In such cases, the following conditions shall apply:

1. Steel plate bridging within access-controlled right-of-way is not allowed.
2. Steel plates used for bridging must extend a minimum of 12 inches beyond the edges of the trench.
3. Steel plate bridging shall be installed to operate with minimum noise.
4. The trench shall be adequately shored, as mentioned in Section 603.6B-2, to support the bridging and traffic loads.
5. Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates, if plate installation by Method (2) described below, is used.
6. Bridging shall be secured against displacement by using adjustable cleats, shims, or other devices.

As required by the District, steel plate bridging and shoring shall be installed using either Method (1) or (2):

**Method 1** For speeds 45 mph or greater:

The pavement shall be cold planed to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate.

Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and

drilled 2 inches into the pavement. Subsequent plates are to be butted and tack welded to each other.

**Method 2** For speeds less than 45 mph:

Approach plate(s) and ending plate (if longitudinal placement) shall be attached to the roadway by a minimum of two (2) dowels pre-drilled into the corners of the plate and drilled 2 inches into the pavement. Subsequent plates are to be butted and tack welded to each other. Fine graded asphalt concrete shall be compacted to form ramps, maximum slope 8.5 percent with a minimum 12 inches taper to cover all edges of the steel plates. When steel plates are removed, the dowel holes in the pavement shall be backfilled with either graded fines of asphalt concrete mix, concrete slurry, epoxy or an equivalent that is satisfactory to the Caltrans' representative.

The permittee is responsible for maintenance of the steel plates, shoring, asphalt concrete ramps, and ensuring that they meet minimum specifications.

Unless specifically noted or granted in the provisions of the permit, or approved by the State representative, steel plate bridging SHALL not exceed four (4) consecutive working days in any given week and should not be left through the weekend. Backfilling of excavations shall be covered with a minimum 3 inches temporary layer of cold asphalt concrete.

The following table shows the underlined minimal thickness of steel plate bridging required for a given trench width (A-36 grade steel, designed for HS20-44 truck loading per Caltrans Bridge Design Specifications Manual).

<u>Trench Width</u>	<u>Minimum Plate Thickness</u>
10 inches	$\frac{1}{2}$ inch
1 foot 11 inches	$\frac{3}{4}$ inch
2 feet 7 inches	$\frac{7}{8}$ inch
3 feet 5 inches	1 inch
5 feet 3 inches	1 $\frac{3}{4}$ inch

NOTE: For spans greater than 5 feet 3 inches, a structural design shall be prepared, signed, and stamped by a California Registered Civil Engineer.

All steel plates within the right-of-way whether used in or out of the traveled way shall be without deformation. Inspectors can determine the trueness of steel plates by using a straight edge and should reject any plate that is permanently deformed.

Steel plates used in the traveled portion of the highway shall have a surface that was manufactured with a nominal coefficient of friction (COF) of 0.35 as determined by California Test Method 342 (see Appendix H). If a different test method is used, the permittee may utilize standard test plates with known COF available from each Caltrans District Materials Engineer to correlate skid resistance results to California Test Method 342. Based on the test data, the

permittee shall determine what amount of surface wear is acceptable, and independently ascertain when to remove, test, or resurface an individual plate.

Caltrans' Permit Inspectors should not enforce plate removal unless it is permanently deformed or delivered without the required surfacing. The utility owners and contractors are responsible for maintaining plates and ensuring that they meet minimum specifications. They will also independently determine when to accept, test, or reject a plate. However, an inspector should document in a diary all contacts with the utility owners and contractors.

A "Rough Road" (W8-8) sign and a "Steel Plate Ahead" (W8-24) sign with black lettering on an orange background must be used in advance of steel plate bridging along with the required construction area signs. These signs must be used along with any other construction area signs.

Surfacing requirements are not necessary for steel plates used in areas not open to traffic, such as parking strips, on shoulders not used for turning movements, or on connecting driveways, etc.

## **602.6 Utility Encroachments and General Construction on Scenic Highways**

The intent of the State Scenic Highway Program is to protect and enhance the natural beauty of California. Scenic highway proposals are initiated by local jurisdictions and officially designated by the Director of Caltrans. Local jurisdictions are required to develop and enforce Corridor Protection Programs for each scenic highway corridor, in the form of ordinances, with the concurrence from Caltrans.

Corridor Protection Programs contain land use elements that support scenic preservation along the route. A scenic corridor is defined as the area of land generally adjacent to and visible from the highway. The California Public Utilities Code has regulations pertaining to utilities within the scenic highway corridor.

### **602.6A Utility Facilities**

The California Public Utility Code Section 320 prohibits new overhead utility distribution installations in scenic highway corridors and requires the California Public Utilities Commission (CPUC) to regulate approved work. Section 320 does not apply to transmission towers, conductors or related facilities designed to operate at high-side voltages of 50 kilovolts (kV) or more, unless the utility designates them as distribution lines.

The CPUC also regulates to what extent repair, replacement and maintenance of existing overhead distribution facilities can take place. Caltrans verifies that proposed construction of utility work complies with the Corridor Protection Program and issues encroachment permits for conforming work. The Encroachment Permits Office does not determine when the placement of facilities underground is required. Determination is made by the CPUC in concert with Section 320.

District Landscape Architecture and Right of Way Utilities are responsible for reviewing applications for proposed utility work in scenic highway corridors.

When the proposed work is non-complying, the applicant is notified by Caltrans' Encroachment Permit Office to provide Caltrans with the exception approval from the Energy Division Reliability Section of the CPUC.

Encroachment Permits are issued for work within a scenic highway when existing overhead distribution utilities are in need of repair, replacement, upgrade, or increased capacity if there is no significant change in appearance. No significant change in appearance is defined as no increase in the diameter of the distribution line.

California Public Utility Code Section 320 stipulates that utility owners must not install new overhead distribution facilities on scenic highways without first obtaining an exemption from the CPUC.

For purposes of CPUC Section 320, the following work does not constitute installation of new overhead distribution facilities and does not require a CPUC exemption:

1. Removing or replacing sections of worn or deteriorated cable with like-size cable or smaller.
2. Removing or replacing worn or damaged equipment, including but not limited to: transformers, connectors, protective devices or repeaters with like-size or smaller equipment.
3. Replacing a deteriorated pole with like-size or smaller pole.
4. Performing any necessary emergency work to continue service, provided any non-complying facility is corrected when the emergency is over.
5. Installing new or relocated overhead transmission facilities (50 kV or greater).
6. Performing reconductoring or an increase in capacity of existing facilities with no significant change in appearance. This includes replacing the existing conductor with a new conductor of a different capacity or changing the voltage of the line.
7. Temporarily relocating poles for other construction purposes provided such poles are removed or returned to their original position within 3 months of the completion of the construction work.
8. Installing new overhead service connections including necessary transformers and protective devices from existing distribution lines.
9. Installing guys as necessary for existing distribution lines.

With respect to electric and communications overhead distribution facilities (less than 50 kV) within the scenic highway corridor, utility owners may not perform any of the following work without first obtaining an exemption from the CPUC:

1. Install new facilities.

2. Relocate existing (distribution) facilities to a new permanent location.
3. Temporarily relocate poles for other construction purposes when such poles will not be returned to their original positions within 3 months of completion of the construction work.

All conditions listed above may be subject to exemption upon written confirmation from the CPUC that proposed work is acceptable.

## **602.6B General Construction**

Any work performed along a designated scenic highway should comply with the Corridor Protection Program established for that scenic corridor by the local agency.

The local agency approves any development and decides if the necessary work in the scenic corridor conforms to the Corridor Protection Program. Permit applications for roadways, driveways, drainage, etc., should have appropriate design review and District Landscape Architect concurrence to assess design compatibility with the scenic corridor (see Project Development Procedures Manual, Chapter 29- Section 10, “Project Development along Scenic Highways”, for additional guidance).

When compatibility issues are identified, the applicant and local agency are notified. If design features meet Caltrans standards and compatibility issues are resolved, the District Landscape Architect approves the work and an encroachment permit is issued.

## **602.7 Utility Encroachments on Structures**

### **602.7A Utilities Within or on Bridges and other Structures** (Rev. 06/20)

#### ***Permit Code UB***

A UB Permit Code is used when utilities are placed or maintained within or on a bridge and other structures. Utility encroachments on structures should be avoided where feasible and alternatives to locate utilities elsewhere must be analyzed.

When a utility pipeline or encasement for a pipeline crosses a bridge or other structures and has cathodic protection, that installation must be electrically isolated from the bridge or other structures. Any cathodic protection anode bed or deep anode well must not be placed near any bridge or other structures or culvert.

When a utility conduit crosses a bridge or other structures and has voltage conductors of 2000 volts and above, that installation must be evaluated for induced voltage in the rebar and prestress cables due to the close proximity to the high voltage conductors. The maximum voltage allowed in an electrical installation must never exceed 69kV regardless of the bridge type.

Installation of individual phase conductors housed in separate conduits or ducts that will pass through steel girder bridges or other structures is prohibited.

Specific induced voltage in rebar and prestress cables, stray current and cathodic protection mitigation issues must be directed to headquarters Office of Electrical, Mechanical, Water and Wastewater Engineering.

Utility facilities on bridges or other structures must meet both the standard utility requirements and the additional requirements shown in Table 6.4 and Table 6.5

All utility encroachments on new structures must be reviewed and concurred in by the Division of Engineering Services (DES) and all utility encroachments on existing structures must be reviewed and concurred in by Structures Maintenance and Investigations (SM&I). All utility encroachments on structures must be supported by a project specific analysis which shows the utility on the structure will not adversely affect the safety, design, construction, future widening, operation, maintenance, or stability of the structure and surrounding highway and meet the following conditions:

- The proposed utility loads must not downgrade the ability of the structure to safely accommodate legal loads and/or transportation permits.
- Shutoff valves for pressurized facilities must be installed outside State right of way, where feasible.
- Utility maintenance is required no more than twice a year.
- The utility is under the California Public Utilities Commission jurisdiction or is publicly owned and provides a dedicated service to the public.

When a proposed encroachment has been reviewed and approved by SM&I, one copy of the encroachment permit and completed plans authorizing work on structures is to be sent to the Office of Structures Maintenance and one copy is to be sent to Headquarters Structures Construction. When a proposed encroachment on a new structure has been reviewed and approved by DES, one copy of the encroachment permit and completed plans authorizing work on structures is to be sent to DES and one copy is to be sent to Headquarters Structures Construction.

For security purposes, high priority utilities (see section 603.1) should not be allowed on structures identified as most critical by the district.

### **602.7B Requirements for High Priority Utilities on Bridges or other Structures** (Rev. 06/20)

Installations of new high priority utilities and any gas lines, regardless of size and pressure, are rarely allowed on structures and require an encroachment policy exception. If an existing high priority or gas utility is reconstructed, relocated, or modified, it will be treated as a new installation and an approved encroachment exception is required for the utility to remain on the structure. A request for an encroachment policy exception will be evaluated for approval only if

DES or SM&I concurs with the proposal. High priority utilities and pressurized lines must be encased throughout the length of the structure.

**Table 6.4**  
**Additional requirements for utility facilities located on bridges or other structures**

(Rev. 06/20)

Utility facilities located on bridges must comply with the standard requirements and the following additional requirements:

1. Location:
  - a. Permitted encroachment must be located between girders whenever possible.
  - b. Encroachments must be installed out of sight. As a last resort, a utility may be placed on the barrier rail, but must be enclosed to look like an integral part of the bridge.
  - c. Structure Maintenance & Investigations may approve exceptions for unusual circumstances.
  - d. On very wide bridges or other structures having an expansion joint in the median, installation normally can occur between the two interior girders in the median.
2. Encroachment applications must include adequate plans of installation and pertinent details showing:
  - a. Bridge number
  - b. Location of encroachment on bridge or other structure
  - c. Method of attachment to bridge or other structure
  - d. Type of material transported
  - e. Weight per foot of facility including load, encasement, etc.
  - f. Maximum operating pressure
  - g. Maximum flow rate of high-pressure water lines in the event of a full rupture
  - h. Wall thickness of pipe
3. Gas pipelines require additional information according to CPUC General Orders.
4. Pipelines carrying highly volatile fluids must show the location of the nearest automatic shut-off valves on each side of the bridge or other structure. Shut-off valves are required to be within a reasonable distance of the bridge or other structure.
5. Pipelines conveying water, sewage, and low volatile fluids must include evidence of compliance with corrosion control requirements of the Federal Department of Transportation and the CPUC.
6. Electrical and communication conduits must indicate maximum voltage and description of carrier conduit. Additional information such as induced voltage calculations may be required by Structures (e.g. "Data for High Voltage Cables on Bridges" form DS-M-0080, see Appendix D).
7. Access to utility facilities on undercrossing structures or bridges over waterways is prohibited from the surface of the traveled way of the State highway. Manholes in the shoulder area or sidewalk area may be authorized. Access to utility facilities on overcrossing bridges or other structures, by means of manholes, may be authorized where necessary and feasible.
8. Basic Specifications
  - a. Exposed pipes or sleeves must be painted or covered with an approved coating that must match the color of the structure and be maintained to the satisfaction of Caltrans. The permittee must pay the costs of repainting or protecting the encroachment.
  - b. High pressure systems:
    - 1) Must conform to API specifications and to ASTM specifications covering sizes and types not covered by API.
    - 2) If operating pressures are over 200 psig:
      - Wall thickness must conform to CPUC General Orders.
      - Maximum allowable hoop stresses for gas must be 40 percent of the specified minimum yield strength.
      - Maximum allowable hoop stresses for other high volatile fluids must conform to ANSI, except that the maximum hoop stress under the "test pressure" must not exceed 90 percent of the yield strength.
      - A pressure test at 1.5 times maximum operating pressure must be conducted for 24 hours.

- Radiographic inspection of all field welds must be made.
- c. Sewer lines cannot be steel pipe unless corrosion protective measures are provided.
- d. Other pipelines may be steel, cast iron, ductile iron or approved material.
- e. Electrical and communication conduits must conform to CPUC General Orders. High voltage lines are not permitted where the traveling public could be endangered and/or the integrity of the bridge steel elements, rebar, and prestress cables is compromised due to the presence of excessive induced voltage in them.

**Table 6.5 (Rev. 06/20)****Additional Encasement Requirements for Utility Facilities Located on Bridges**

In addition to the encasement requirements in Section 603.3C, utility facilities located on bridges or other structures must comply with the following:

1. High priority utilities (see section 603.1) and pressurized facilities must be encased throughout the bridge or other structure in a steel sleeve.
  - a) The sleeve must have a diameter sufficiently larger than the largest outside diameter of pipe (but not less than 4 inches) to facilitate removal and replacement of the pipe.
  - b) The space between the pipe and encasement must be vented effectively at each end of the structure so that no pressure buildup is possible. It is not permissible to vent into the earth or backfill material because of explosion possibilities.
  - c) In unusual instances, it may be impractical to provide encasement because of curvature, space limitations, etc. The Office of Structures Maintenance and Investigations or DES as appropriate must concur with the proposed and existing encasement of utilities on bridges or other structures, the wall thickness of the carrier pipe must be increased in such instances.
2. Pipelines conveying water, sewage, and low volatile fluids:
  - a) The pipeline must be encased if it passes over access-controlled right-of-way, primary road, or railroad. Other locations where encasement is required are determined by the Office of Structure Maintenance and Investigations or DES.
  - b) A box girder cell may be considered as the encasement for water and non-corrosive material if access is available on the structure for the full length of the pipeline and the carrier is metal pipe.
  - c) The pipeline must be encased to prevent leakage from flowing under or around bridge abutments.
  - d) It may be impractical to provide encasement in unusual instances because of curvature, space limitations, etc., and other safeguards may be required.
3. Electrical and communication lines must be encased in rigid metallic conduit or other approved material. All electrical conduits must be grounded according to the General Orders of the CPUC and the Electrical Safety Orders of Cal-OSHA.
4. When not required, encasement should be considered if clearance is impaired or the utility facility is near such hazards as high-tension power lines, flood channels, subsiding ground, etc.

**602.7C Traffic Tunnels and Tubes**

New utilities are not allowed in traffic tunnels. High priority utilities (see section 603.1) are not allowed in any traffic tunnel under any circumstances (an encroachment policy exception will not be approved).

### **602.7D Limited Space Highway Facility** (Rev. 06/20)

A limited space highway facility is defined as a State Facility that Caltrans has determined to have a limited amount of space available for the installation of communication facilities, e.g., toll bridges. The determination of which highway facilities are limited capacity must be made by Structures, if a bridge, and the Chief, Headquarters Division of Design or district delegate, if a highway. Once a State highway facility is determined to be a limited space facility the following conditions will apply:

1. The first applicant requesting an encroachment permit for the installation of a communication facility will be required to enter into a Master Agreement for Longitudinal Encroachment on Limited Facilities.
2. The Master Agreement must contain all of the conditions that govern the installation, operation, use, and maintenance of said communication facility.
3. Each Master Agreement must be reviewed and approved by Caltrans legal.

Public utilities are not allowed on toll bridges due to existing conduits and openings being used by the State and lack of space to place new conduits. An existing encroachment on a toll bridge that is incorporated in a new highway improvement project should be relocated whenever feasible.

### **602.7E State Contract Plans**

Structures Design must approve installation plans for each utility that encroaches on a new structure before an encroachment permit is issued. This review is coordinated through the District project engineer. After award of the contract, utility plans not reviewed previously by Structures Design should be sent to Structures Maintenance for review and approval. Installation of utility facilities in new structures is coordinated by the permit engineer through the District project engineer and solely by the permit engineer for existing structures. Installation of all relocated utility facilities is coordinated by District Right of Way.

## **603 UTILITY TYPES AND INSTALLATION REQUIREMENTS** (Rev. 04/18)

Once the determination has been made that a utility can be accommodated within the State right-of-way, the utility must meet Caltrans' locating requirements, clearance and offset requirements, encasement requirements, be protected in place, or be relocated. If a utility is relocated within the right-of-way, the utility must meet the requirements for new installations. Projects must have an approved utility policy exception for utilities that do not meet the requirements in this section. During development of projects, various constraints may require deviation from these policies in the form of a utility policy exception. See PDPM, Chapter 17, Section 4 "Exception Requests," for a summary of the steps to request a utility policy exception.

### **603.1 High Priority Utilities** (Rev. 04/18)

High priority utilities include the following primarily derived from the California Government Code, Section 4216:

- Natural gas pipelines greater than 6” in diameter or with normal operating pressures greater than 60 psig
- Petroleum pipelines
- Pressurized sanitary sewer pipelines
- High-voltage electric supply lines, conductors, or cables that have a potential to ground of greater than or equal to 60 kV
- Hazardous materials pipelines that are potentially harmful to workers or the public if damaged

### **603.2 Communication Facilities**

This section is only applicable to wired communication facility installations. For wireless communication facility installations, see section 601.2 and 500.3 (Permit Code AS).

#### **603.2A Telecommunications (including broadband)** (Rev. 04/18)

##### ***Permit Code BB***

“Telecommunications” refers to any facility (including conduits and cabling) used to transmit voice, data, and/or video signals that are not transmitted through the air.

“Broadband” refers to any telecommunications facility (including copper and fiber optic cabling) that uses wide bandwidth to transmit voice, data, and/or video signals.

See section 603.2A-1 for information related to installing wired broadband through the Stand-alone Encroachment Process and the Planned Transportation Partnering Process.

##### **Requirements:**

Accommodation must be in accordance with Federal and State laws and be constructed and maintained so as not to adversely affect the safety, design, construction, operation, maintenance, and stability of the highway or any proposed or existing highway appurtenance.

Underground longitudinal telecommunications encroachments within access-controlled right-of-way may be approved at the District level if all of the requirements shown in Table 6.6B are met, in addition to complying with all other applicable requirements established in this manual.

Requests submitted for the replacement of telecommunications (regardless of capacity or upgrade issues) must adhere to policy as a new submittal.

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**Table 6.6A** (Rev. 06/20)**Requirements for Telecommunication Encroachments within All highway right-of-way**

- 1) Longitudinal installations must be placed as close to the right-of-way line as possible.
- 2) Installations are not permitted in the median.
- 3) All above ground installations and access points must be placed outside the Clear Recovery Zone for discretionary fixed objects. (CRZ, see Highway Design Manual Topic 309).
- 4) If any facilities are required to be relocated, all costs must be borne by the permittee.
- 5) Caltrans may consider accommodation under master agreements, airspace leases, Request For Proposals (RFP) or any other legally acceptable method.

**Table 6.6B** (Rev. 06/20)**Additional Requirements for Telecommunication Encroachments within access-controlled right-of-way**

- 1) All installations must be **underground** and subject to Department policy on encroachment permits including all applicable local, state and federal laws and regulations.
- 2) Routine maintenance of facilities must be conducted under individual encroachment permits and not allowed under “blanket permits”.
- 3) Longitudinal installations are not permitted in existing or planned roadbed.
- 4) District may also limit construction activities (the number of trenching, plowing or boring) to once every five years if any of the following conditions apply:
  - a) Longitudinal installation with above ground fixed objects is fully or partially proposed within the CRZ and an approved Design Standard Decision Document is granted.
  - b) Installation exceeds one mile in length.
  - c) District determines that the future installation of facilities will be limited because of physical constraints, limited right-of-way width, safety or other relevant factors.
- 5) If construction activities are limited as provided in 4), applicants will be required to provide public notice informing interested parties of the limitations and providing them an opportunity to respond and/or participate in the project (joint build). The notice process must be as follows:
  - a) Applicant publishes a notice in one newspaper of general circulation in the county/counties where the project is proposed. The notice must provide a public response period of no less than 30 days from the date of publication; and
  - b) Applicant must provide notice to all companies from the same industry (obtain list from California Public Utilities Commission - CPUC) including a response period of no less than 30 days from the day they are notified. A copy of this notice must be attached to the encroachment permit application.

Note: Maintenance access points such as pull boxes and controller cabinets are not allowed within access-controlled right-of-way (an approved exception request is required)

**603.2A-1 Broadband Installation Processes** (Rev. 04/18)

Broadband installations can be pursued through the Stand-alone Encroachment Permit Process or the Planned Transportation Partnering Process. Whichever process is pursued, all installations must comply with all applicable Caltrans policies, standards and requirements in addition to applicable state and federal laws, regulations and requirements.

**Stand-alone Encroachment Permit Process:**

Broadband facility owners must submit the completed and signed permit application with all required attachments and plans for review and approval to the appropriate District Encroachment Permits Office. Broadband proposals must be processed for a detailed plan review through Environmental, Design, Structures, and Traffic Operations as applicable. Broadband installation requests should be prioritized and all reasonable efforts should be made to complete the review and approve or deny such requests within 40 calendar days.

**Planned Transportation Partnering Process:**

Caltrans may provide partnering opportunities in planned transportation projects with Wired Broadband Stakeholders to incorporate wired broadband facilities within the State highway right-of-way.

For a wired broadband facility to be installed as a part of a planned transportation project, the facility planning, design, and construction must follow the Caltrans project development and delivery procedures, and design guidance as outlined in the Project Development Procedures Manual, Highway Design Manual, Plans Preparation Manual and other pertinent Caltrans manuals and guidance.

The Administrative Encroachment Permit Process (see Section 500) is used for these types of projects. **Permit code BB must be used for all such permits.**

After construction of the project is completed but prior to the final acceptance of the project, stakeholders must apply for and secure an encroachment permit to assume ownership of the facility. Thereafter, separate permits for work such as routine or emergency maintenance must be applied for and secured.

Additional information is available on the “User Guide on Incorporating Wired Broadband in State Highway Right-of-Way”.

<https://dot.ca.gov/programs/design/wired-broadband/>

***603.2A-2 CPUC Mandate - New Telecommunication Wiring Within Existing Facilities***

In conjunction with the California Public Utility Commission (CPUC) imposed mandate, existing telecommunications franchises must now share their unused conduits with competitors.

Caltrans may allow new telecommunication franchises to place their "**cabling only**" (fiber optics or wire) into an existing facility that falls under the parameters of "prior rights" or an "exception to policy", belonging to another telecommunications franchise within access-controlled right-of-way.

The requesting telecommunications franchise must submit proof of concurrence from the owning telecommunications franchise by means of an agreement, letter, or contract when submitting their encroachment permit application.

### **603.2A-3 Preliminary Site Survey Permits (pre-design)**

Districts may issue an annual survey, “SV” permit, to each Broadband service carrier for all conventional highways within the District. Survey permit requests for within access-controlled right-of-way must be issued on a one-time basis.

A deposit equivalent to six (6) hours of the encroachment permit standard hourly rate must be collected upon submittal. If the surveying is contracted to a surveying company, a double permit (“DP”) must be required.

Work within or from adjacent property owners’ land, U.S. Forest Service property, other leased or prescriptive right-of-way are not authorized under Caltrans’s encroachment permit, approval must be obtained from that specific property owner by means of written permission or permit. A copy of that authorization or issued permit must also be included in the submittal to the District Encroachment Permits Office.

### **603.2B Telephones (coin and credit card operated phones)**

As a public convenience, Caltrans allows telephones within the right-of-way. An encroachment permit is required for their installation, operation, and maintenance. They are placed only at locations authorized by statutes.

Districts may permit coin or credit card-operated telephones within the right-of-way only at rest areas, vista points, park-and-ride lots, truck inspection facilities, and in bus passenger waiting shelters that are located on conventional highways and are equipped to hold the telephones. State statutes and Caltrans policies do not permit coin-operated telephones at other State highway right-of-way locations because telephones are a form of vending that is prohibited by Section 731 of the Streets and Highways Code.

Caltrans, law enforcement, or local agencies may request telephone installations in roadside rest areas, vista points, park-and-ride lots, or truck inspection facilities. Permits are issued to the requesting authority (if not Caltrans) and the installing telephone company at no charge. Local public transit agencies must request permits for telephones in existing and proposed bus passenger waiting shelters.

The maximum number of telephones to be installed at roadside rests, vista points, and park-and-ride lots is determined by the District Landscape Architect in cooperation with Maintenance and Traffic Operations. The California Highway Patrol and Caltrans will agree to the number of telephones needed in truck inspection stations.

Local agencies and law enforcement may request telephones along rural conventional highways when existing facilities and suitable installation locations are not available outside the right-of-way. These telephones must **not** be coin or credit card operated. Permits are issued to the local agency, and an additional permit is issued to the installing telephone company for operation and maintenance.

When a telephone owner requests a permit to maintain existing telephones that were installed without a permit, Districts should review the facility for conformance to current policy. When appropriate, the telephones can remain in place and a permit can be issued.

All telephones must provide telephone company operator assistance.

## 603.2C Cable Television

Privately-owned cable television systems holding city or county franchises may be granted aerial or underground encroachment privileges the same as public utilities, if Sections 682-695 of the Streets and Highways Code are met. They may be granted biennial maintenance permits.

Other privately-owned cable television system facilities not covered by city or county franchises may only be attached to existing utility poles or placed in existing underground ducts subject to the owner's consent as set forth in CPUC General Orders.

In any case, use of highway structures is subject to Structures Maintenance approval.

## 603.3 Installation Requirements

### 603.3A Locating Requirements (Rev. 06/20)

All utilities within the right-of-way must be shown on the utility plans. Positive location is required for high priority utilities and approximate location is required for all other utilities in areas of excavation (Reference Section 3 Article 2) PDDM Chapter 17 for the entire project limits. Projects must have an approved utility policy exception to avoid the requirement for locating the utilities and depicting them on the plans. See PDDM Chapter 17, Section 3, Article 3 for more details on location and depiction requirements.

Projects that meet the following criteria are exempt from locating and depicting requirements.

#### **Exempt Work:**

Works that does not involve any excavation, as defined in PDDM CH17, Section 1, “Definitions and laws” is exempt from the locating and depicting requirements. Work that only involves limited excavation is also exempt from the locating and depicting requirements, provided that the limited excavation is in conjunction with:

- Digging less than 6 inches. below existing ground level outside the roadbed within the roadside area (outside the roadway).
- Digging within the existing limits of the pavement structural section. This includes: concrete or asphalt pavement driveways, sidewalks, curb ramps, curbs, gutters, dike, and bridge approach slabs. This does not include work that changes the grading plane within the roadbed.
- Concrete or asphalt pavement driveways, sidewalks, curb ramps, curbs, gutters, dike and bridge approach slabs. This does not include work that changes the grading plane.
- Hand digging or digging by air-lance, hydro-excavation, and vacuum excavation

Work is not exempt when it includes:

- Installation of push button assemblies or foundations for lighting
- Transition railing or anchor blocks for guardrail or thrie beam barrier

### **Exempt Utilities**

The following utilities (not including State owned utilities) are exempt from these policies and do not need to be plotted on the plans unless the depiction of the utility is needed for interconnectivity with the proposed work:

- Natural gas service lines less than 2 inches in pipe diameter that have normal operating pressures of 60 psig or less and not on a structure
- Subsurface electrical service connections with a potential to ground of 50 volts or less
- Service connections (laterals) for water, sewer, telephone, telecommunication, and cable service

All State-owned utilities must be plotted on the plans.

### **603.3B Clearance and Offset Requirements** (Rev. 04/18)

All installations proposed must comply with Clearance and Offset requirements (including depth of cover) for new and existing utility facilities identified in PDPM, Chapter 17, Section 2, Article 4.

New installations within streets or frontage roads to be turned over to a local agency may be installed at lesser depths, as allowed by CPUC General Orders or normal procedures.

### **603.3C Encasements** (Rev. 06/20)

In accordance with Caltrans's Project Development Procedures Manual, except for gravity flow sewer lines all utilities crossing the State right-of-way or crossing under ramps, roads, and other paved areas within the State right-of-way must be encased. New high priority utilities (see section 603.1) pressurized fluid carrier facilities are required to be encased within both conventional and access-controlled right of way for utility crossings.

These installations must comply with the requirements listed in Table 6.7 and Table 6.8. The steel encasement can be either new or used, or of the approved connector system. Used steel casing must be pre-approved by a Caltrans' representative prior to 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.

Reinforced Concrete Pipe (RCP) in compliance with Caltrans's Standard Specifications is an acceptable carrier for storm drain gravity flow or non-pressure flow. RCP when installed by Bore & Jack must have rubber gaskets at the joints, and holes for the grouting of voids left by jacking operations (see grouting requirements in Table 6.7.).

Based on the Memorandum dated November 9, 1994, "Exception to Policy - Uncased High-pressure Natural Gas Pipelines" (see Appendix H) and Special Provisions TR-0158 (see Appendix K), Caltrans allows an exception to this encasement policy on a case by case basis for the utility crossing installation of uncased high pressure natural gas pipelines, provided all of the requirements listed in the memo and Special Provisions are met.

**Table 6.7 (Rev. 06/20)**  
**Encasement and Protection Requirements**

<p>Utility facilities must comply with the following encasement and protection requirements:</p> <p>1.Types of facilities requiring encasement or protection:</p> <ul style="list-style-type: none"> <li>a. New or relocated underground utility crossings must be encased so that future repair or replacement does not require trench excavation in the roadway, facilitates mechanical suction and protects the roadway and structures from damage caused by soil liquefaction, leaked fluids or gases.</li> <li>b. Consider encasement of carriers that are exempt from encasement, when these possibilities exist: <ul style="list-style-type: none"> <li>i. When under embankments of 10 feet or more.</li> <li>ii. Appreciable settlement of supporting ground.</li> <li>iii. When detrimental subsidence of the ground under a fill is anticipated. In such cases, a sleeve 6 inches larger than the outside diameter of the pipe is recommended.</li> <li>iv. Damage to protective pipe coatings during jacking.</li> <li>v. A corrosion protective coating and/or cathodic protection may be required due to corrosive environments or when the CPUC requires cathodic protection. (Corrosive environments can deteriorate steel and cement mortar. Check cathodic protection requirements with headquarters Structures Design, Electrical, Mechanical, Water and Waste Water Branch.)</li> <li>vi. Cracking of mortar coating during jacking or boring operations.</li> <li>vii. Corrosion of field-coated joints.</li> <li>viii. Existing electrical and communication lines under an embankment of 10 feet or more.</li> </ul> </li> </ul> <p>2.Types of encasements and their purposes:</p> <ul style="list-style-type: none"> <li>a. A sleeve is an encasement that: <ul style="list-style-type: none"> <li>i. Contains or controls leaks,</li> <li>ii. Facilitates carrier pipe maintenance and replacement,</li> <li>iii. Protects carrier pipe from crushing or bending stresses and minimizes coating damage during installation,</li> <li>iv. Protects the pipe from corrosive elements and aggressive salts,</li> <li>v. Protects carrier pipe against highway maintenance and repair activities, and</li> <li>vi. Isolates cathodically protected lines and limits stray currents.</li> </ul> </li> <li>b. A reinforced concrete jacket is an encasement that: <ul style="list-style-type: none"> <li>i. Contains or controls leaks,</li> <li>ii. Protects carrier pipe from crushing or bending stresses and minimizes coating damage during installation,</li> <li>iii. Provides some protection from corrosive elements and aggressive salts, and</li> <li>iv. Protects against highway maintenance and repair activities.</li> </ul> </li> <li>c. A reinforced concrete cradle protects a carrier pipe from crushing or bending stresses. However, it is not to be used with asbestos cement pipe and is not considered an encasement.</li> <li>d. A reinforced concrete slab is placed over an undisturbed facility to distribute and equalize a superimposed load. (Caution: A slab may interfere with other utilities and rock under a load.)</li> </ul> <p>3.Design requirements for encasement or protection:</p> <ul style="list-style-type: none"> <li>a) The minimum wall thickness required for steel encasements is based on lengths and diameters of pipes. See Table 6.8.</li> </ul>
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- b) Encasements must extend to the highway right-of-way lines unless Caltrans determines that is impractical.
- c) A sleeve is preferred to a reinforced concrete jacket when practical. Considerations include soil conditions, height of embankment, and economic conditions.
- d) A sleeve under the highway must meet "D-Loading, H20-Loading and culvert requirements regarding strength and service life.
- e) A sleeve should have an inside diameter that is 4 inches larger than the outside diameter of the carrier pipe. A larger clearance may be required under unusual conditions, such as settlement.
- f) There is a spacing requirement when placement of multiple encasements is requested. The distance between multiple encasements must be the greater of either 24 inches or twice that of the diameter of the larger pipe being installed.
- g) Encasement ends must be plugged with un-grouted bricks or other suitable material approved by the Caltrans' representative.
- h) The Caltrans' representative may require the permittee to pressure grout, filling any voids generated in the course of the permitted work. Grouting must be at the expense of the permittee. Grout holes when placed inside the of the pipe, generally on diameters of 36 inches or greater, must be on 8 feet 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 must not exceed five (5) psig for a duration sufficient to fill all voids.
- i) Wing cutters when used must only add a maximum of 1 inch in diameter to the outside diameter of the encasement pipe. Voids in excess of the Standard Specifications must be grouted.
- j) 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 feet must not be permitted.
- k) The length of the auger strand must be equal to that of the section of encasement pipe.
- l) Highway lighting and signal facilities are exempt from these encasement requirements.
- m) See Table 6.5 for additional encasements requirements for utilities on structures.

Note: Conduit for electrical, fiber optics and telephone cable is considered encasement.

**Table 6.8**  
**Required Thickness for Steel Pipe Casings**

Casing Diameter	Minimum Wall Thickness	
	Up to 150' in length	Over 150' in length
6 inches to 28 inches	¼ inches	¼ inches
30 inches to 38 inches	3/8 inches	½ inches
40 inches to 60 inches	½ inches	¾ inches
62 inches to 72 inches	¾ inches	¾ inches

### 603.3D Minimum Carrier Pipeline Specifications (Rev. 06/20)

Carrier pipe materials must conform to State, Federal and industry requirements, including but not limited to California Public Utilities Commission (CPUC), Code of Federal Regulations (CFR), and American Petroleum Institute (API), as described in Table 6.9

**Table 6.9 (Rev. 06/20)**  
**Minimum Carrier Pipeline Specifications**

<p>Pipeline encroachments must comply with these minimum specifications:</p> <ol style="list-style-type: none"> <li>1. Metal Pipe <ol style="list-style-type: none"> <li>a. Gas transmission and distribution piping systems must conform to General Order No. 112F of the California Public Utilities Commission (CPUC), and applicable provisions of Title 49, Code of Federal Regulations (CFR).</li> <li>b. Other fluids under pressure must conform to the American Society of Mechanical Engineers (ASME) B31 - Pressure Piping.</li> <li>c. Water transmission and distribution piping systems must confirm to the American Water Works Association (AWWA) Standards.</li> </ol> </li> <li>2. Concrete Pipe <ol style="list-style-type: none"> <li>a. Must not exceed the manufacturer's recommended pressure.</li> <li>b. Requirements for underground culverts stated in Caltrans' Highway Design Manual must apply.</li> <li>c. Uncoated sewer pipe that is located under the highway must be designed to flow full to protect against attack from generated acids.</li> <li>d. Water transmission and distribution piping systems must confirm to AWWA Standards.</li> </ol> </li> <li>3. Plastic Pipe <ol style="list-style-type: none"> <li>a. Specifications must ensure that the type of pipe is adequate for the intended purpose (see CPUC General Orders).</li> <li>b. Gas transmission and distribution piping system must confirm to Title 49 CFR.</li> <li>c. High-Density Polyethylene (HDPE) line pipe must confirm to ASTM F2619 Standard Specification and contingent to CPUC approval.</li> <li>d. Water transmission and distribution piping systems must confirm to AWWA Standard.</li> <li>e. A means for detection of nonmetallic material must be provided.</li> </ol> </li> <li>4. Pipe Joints <ol style="list-style-type: none"> <li>a. Must be watertight under pressure and foreseeable conditions of expansion, contraction, and settlement.</li> <li>b. Recommended joint sealants include rubber, neoprene, and similar synthetic products.</li> <li>c. Mortar, grout, or other Portland cement materials are not allowed as joint sealants.</li> <li>d. Steel welding of pipeline joints must confirm to Title 49 CFR.</li> </ol> </li> <li>5. Water and wastewater pipelines must be "lead free" and conform to CPUC General Order 103A.</li> <li>6. Markers required under the permit provisions should be placed so they do not interfere with vehicle recovery areas.</li> <li>7. Pipelines carrying hazardous materials can be required to have corrosion control measures as outlined in the appropriate federal or State regulations, included but not limited to Pipeline and Hazardous Materials Safety Administration (PHMSA) and Department of Toxic Substances Control (DTSC). Evidence of compliance must be submitted before issuance of an encroachment permit.</li> <li>8. Specifications for pipelines on bridges are discussed in the Section 602.7</li> </ol>
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## 603.4 Aerial Crossings

### 603.4A Conventional Aerial (Rev. 04/18)

#### *Permit Code UC*

UC permits authorize aerial facilities on conventional highways. Utility companies may use conventional highway right-of-way when adjacent utility easements or corridors do not exist on private or public property. Pole line cross-arm members or conductors may not overhang private property without an easement, so pole lines generally must be located on public property.

Pole lines that affect pedestrian facilities must process an ADA certification for design and construction compliance. Please see section 500A for more information.

Maintenance of aerial facilities is authorized by UE annual permits. These annual permits allow capacity increases when the carrying pole lines are designed and constructed to accept additional cable or a larger replacement cable and new permits are not required.

Permittee should ensure that aerial cables have the minimum vertical clearance required by the California Public Utilities Commission. CPUC Rule 84-4-A6 indicates communication cables installed longitudinally on conventional highways may have a minimum 16 feet clearance when they do not overhang the thoroughfare or they are behind established curbs, ditches, or berms. This new clearance applies even when there are connecting driveways but does not affect the 18 feet minimum clearance required for public connecting roads.

Supports for overhead lines within conventional highway right-of-way must be as close to the right-of-way line as possible, outside the CRZ (See Topic 309 of Highway Design Manual). On conventional highways with posted speeds less than or equal to 35 miles per hour and curbs, clear recovery zone widths do not apply. For these facilities a minimum horizontal clearance of 1 foot 6 inches must be provided beyond the face of curb.

Appendix F provides tables and details showing minimum clearances for aerial utility facilities and require exceptions to standards. (For additional information, see Highway Design Manual, Topic 309 Clearances).

### **603.4B Access-controlled (formerly “Freeway”) Aerial** (Rev. 04/18)

#### ***Permit Code UF***

UF permits authorize aerial facilities that cross access-controlled right-of-way. Utility facilities affecting access-controlled right-of-way generally are direct crossings, but they may include existing longitudinal installations approved to remain during construction or by prior permit. These aerial utility facilities may be allowed for their useful life with relocation performed at that time, but any alterations to the existing longitudinal exception requires an encroachment policy exception.

When existing facilities are covered by a Joint Use or Consent to Common Use agreement with a utility company, the agreement specifies the utility’s right to remain within the access-controlled right-of-way and fees associated with the permit. A request for new longitudinal encroachments requires an encroachment policy exception and normally is not permitted.

Installation or removal of overhead conductors crossing access-controlled right-of-way require traffic control by the California Highway Patrol (CHP) and usually occur on weekend mornings. The CHP can perform a rolling break in traffic on most highways to allow up to a five-minute clearing. These breaks are adequate for simple cable installation. Utility personnel carry the

conductors across the access-controlled right-of-way lanes and hoist them into place on the opposite side of the access-controlled right-of-way.

On larger conductor crossings such as transmission lines, Districts may determine that safety nets are needed to prevent transmission lines from falling on traffic during cabling installations. Temporary safety-net support poles are placed at protected locations outside shoulders and in medians. If locations for temporary supports are not available, the utility company may use K-rail and sand barrel crash cushions. After rope-nets are strung during CHP traffic breaks, other work is then allowed to proceed.

Requirements that apply to transmission line supports for overhead lines crossing access-controlled right-of-way are shown in Table 6.10. Consideration should be given to underground facilities when spanning roadways with aerial facilities is not feasible.

**Table 6.10**  
**Requirements for Line Supports for Overhead Lines Crossing in access-controlled right-of-Way**

Line supports for overhead lines crossing in access-controlled right-of-way must comply with these requirements, they:

- 1) Must be located outside the right-of-way or between the right-of-way line and access control line if different. Any deviations require an approved encroachment policy exception.
- 2) Should have a minimum lateral clearance of 52 feet from the edge of traveled way of a through lane and ramp lane.
- 3) Should not be permitted in medians.
- 4) Should not be permitted on cut or fill slopes.
- 5) Must not impair sight distances.
- 6) Must be compatible with access requirements.

## **603.5 Service Connections, Potholing, Modifications, Joint Pole Work and Miscellaneous Utility Work** (Rev. 10/19)

### ***Permit Code US***

#### **Service Connections:**

Utility companies without a UE permit are required to apply for and obtain encroachment permits for service connections. Caltrans doesn't allow individuals or non-CPUC regulated utility entities that are not authorized by law (except for Broadband and sewer services) to own, operate or maintain utility facilities including service connections because of potential liability.

Annual permits do not authorize service connections in access-controlled right of way. Separate permits are required for these types of installations.

Utility meters and shut-offs serving State facilities may be located within access-controlled right-of-way, provided that the utility company is able to service their equipment from local roads or ramp terminal areas. The utility company must obtain a “No fee Utility Service” (NUS) permit for the connection.

A property owner or developer may be required by a city or county to construct service connections that later will be owned, operated and maintained by the utility company. Permits for the installation of such longitudinal or crossings of public utility facilities within the right-of-way are issued to the developer, private individual or non-public utility-corporation to service their property from the nearest utility distribution line. The permittee’s contractor may install the facility under the Encroachment Permit General Provision # 4.

The developer, private individual, or non-public utility-corporation assumes responsibility to coordinate submission of an application from the public utility or public corporation for a permit to “own and operate the facility”. The installation permit must not be issued until this application has been submitted.

The public utility or public corporation is not charged a fee for the permit to “own and operate and maintain the facility” through the NUS permit.

**Potholing:**

Utility owners must apply for and obtain individual permits for potholing when their annual permit doesn’t authorize potholing. Method of potholing, exact locations with lateral dimensions to right-of-way line and travel lanes, size and depth must be provided in the application and submittal.

Potholing, to determine utility depth before State highway contract work, is handled through a Right of Way issued utility notice and UR permit.

**Modifications, Joint Pole Work and Miscellaneous Utility Work:**

Permit code US can be used for modifications to existing utility facilities in place, pole replacements, relocation, or other miscellaneous utility work not covered under the scope of other utility permit codes.

Owner of the pole must be the permittee. If it is joint ownership, permittee must be one of the owners and obtain authorization from other co-owners, authorizing pole replacement. Permittee must provide authorization letters from co-owners, if requested by the state representative.

Owner or entity (in case of joint ownership) to whom the permit is issued is responsible for coordinating utility relocation with other utilities (co-owners or tenants) sharing the pole. Coordination must happen before installing new pole, and all utilities transfer to the new pole must be scheduled to be completed within 15 calendar days from installation of new pole. A schedule/timeline of new pole installation, all utility transfers and removal of old pole must be submitted to Caltrans Permit Inspector at pre-construction meeting. Utility will be considered non-compliant if permit requirements are not complied with, resulting in corrective action

including but not limited to requiring bonds or revoking annual permits or rescinding deferred payment privileges or requiring double permit from contractors of the utility, until the compliance issues are rectified to the satisfaction of the District Permit Engineer.

### **603.6 Methods of Installation** (Rev. 04/18)

Underground installations within highway right-of-way must be performed using a trenchless technology method (Bore & Jack, Horizontal Directional Drilling, Microtunneling, Pipe Bursting or Pipe Ramming) unless specified otherwise by permit. Open trenching is authorized only when the applicant demonstrates that all alternatives have been investigated and that installation by a trenchless technology is not feasible.

When a number of parallel services are proposed, it is preferable to place a distribution facility. For very large installations, Districts may need to require extensive traffic control or detours. Permittees should prepare traffic control plans for Caltrans approval and obtain local approval for detours. Additionally, these large facilities can have extensive shoring. If shoring failures could damage State facilities or if the excavation is 5-ft or deeper, permittees must submit shoring plans and calculations to Structures Maintenance for approval. Allow a minimum of two weeks for review and approval (see California Code of Regulations, Title 8, Chapter 4).

Caltrans' policy for developer installed public utility facilities is discussed in Section 603.5.

#### **603.6A Trenchless Technologies: Bore & Jack / Horizontal Directional Drilling / Microtunneling / Pipe Ramming / Pipe Bursting**

The establishment of a “Survey Grid Line” is required on installations with proposed “hole-diameters at 30 inches or greater,” and may be required on installations with hole-diameters less than 30 inches as directed by the DPE or delegate. For Survey Grid and Settlement Rod Details, see forms TR-0151 and TR-0152 in Appendix E. Requirements for trenchless technologies may be increased or modified as needed by the DPE or delegate at his or her discretion.

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

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. Please refer to section 603.2C for encasement requirements. Any deviations require an approved encroachment policy exception. For additional information on trenchless technologies, see Appendix E and Design Information Bulletin (DIB) 83-04 Section 9.1.2.2 “Trenchless Excavation Construction Methods”

<https://dot.ca.gov/programs/design/design-information-bulletins-dibs>

**603.6A-1 Bore & Jack**

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

Bore & Jack consists of cutting of the soil, generally 6 inches to 8 inches 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 pipe useless.

**603.6A-1A Bore and Receiving Pits**

Requirements:

1. Must be located as far from the traveled way as feasible. At minimum, must be located 10 feet from the edge of pavement in rural areas, or at least 5 feet beyond the concrete curb and gutter or AC dike in urban areas, or at least 5 feet beyond the toe of slope of embankments.
2. Must be located outside of access-controlled right-of-way. Any deviations for direct crossings that are excessively long, or there is restricted space available for placement, outside of the right-of-way require an approved encroachment policy exception. Those portions of the installation not placed by Bore & Jack must be encased by the open trench method.
3. Must be protected by placement of 6 feet chain link fence or Type-K barrier around them.
4. Must be shored in accordance to Cal-OSHA requirements. Shoring of pits located within 15 feet of lanes within State highway right-of-way must not extend more than 36 inches in height above the pavement grade, unless authorized by a Caltrans' representative.
5. Reflectors must be affixed to the shoring on all sides facing traffic.
6. Pits must not affect any State facilities, or create a hazard to the traveling public. Damaged State facilities must 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 must be lined with filter fabric when groundwater is found and pumping is required.
8. Temporary Type-K railing must be placed at a 10:1 taper or as otherwise directed by the Caltrans' representative to maintain the integrity of the adjacent travel lane.

Any installation that is 30 inches in diameter or greater is defined as tunnel. See Section 518, and Table 5.29 - Permit Code TN for the requirements of such installations.

### ***603.6A-2 Horizontal Directional Drilling***

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

#### **603.6A-2A Backreamer Detection**

The backreamer must have a sonic detection system. See attachment E “Guidelines and Specifications for Trenchless Technology Projects.”

#### **603.6A-2B Documentation of Projected Path**

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

#### **603.6A-2C Safety Requirements**

All members of the contractor’s crew must wear protective safety gear, (Die-Electric boots are recommended).

#### **603.6A-2D Permit Application Submittal**

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.
6. Soil analysis \*\*.
7. Product material (HDPE/steel), length, diameter-wall thickness, reamer diameter.
8. Detailed pipe calculations, confirming ability of product pipe to withstand installation loads and long-term operational loads including H2O.
9. Proposed composition of drilling fluid (based on soil analysis) viscosity and density.
10. Drilling fluid pumping capacity, pressures, and flowrates proposed.
11. State right-of-way lines, property, and other utility right-of-way or easement lines.
12. Elevations.
13. Type of tracking method/system.
14. Survey Grid establishment for monitoring ground surface movement (settlement or heave) due to the drilling operation.

Note: \*\* *May be waived by the District Permit Engineer on HDD jobs with pipe size of 6 inches or less in diameter and on a utility crossing less than 150 feet in length.*

All additional permit conditions must be set forth in the special provisions of the permit.

<b>RECOMMENDED MINIMUM DEPTH OF COVER FOR HDD INSTALLATIONS</b>	
<b>Diameter</b>	<b>Depth of cover</b>
2 inches to 6 inches	4 feet
8 inches to 14 inches	6 feet
15 inches to 24 inches	10 feet
25 inches to 48 inches	15 feet

The permittee/contractor must, prior to and upon completion of the directional drill, establish a Survey Grid Line and provide monitoring.

Upon completion of the work, the permittee must provide an accurate “As-Built” drawing of the installed pipe.

#### **603.6A-2E** Soils Investigation

A soils investigation should be undertaken, suitable for the proposed complexity of the installation to confirm ground conditions. Engineering judgment must be utilized when requiring the extensiveness of the soil analysis. A soil analysis is required in order to obtain information on the ground conditions that the contractor will encounter during the HDD operation.

If the contractor can go to the project site and do an excavation with a backhoe to one foot below the proposed depth of the bore, that excavation can be considered a soil investigation. In all cases when an excavation is made in creating of an entrance and exit pit for an HDD project, that is an example of a soil investigation. The HDD process is in itself a continual and extensive soil analysis as the pilot bore is made and it encounters the varying soils and formations the drilling slurry will change colors, therefore providing the contractor with continual additional information.

The purpose and intent of the soil analysis is to assist the contractor in developing the proper drilling fluid mixture, and to ensure Caltrans that the contractor is aware of the conditions that do exist in the area of the proposed project. This prepares the contractor in the event they should encounter a zone of pre-tectonics, and that they would need additives or preventive measures in dealing with inadvertent returns (frac-outs).

The discretion on the extensiveness of the soil analysis is left to each individual District Permit Engineer (DPE) respectfully, for their respective areas. The inspectors play a large role in assisting the DPE in making decisions on the extensiveness. Each individual inspector has a general knowledge of the soil conditions in their area of responsibility.

In many circumstances the soil information has already been prepared, either by Caltrans or by City and County Entities. This information if existing should be provided to the requesting

permittee, if there is a structure within 1/2 mile of the proposed project, then Caltrans has already done an extensive soil analysis and the information is stored in our Maps & Records Branch. As-Builts, on our access-controlled right-of-way provide stationing and detailed information regarding soil information, cut and fill areas.

#### **603.6A-2F Determination of Soil Investigations**

The District Permit Engineer (DPE) should determine the extensiveness of the soils investigation to be performed based on the complexity of the HDD operation. The DPE in consultation with the District Materials Engineer may recommend according to the guidelines listed below, a combination of, or modify the guideline to fit the respective area:

- **Projects less than 500 feet in length, where the product or casing is 8 inches or less in diameter:**  
A field soil sampling investigation to a depth of one foot below the proposed drilling.
  - a) subsurface strata, fill, debris and material
- **Projects less than 800 feet in length, where the product or casing is 14 inches or less in diameter:**  
A field soil sampling investigation to a depth of one foot below the proposed drilling.
  - a) subsurface strata, fill, debris and material
  - b) particle size distribution (particularly percent gravel and cobble)
- **Projects where the product or casing is 16 inches or greater in diameter:**  
A geotechnical evaluation by a qualified soil engineer to determine the following.
  - a) subsurface strata, fill, debris and material,
  - b) particle size distribution (particularly percent gravel and cobble),
  - c) cohesion index, internal angle of friction, and soil classification,
  - d) plastic and liquid limits (clays), expansion index (clays), soil density, water table levels, and soil permeability,
- **Projects where the product or casing is 24 inches or greater in diameter:**  
A geotechnical evaluation by a qualified soil engineer to determine the following.
  - a) subsurface strata, fill, debris and material
  - b) particle size distribution (particularly percent gravel and cobble)
  - c) cohesion index, internal angle of friction, and soil classification
  - d) plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,
  - e) rock strength, rock joint fracture and orientation, water table levels, and soil permeability,
  - f) areas of suspected and known contamination should also be noted and characterized.

Boreholes or test pits should be undertaken at approximately 250 feet to 410 feet intervals where proposed installations greater than 1000 feet in length and parallel an existing road. For road

crossings a borehole or test pit must be undertaken on either side with one or more additional boreholes or test pits in the median where conditions permit. Additional boreholes or test pits should be considered if substantial variation in soil conditions are encountered.

Should the soil investigation determine the presence of gravel, cobble, and/or boulders, care should be exercised in the selection of drilling equipment and drilling fluids. In such ground conditions the use of casing pipes or washover pipes may be required or specialized drilling fluids utilized. Fluid jetting methods used as a means of cutting should only be considered where soils have a high cohesion such as stiff clays.

Directional drilled gravity sewers must only be considered where suitable soil conditions are present. Suitable soil conditions include homogenous soils consisting of clays, silts, silty sands, and sands that would allow for good control of the drill head during the pilot hole drilling.

### **603.6A-3 *Microtunneling***

Microtunneling is a hybrid of the tunneling industry (miniaturization of tunnel boring machines) and the pipeline industry where pipe jacking has been used for more than 100 years.

Microtunneling does not require personnel entry into the tunnel. Microtunneling is a special construction method suitable for many conditions where open-cut construction methods are not cost effective, too disruptive, or not physically possible.

#### **603.6A-3A Microtunneling Permit Application Submittal**

The encroachment permit application package must consist of two separate submittals. The first submittal must be by the Owner of the installation. The second submittal required must be by the owner's contractor, when applying for the "DP."

The encroachment permit application package must contain a construction plan, site layout plan, project schedule, communication plan, safety and emergency procedures, company's experience record, in addition to the information listed as follows:

The first submittal by the owning agency must contain the following plans and information:

1. Drive lengths
2. Proposed depth
3. Shaft; jacking and receiving shafts, manhole construction, shaft backfill, and shoring removal;
  - Type of shaft;
    - a) Sheet Pile
    - b) Beams and Lagging
    - c) Trench Box
    - d) Auger Drilled and Lined
    - e) Caissons
4. Intermediate jacking stations;

- Number of Stations;
  - a) Required by Specifications
  - b) On site
- 5. Geotechnical; including ground water information
  - Geotechnical evaluation by a qualified soil engineer to determine the following;
    - a) Boring logs & plan locations of borings and cross sections, Subsurface strata, fill and ground water elevations
    - b) Particle size distribution (particularly percent rock and cobble),
    - c) Cohesion indexes, internal angle of friction, and soil classification,
    - d) Plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,
    - e) Rock strength; rock joint fracture and orientation, water table levels, and soil permeability,
    - f) Areas of suspected and known contamination should also be noted and characterized.
  - Should the soil investigation determine the presence of rock, cobbles, and/or boulders, determination of the following information would be required;
    - a) Depth and extent of rock
    - b) Rock type
    - c) Rock strength
    - d) Rock joint/fracture spacing
    - e) Hardness
    - f) RQD
    - g) Estimated range of sizes & frequency of occurrence of cobbles and boulders.

Boreholes or test pits for road crossings must be undertaken on both sides with one or more additional boreholes or test pits in the median where conditions permit. Additional boreholes or test pits should be considered if substantial variation in soil conditions are encountered. Where a proposed installation parallels an existing road, boreholes or test pits should be undertaken at approximately 250 to 410 foot intervals.

#### **603.6A-3B Contractor's Submittal**

The second submittal by the owner's contractor must contain the following plans and information:

1. Shaft; soil stability at portals and ground improvement.
2. Dewatering plans for jacking and receiving shafts, if any.
3. Shoring design for jacking and receiving shafts.
4. Survey control plan: lasers, laser mounting, laser checking.

5. Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
  - Buried points
    - a) Rebar points, or
    - b) MPBX (Multi-point borehole extensometers)
6. Recycling information; slurry mix and polymer additives, slurry separation plant type, and spoils disposal;
  - a) Removal of slurry in dump trucks.
  - b) Removal of slurry in tankers.
  - c) Settlement ponds.
  - d) Muck piles on site.
7. Contingency plan information;
  - a) Ground improvement plans when required at portals and/or behind thrust block/reaction wall due to weak and unstable soil conditions.
  - b) Obstruction removal through emergency (911) shafts or other means.
  - c) Mechanical breakdowns and recovery of the MTBM through 911 shafts or other means.
  - d) Control of hydrofracture and slurry loss.
  - e) Remediation of loss of ground and excessive ground surface settlement.

#### **603.6A-4 Pipe Ramming**

Pipe Ramming pit requirements are identical to those for Bore & Jack. Establishment of a survey-grid line is required.

Before any project begins, exploration bore-holes and a complete geotechnical investigation must be conducted to determine possible difficulties in order to determine the drilling trajectory.

The casing must be rammed open ended, except when the diameter is 6 inches or smaller. Pipes 6 inches or smaller may be rammed open ended or closed.

A soil shoe may be installed on the leading edge of the casing, either by fabrication on site or obtained from the manufacturer. No installation should be less than a service connection of 30 inches.

Lubrication must only be utilized to reduce friction and increase production. The amount of lubrication directed to the outside of the pipe must only be of a sufficient amount required to fill the void between the outside of the pipe and soil, as created by the soil shoe.

Lubrication to the inside of the casing must only be an amount adequate to assist in spoil removal when the ram is completed.

Welding of the casing at joints must be as per the manufacturer's recommendations.

The use of straps at each joint on pipe diameters of 12 inches or larger is required as is the use of the manufacturers' specified welding wire or rod.

Spoil removal for rammed encasements of 30 inches in diameter or less, may utilize pressurized air or water.

Air pressure must not exceed 150 psi and water pressure must not exceed 300 psi.

Encasements larger than 30 inches in diameter must have the spoils removed by other means than by pressurizing of the pipe, such as, manual, auguring, vacuum, washing or other means.

The Receiving Pit must be steel plated entirely when the spoils are to be removed from within the encasement by means of air or water pressurized methods.

### **603.6A-5 Pipe Bursting**

Pipe Bursting operations generally are only performed by the owning utility when they have exceeded the operating capacity of their existing facilities. In most cases pipe bursting allows the utility owners the advantage of upgrading their existing facilities by up to 50%.

A contractor with a significant resume/track record should be obtained to perform the pipe bursting work.

On installations of diameters 12 inches or greater, it is necessary to establish a survey-grid line and establish the existing elevation points over the existing area of installation.

A soil analysis should be required and review of the information to identify any locations of difficulty, density, water table, changes in soil formation that could present or create greater friction resistance.

Request information of the proposed project as to:

1. the ratio of the proposed upgrade to determine difficulty, generally up to 25% increase in diameter is common. An increase of 25% - 50% is considered challenging and an increase of 50% or greater is considered experimental.
2. the existing depth of cover, "rule of thumb" depth of cover should be at least 10X the difference in the upgrade of the existing diameter to be burst.
3. whether or not the existing line has been viewed by video, do not allow line to be burst blind.
4. is this proposed line straight or are there bends in the line?
5. if bends are existing in the line, the location of the bend will have to be excavated and new pits re-established at those locations.

6. require that the contractor provide a list of equipment to be on site to handle an emergency, in the event that bypass pumping is required to maintain the existing service in the event of a problem.
7. as to what method will be utilized (static, pneumatic, burst and jack, or hydraulic).

### **603.6A-6 Tunneling - Rib & Lagging**

NOTE: All projects will vary in their own characteristics. General similarities are listed below to provide a general understanding of these types of projects.

Establishment of a survey-grid line and existing elevation points must be over the centerline and wing points of the installation.

Designed plans and specifications, calculations and details (liner plates, rib & lagging, bracing, etc.) must be stamped by a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in sub-structural design of tunnels. Proof of experience must be submitted on "Certification of Structural Experience" (form TR-0133) in conjunction with project package submittal.

A geotechnical investigation and soil analysis by a licensed geotechnical engineer/engineering geologist is required. It must provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the tunnel alignment at intervals of 25 feet to 100 feet as determined by the DPE or Structures Division.

When the length of the tunnel is greater than 400 feet, alignment holes may be required. Alignment holes must be drilled at a maximum spacing of 200 feet and a casing of 4 inches to 6 inches in diameter installed vertically, to a depth necessary for the installed casing to extend into the tunnel excavation. When alignment holes fall within the pavement area of the roadway, the pavement must be saw-cut, a cover must be placed over the end of the casing at grade, and the space around the casing within the roadway filled with concrete (EXCEPT within access-controlled right-of-way).

### **603.6A-6A Cal/OSHA Requirements**

The California Code of Regulations (CCR) mandates the following requirements for Tunneling Projects.

The Owner or Local Entity proposing the construction of the tunnel must make a full submittal to the Department of Industrial Relations, Cal/OSHA, to determine tunnel classification (CCR 8422).

Development of a check-in/check-out procedure to ensure an accurate account of personnel underground in the event of an emergency (CCR 8410).

Development of an Emergency Plan that outlines duties and responsibilities of all personnel on the project during an emergency. The plan must include ventilation controls, firefighting equipment, rescue procedures, evacuation plans, and communications (CCR 8426).

Cal/OSHA requires a State of California certified person performing the duties of gas tester or safety representative to be certified by passing a written and an oral examination administered by the Cal/OSHA Mining & Tunneling Unit (CCR 8406(f), (h)).

A certified safety representative must direct the required safety and health program and must be on-site while employees are engaged in operations during which the Tunnel Safety Orders (TSO) apply (CCR 8406(f)).

The certified safety representative must have knowledge in underground safety, must be able to recognize hazards, and must have the authority to correct unsafe conditions and procedures subject to the TSO (CCR 8406(f)).

A State of California certified gas tester is required for the following operations:

- All classifications other than non-gassy
- Projects during which diesel equipment is used underground
- Hazardous underground gas conditions (CCR 8470).

#### **603.6A-6B** Tunnel

Tunnel construction is accomplished by the method of Hand-mining, or by Mechanical means, and the use of a protective shield.

Continuous monitoring and observation of the ground surface above the tunnel is required. In some cases, it may be required to survey and record elevations along the survey grid line, several times a day or daily.

Generally, when tunneling in good ground, tunnels with a diameter of less than 8 feet and less than 300 feet to 400 feet in length may be holed-through (excavated completely) before concreting the interior of the tunnel, when placement of pre-fabricated or pre-cast pipe is to be installed. When this is proposed, hole-through (unsupported length) before concreting of the interior of the tunnel, it must be justified by the original subsurface geotechnical investigation and design.

Tunnel lining and bracing should consist of steel ribs and steel spreaders (dutchmen) with wood, concrete, or steel lagging, or with bolted steel liner plates.

Fireproof materials should be utilized in all construction of plant structures, above ground, within 100 feet of the shaft or tunnel. The use of flammable materials or wood shoring would require that adequate fire protection be provided.

Ventilation systems must be established and provide a minimum of 200 cfm per worker.

- All equipment must maintain a minimum clearance of 25 feet from opening.
- An established contingency plan in the event of ground loss.
- Cranes utilized in operations must maintain minimum required clearances.

#### **603.6A-6C** Tunnel Shield

- The face of the shield must be provided with a hood or an approved grid system.
- The excavation face must have a sufficient length to allow for the installation of one (1) complete ring of liner plates, or one (1) complete set of ribs and lagging before advancing.
- The contractor must submit details and design information of the shield.

#### **603.6A-6D** Tunnel Lining

Tunnel lining and bracing should consist of steel ribs and steel spreaders with wood lagging and concrete, or steel lagging, or with bolted steel liner plates.

The tunnel liner and bracing must be designed (calculations provided) of an adequate strength based upon the geotechnical investigation, soil analysis, loading, and the diameter and depth of cover to provide adequate support of the tunnel.

- A ring expander must be used to expand the rib continuously outward and upward.
- Liner plates must be designed based on joint strength, minimum stiffness, critical buckling of the liner plate wall, and deflection, or flattening of the tunnel section.
- On tunnels with a diameter greater than 10 feet, the placement of ribs inside of liner plate may be required.
- When the geotechnical investigation has determined that silts and fine sands exist, that may flow under pressure, all liner plates must include a neoprene gasket adhered to each flange face.

#### **603.6A-6E** Lagging

Lags are generally started at spring line and continue upwards towards the crown.

Lag spacing consists of three methods:

1. **Wedging** – done by driving a block of wood between the earth and the lag at each end, or by driving a wedge between the rib and the lag.
2. **Stops** – by welding small angles to the ribs outer flange to prevent sliding.
3. **Clamps** – which are applied to wood or steel lags.

If the spacing of lags between ribs is used in tunnel construction, packing between lags with filler may be required.

- Lags are boards of steel plates placed longitudinally against the roof and walls of the tunnel excavation.

- Steel lagging may consist of channel, liner plate or corrugated metal.
- Steel lagging thickness must be designed on strength based upon the geotechnical investigation, soil analysis, and loading.
- Wood lagging thickness must be designed on strength based upon the geotechnical investigation, soil analysis, loading. Generally wooden lags common size are 3 inches by 6 inches, and the length is cut according to the spacing of the ribs.
- A minimum of one liner plate per ring with a 2 inch diameter coupling for grouting is required.

#### **603.6A-6F**    The Construction of Shafts / Pits

Shafts / pits should be constructed of a proper size and shape, and equipped as to allow work to be carried on safely.

- Shafts must be constructed of driven steel sheet pilings, steel bracing and tight wood, or steel lagging or steel liner plates and ribs.
- The removal of spoils should be accomplished by mechanical means (muck box).
- All shafts must be provided with guardrail and a toeboard.
- When ladders are utilized within the shaft or pit, cages and/or safety devices must be provided on depths of 15 feet to 20 feet, platforms must be provided at depths of greater than 20 feet.
- Ventilation systems must be established and provide a minimum of 200 cfm per worker.
- All equipment must maintain a minimum clearance of 25 feet from openings.
- Upon completion of project all shafts, pits and drifts that are not part of the finished product must be backfilled.

#### **603.6A-6G**    Placement of Shafts / Pits

Shafts /Pits must be:

- Preferred to be located as far from the traveled way as feasible. At minimum, should be located 10 feet from the edge of pavement in rural areas, or at least 5 feet beyond the concrete curb and gutter or AC dike in urban areas, or at least 5 feet beyond the toe of slope of embankments.
- Located outside of access-controlled right-of-way.
- Adequately fenced or have a Type-K barrier placed around them at a 10:1 taper or as otherwise directed.
- Shored according to Cal-OSHA minimum requirements. Located within 15 feet of traffic lanes on a State highway must not extend more than 36 inches above the pavement grade unless otherwise authorized by the State representative. Reflectors must be affixed to the sides facing traffic, and placement around the perimeter of a 6 feet chain link fence during non-working hours.

- Are only allowed within access-controlled right-of-way for direct access-controlled right-of-way crossings that are excessively long or that have restricted space available outside the right-of-way.
- They must not Affect State facilities or create a hazard to the traveling public. When placement is approved within access-controlled right-of-way, damaged State facilities must be replaced or repaired according to State Standard Specifications.
- Must have crushed-rock and sump areas to clear groundwater and water used to clean. They must be lined with filter fabric when groundwater is found and pumping is required.

#### **603.6A-6H** Excavation

In some locations Soil Stabilization may be required. It may become necessary at the direction of the Engineer to either pressure grout or freeze the soil area of the project to control water, to prevent loss of ground, to prevent settlement or displacement of an embankment. When required, a California Registered Geotechnical Engineer must prepare and stamp the plans determining the material and method for use.

In some projects masonry sections are installed, the amount of excavation of the tunnel should not exceed the amount needed for placement of a full masonry section after all lining is in place.

All excavated material must be considered as unclassified material.

- In the event of any ground movement over or adjacent to construction, all work must be suspended, except that which will assist in making the construction site secure and prevent any further additional movement of the ground.
- Excavation should not be advanced beyond the edge of the shield, except in rock.
- The geotechnical engineer/engineering geologist must determine the allowable amount of tunnel length unsupported by bracing, based on the geotechnical investigation and design.
- All voids between the excavation and the liner must be grouted after setting of ribs and lagging, if not expanded to full contact with the surrounding ground, as determined by the Safety Engineer.
- A log must be maintained of all surrounding utilities and facilities.

#### **603.6A-6I** Dewatering (Rev. 06/20)

When ground water is anticipated, pumps of sufficient capacity to handle the flow must be maintained at the site. Observation must be maintained to detect any settlement, displacement, or washing of fines into the pit, shaft or tunnel. A NPDES permit is required if the water is not put in the sewer. Dewatering operations conducted within Caltrans ROW or dewatering operations that have potential to discharge onto Caltrans ROW (whether fully or partially) must implement the most current standard specifications for construction requiring a dewatering and discharge work plan be submitted to the permit inspector prior to any work taking place in Caltrans ROW. Applicants may be subject to delays in the start of construction due to missing required

dewatering and discharge work plan and dewatering permit coverage under the applicable regional water quality control board dewatering operations/permits.

### **603.6A-6J** Grouting

Grouting should be kept close to the heading (working front of tunnel). It may be required to add pea-gravel and fly ash to the grout. The pea-gravel would assist in consolidation and the filling of the voids, fly-ash works as a lubricant allowing the grout to free-flow.

- The use of grout stops may be utilized if necessary or if required by the Safety Engineer.
- Grouting must be performed when ordered by the Safety Engineer.
- At no time must progression of the tunnel exceed 6 feet beyond the grouting of the exterior void.
- Pressure on the grouting gauge should not exceed the capacity of the lining, sufficient to fill all voids.
- A gauge must be provided which will accurately indicate working pressure and must be monitored constantly during grouting procedures.
- Grouting must start at the lowest point and proceed upwards simultaneously on alternating sides.
- When grouting is complete at that location a threaded plug must be installed into the coupling.

### **603.6A-6K** Materials

The form “Notice of Materials to be used,” form CEM-3101 is required.

- The manufacturer must provide a Certificate of Compliance, to ensure tensile and yield strengths.
- Steel lagging may consist of channel, liner plate or corrugated metal.
- Steel lagging thickness must be designed on strength based upon the geotechnical investigation, soil analysis, and loading.
- Wood lagging thickness must be designed on strength based upon the geotechnical investigation, soil analysis, loading. Generally wooden lags common size are 3 inches by 6 inches, and the length is cut according to the spacing of the ribs.
- When the geotechnical investigation has determined that silts and fine sands exist, that may flow under pressure, all liner plates must include a neoprene gasket adhered to each flange face.
- Ensure Manufacturer’s Specification Data Sheets (MSDS) are provided stipulating recommended:
  - Specifications of steel spreaders (spacing, tolerances).
  - Specifications of steel rib (section lengths, spacing, etc.).

**603.6A-6L Project Owner's / Permittee's Responsibilities**

The project owner/permittee is responsible for providing:

- **A full-time Safety Engineer;**

Must be a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in sub-structural design or inspection of tunnels. Proof of experience must be submitted on "Certification of Structural Experience" (form TR-0133),

**OR**

- **A full-time Safety Representative;**

State certified by Department of Industrial Relations, Cal/OSHA, proof of certification is required.

Cal/OSHA requires persons performing the duties of gas tester or safety representative to be certified by passing a written and an oral examination administered by the M&T Unit. CCR 8406(f), (h)

- Project drawings and specifications, calculations and details stamped by a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in sub-structural design of tunnels.
- A geotechnical investigation by a licensed geotechnical engineer to determine the following;
- Storm Water Pollution Prevention Plan (SWPPP) or Water Pollution Control Plan (WPCP).
- De-Watering Plan, if needed.
- Ground water information
- Boring and soil analysis logs, location plan of borings, cross sections, subsurface strata, fill and ground water elevations;
  - Particle size distribution (particularly percent rock and cobble),
  - Cohesion index, internal angle of friction, and soil classification,
  - Plastic and liquid limits (clays), expansion index (clays), soil density, and penetration tests,
  - Rock strength, rock joint fracture and orientation, water table levels, and soil permeability,
  - Areas of suspected and known contamination should also be noted and characterized.
- The soil investigation must also determine the presence of rock, cobbles, and/or boulders, and the following;
  - Depth and extent of rock
  - Rock type

- Rock strength
- Rock joint/fracture spacing
- Hardness
- RQD
- Estimated range of sizes & frequency of occurrence of cobbles and boulders.

#### **603.6A-6M Contractor's Responsibilities**

The contractor is responsible for providing:

- Tunnel project construction plans and specifications, calculations and details, method of construction, to include the adequacy of the shield and liner material stamped by a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in sub-structural design of tunnels.
- "Notice of Materials to be used," form CEM-3101.
- Method of construction plan.
- A Licensed Surveyor.
- Proof of rib expanders and/or liner supports.
- Working schedule of the project.
- Contingency plan for dealing with ground loss work.
- Shaft; soil stability at portals and ground improvement plan.
- Dewatering plans for entry and exit shafts/pits, if needed.
- Installation and monitoring of SWPPP or WPCP facilities and conditions.
- Shoring design for entry and exit shafts/pits.
- Survey control plan: lasers, laser mounting, laser checking.
- Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
  - Buried points

#### **603.6A-6N Key Points of Inspection**

Meet and confer with the Safety Engineer hired by the Owner/Permittee, explain exactly what is expected and required on a daily report, and any issues of concern.

State Representative and Safety Engineer/Safety Representative, together both should:

1. Review the geotechnical investigation.
2. Review the emergency and contingency plans.
3. Inspect the roadway and shoulder area for existing cracks in the ground and mark them.
4. Inspect the area for all-existing utility facilities and sub-structures.
5. Check and confirm any requirements or concessions requested by any Utility companies with the owner and the contractor.
6. Ensure that a Survey Grid line has been established over proposed alignment of tunnel.

7. Make a determination on the frequency of surface monitoring that will be required and identify what would constitute additional monitoring and/or surveying.
8. Inspect and ensure there is sufficient space for the staging area, that equipment and workers can work safely.
9. Establish the limits of minimum clearance.

Safety Engineer/Safety Representative – start of project and construction of shafts/pits.

1. Request to see OSHA permit and tunnel classification sheet.
2. Ensure the contractor has equipment on site to handle an emergency, and in the event that ground loss occurs.
3. Inspect installation of SWPPP or WPCP facilities and conditions.
4. Have knowledge of the soil conditions, density, and water table (sand, clay, cobble, etc.).
5. Inspect the shafts/pits for Cal OSHA (trenching and shoring) requirements.
6. Ensure that guardrails and toe-boards are secured around shafts.
7. Ensure the flooring of the shaft/pit is lined with gravel or ballast rock.
8. Ensure that the sump pumps setup and that they are adequate for dewatering.
9. Ensure all electrical cords and facilities are properly secured.
10. Inspect materials to be used against list provided by contractor.
11. Obtain receipt of the certificates of compliance from the manufacturer on all materials delivered and to be used for the project.
12. Ensure that ventilation system is adequate and installed.
13. Ensure a location is designated for spoils, that they are adequately stockpiled and removed.

Safety Engineer/Safety Representative – daily inspection

1. Ensure that laser is verified every morning prior to start of work.
2. Inspect SWPPP or WPCP facilities and conditions.
3. Check traffic control, signs, and delineation.
4. When warranted request line to be re-surveyed to determine heaving or subsidence, if greater than 0.2 inches take corrective measures.
5. Visually inspect gauge during grouting operations.
6. Inspect ventilation equipment, request copies of contractor's records of maintenance.
7. Ensure safety equipment is worn at all times by everyone.
8. Notify State Representative in the event of an incident or accident.
9. Ensure that all excavations are adequately protected with Type-K barrier and chain link fence around them or covered with steel plates.

State Representative and Safety Engineer/Safety Representative – close of project

1. Upon completion, visually inspect the area of installation, highway and shoulder area to ensure no new cracks, heaving or subsidence have occurred.

2. Require line to be re-surveyed to determine heaving or subsidence.
3. Ensure that all excavations were backfilled.
4. Work site and staging areas are restored to their original condition.
5. Establish a checklist if necessary for completion points (i.e. repairs or corrections).

#### **603.6A-7 Procedural Requirements for Structural and Sub-Structural Design and Calculations**

All submittals must be stamped by a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in structural design and preparation of calculations, proof of experience is required by use of Encroachment Permits form "Certification of Structural Experience" (form TR-0133) to be included within the project package submittal.

Sub-structural projects may consist of but are not limited to; drainage boxes & systems, tunneling projects (mechanical or manual tunnel excavations for the placement of tunnel supports), and Trenchless Technologies for the installation of utilities when the diameter is 30 inches or larger (jack & bore, microtunneling, horizontal directional drilling, or pipe-ramming).

#### **603.6A-7A Structural Design and Calculations**

All Structural Project submittals (structures and structural falsework) will require review by Division of Engineering Services (DES), for construction under an encroachment permit and require the following:

- Designed plans and specifications, calculations and details (structural and falsework).
- A geotechnical investigation and soil analysis by a licensed geotechnical engineer are required. It must provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the alignment of the project.

Construction or Structures Construction will review false work and shoring submittals. Submittals may be routed through Structure Maintenance.

#### **603.6A-7B Sub-structural Design and Calculations**

When the distance between a tunnel and an existing structure is less than twenty times the tunnel's diameter, it must be sent to Division of Engineering Services (DES) for review of the potential lateral loading effects to the pilings and foundation. As in Section 603.6B-7, submittals may be routed through Structure Maintenance.

Otherwise, Sub-structural Project submittals, listed below and submitted with the "Certification of Experience" (form TR-0133) **do not** require review by DES.

1. Microtunneling projects.
2. Bore & Jack, HDD, or Pipe Ramming (diameter is 30-in or larger and requiring structural/sub-structural design, investigations and calculations).

3. Tunneling for the placement of tunnel support systems (rib & lagging, or steel liner plate requiring structural/sub-structural design, investigations, and calculations).
4. Drainage boxes and systems.

All Sub-structural Project submittals require the following:

- The District Encroachment Permits Office is responsible for verification of the California Registered Engineers stamp, validation of the date of expiration against the dated plan set and calculations. The permit office engineer must validate the RE’s stamp at the [web site listed below](#), by entering the RE’s number. A copy of the results must be printed and included within the permit file. The encroachment permit may be issued, upon completion of the normal review process (Traffic, Environmental, R/W, etc.).  
<https://search.dca.ca.gov/>
- Designed plans and specifications, calculations and details (liner plates, rib, & lagging, bracing, etc.).
- A geotechnical investigation and soil analysis by a licensed geotechnical engineer are required. It must provide identification of any locations of difficulty, changes in soil formation, or mixed face conditions that could present or create ground loss, exploratory soil corings and logs are required along the alignment of the project.
- When the length of the tunnel is greater than 400 feet, alignment holes may be required. Alignment holes must be drilled at a maximum spacing of 200 feet and a casing of 4 inches to 6 inches in diameter installed vertically, to a depth necessary for the installed casing to extend into the tunnel excavation. When alignment holes fall within the pavement area of the roadway, the pavement must be saw-cut, a cover must be placed over the end of the casing at grade, and the space around the casing within the roadway filled with concrete (EXCEPT within access-controlled right-of-way).

**603.6A-7C Project Owner’s / Permittee’s Responsibilities**

On projects deemed by Caltrans as requiring full-time inspection, the project owner/permittee is responsible for providing a third-party full-time inspector.

On projects over 30 inches diameter and deemed as requiring full-time inspection, the project owner is responsible for providing:

- **A full-time Safety Engineer:**  
A California Registered Structural or Civil Engineer, with a minimum of five (5) years’ experience in design or inspection of Sub-structural Projects (tunnels). Proof of experience must be submitted on Encroachment Permits form “Certification of Structural Experience” (form TR-0133),
- OR**
- **A full-time Safety Representative:**

State certified by Department of Industrial Relations, Cal/OSHA Mining & Tunnel Unit, proof of certification is required. California Code of Regulations 8406(f), (h)

### **603.6A-7D Contractor's Responsibilities**

Prior to issuance of the "DP" permit, the following must be submitted:

- Proof of experience, as stipulated by the District Office, in respect to diameter and length of proposed project.
- Tunnel support system construction plans and specifications, calculations and details, method of construction, to include the adequacy of the shield and liner material stamped by a California Registered Structural or Civil Engineer, with a minimum of five (5) years' experience in sub-structural design and preparation of calculations.
- "Notice of Materials to be used," form CEM-3101.
- Method of construction plan.
- A Licensed Surveyor.
- Proof of rib expanders and/or liner supports.
- Working schedule of the project.
- Contingency plan for dealing with ground loss work.
- Shaft; soil stability at portals and ground improvement plan.
- Dewatering plans for entry and exit shafts/pits, if needed.
- Installation and monitoring of SWPPP or WPCP facilities and conditions.
- Shoring design for entry and exit shafts/pits.
- Survey control plan: lasers, laser mounting, laser checking.
- Ground surface settlement monuments and subsurface settlement monuments monitoring program plan.
- Buried points

### **603.6B Open-cut Road** (Rev. 04/18)

#### ***Permit Code UT***

Underground installations within highway right-of-way must be performed using a trenchless technology method (Bore & Jack, Horizontal Directional Drilling, Microtunneling, Pipe Bursting or Pipe Ramming), unless specified otherwise by permit. Open trenching is authorized only when the applicant demonstrates that all alternatives have been investigated and that installation by a trenchless technology is not feasible. Procedures that must be followed in evaluating applications for open trenching are shown in Table 6.11.

The Reclamation Board, in maintaining the integrity of the State's levee system, issues permits for construction of facilities within the levee prism. Caltrans and the Reclamation Board cooperatively have developed procedures for controlling installation of underground facilities where a State highway is on or crosses a levee. The Board prefers open-cut highway crossings to ensure the integrity of the levee. Caltrans issues permits that conform to Board requirements.

Authorized open trenching must be noted clearly in the encroachment permit or permit rider. Traffic controls must conform to State standards and recommendations of Highway Operations or Permits. Unless otherwise specified in the permit, work must be accomplished one lane-width at a time on conventional two-lane highways. If determined acceptable, two lanes of a multi-lane highway may be used for the work when one full lane width in each direction is available for traffic. Trenching, backfilling, and paving operations must conform to Caltrans' standards.

Trenching of crossings is not authorized within access-controlled right-of-way.

### ***603.6B-1 Backfill of Excavations and Trenches***

Backfilling of excavations and trenches must comply with Caltrans Standard Specifications. The specification for Controlled Low Strength Material (CLSM) is shown in Appendix H, unless otherwise specified by Caltrans' Material Engineer.

### ***603.6B-2 Trenching and Shoring***

Trenching and shoring must be in conformance to the requirements of the California Department of Safety and Health, Title 8 of the California Administration Code (Construction Safety Orders).

The Caltrans "Trenching and Shoring Manual" is available at the following website:

<https://dot.ca.gov/programs/engineering-services/manuals>

The contractor may elect to use the Construction Safety Order Details, it is not required that a Professional Engineer prepares the plan. However, a plan is still required. This plan can be a letter to the State Representative containing the information outlined in Section 2.0 "Shoring Plan Submittal" in Chapter 2 of the Caltrans Trenching and Shoring Manual (Second paragraph Section 1.6, page 1-9).

Shoring that does not meet the California Department of Safety and Health, Title 8 of the California Administration Code (Construction Safety Orders) must be designed by a California Registered Civil or Structural Engineer, and they must sign the shoring plan.

### **Technical Data**

The technical engineering information below can be used by an Engineer when reviewing shoring plans.

The design or engineering analysis, of a shoring system is accomplished in the following sequence:

1. The soil or earth that is to be retained and its engineering properties are determined.
2. Soil properties are then used in geotechnical mechanics or procedures to determine the earth pressure force acting on the shoring system. An equivalent fluid,  $K_w$ , may be determined.

3. The design lateral force is then distributed, in the form of a pressure diagram. The distribution, or shape, of the diagram is a function of type of shoring system and the soil interaction with the system.
4. Lateral loads due to surcharges and from sources other than basic soil pressure (e.g., ground water) are determined and may be combined with the basic soil pressure diagram, modified for practicability, the resulting lateral pressures become the design, lateral pressure diagram.
5. The design lateral pressure diagram is applied to the system, and a structural analysis is made. Again, there is a range from simplified to refined or complex procedures that can be used.

In general, engineered drawings may be accompanied by the engineer's calculations. If railroads are involved, a minimum of three sets of calculations and seven sets of plans must be submitted.

The railroads require a minimum of one set of calculations each from the designer and reviewer and four sets of shoring plans. One additional complete set of calculations and drawings will be needed for the OSC Sacramento Office.

**Table 6.11  
Procedures for Evaluating Proposals for Open Trenching**

Follow these procedures to evaluate applications for open trenching:

- 1) The applicant must supply these items for consideration by the permit engineer:
  - Profile plans or cross-sections showing the locations of all existing utilities, culverts, or other permanent installations that restrict the bore.
  - Soils information showing that trenchless technologies, such as Bore & Jack or HDD are not feasible.
  - Detail plan showing detailed restrictions.
  - Any other information indicating that trenchless technologies are not allowable methods in the area.
- 2) A design change is mandatory when the crossing location can be changed to allow boring and jacking and not affect the function of a facility.
- 3) Trenched crossings of connecting local streets and public roads where traffic is not adversely affected is acceptable with concurrence of the local agency that owns the public connection.
- 4) Casing in open trenches may be required for future maintenance or added facilities.
- 5) The District Permit Engineer will review submitted materials to determine if the request is reasonable. Reviewing units may include: Environmental, Field Inspection, Highway Operations--Traffic Operations, Maintenance Materials Engineering, Project Development, and Right of Way Utilities.

**604 ANNUAL UTILITY MAINTENANCE (Rev. 10/19)**

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***Permit Code UE***

Annual utility maintenance permits (UE permits) authorize utility companies that lawfully maintain a utility facility within State's conventional highway right-of-way to inspect, maintain, and repair utility facilities, to install service connections under specified conditions, pole maintenance and chemical treatment, and to make emergency repairs to remedy hazardous conditions or any interruption of service to a customer. Annual UE utility permits may be issued to public and private utility owners.

UE permits are valid for one calendar year, no extensions of the permits are allowed.

UM permits were issued prior to 2019 and has since been discontinued. See 604.1 for details.

Only those maintenance activities that can be performed using Caltrans Standard Plans for Temporary Traffic Control Systems and Temporary Pedestrian Access Routes, are authorized under the annual maintenance permit. Otherwise a separate permit application for the work, along with a traffic control plan designed and signed by a California Registered Civil or Traffic Engineer must be submitted for review and approval.

UE permits authorize communication utility companies to install additional capacity in existing ducts by placing additional cable or replacing an existing cable with a greater cable pair or fiber optics. Authorized work also includes interconnect splicing of existing cable pairs, placement of air flow monitoring transducers and air piping facilities in existing conduits, replacing pull boxes, and reconnection of existing service. Increasing the capacity of existing aerial facilities is also allowed along conventional highways. Utility owners may place new cable or replace existing cable provided the highway is not part of the State Scenic Highway System.

Communication utility owners are not authorized, under a UE Permit, to place conduit or utility vaults within highway right-of-way, or to make any excavations other than for potholing or service connections under specified conditions.

Routine or planned pole replacement / relocation are not under the scope of UE permits. A separate encroachment permit (US) must be obtained for pole replacement and relocation (see 603.5 for details). Poles that are knocked down by vehicles, accidental causes or natural disasters are authorized to be replaced by UE permits. The entire length of poles and stubs must be removed from the ground and replacement pole must be placed at the exact location.

Encroachment permits are also required for utility companies, to operate and maintain services to State owned facilities (Safety Roadside Rest Areas, etc.) within the right-of-way. Service connections to State owned facilities installed within a conventional highway must comply with the utility company's annual permit. A no fee Utility Service (NUS) permit must be obtained by the utility company if the service connection does not qualify under the annual permit. Service connections such as service disconnects, meters, shut-off valves or switches within the access

control lines require the utility owner to obtain a NUS permit for the connections (see 603.5 for details).

Maintenance work on utility facilities within the right-of-way must be authorized under an encroachment permit, and a copy present at the work site. All maintenance work must be performed in compliance with the Encroachment Permit General Provisions (TR-0045) and applicable Special Provisions.

A developer may be required by a city or county to construct service connections that later will be maintained by the utility company. Utility owners must apply for an encroachment permit to identify their ownership and establish maintenance responsibilities of a utility service within the State right-of-way. The utility company should apply before the property owner is issued an encroachment permit for the installation.

Caltrans' policy for developer installed public utility facilities is discussed in Section 603.5.

Permit inspectors should use “Encroachment Permit Report (Diary)” (form TR-0130) to record work performed under an annual utility maintenance encroachment permit. See 206.1 for details.

**Requirements for Pole Maintenance by Chemical Treatment:**

Utility Companies must submit copies of the Safety Data Sheets (SDS) for all chemical compounds to be used in their pole treatment maintenance operations, along with the permit application submittal.

Prior to any application or use of Tree Growth Regulators (TGR), prior approval must be obtained from the District Landscape Specialist or their designee.

Utility Companies are to notify the District Landscape Specialist or their designee and the District Encroachment Permits Office when there is any change or modification in the type(s) of chemical(s) used in their pole treatment maintenance operations.

After each treatment Utility Companies are to record a list with the pole identification, location(s), type of chemical(s) and quantities used for their pole treatment maintenance operations. This information must be provided to District Permit Office upon expiration of their UE annual permit and upon request of Caltrans during the life of the annual permit.

**604.1 Encroachment Permit Annual Utility Maintenance Provisions** (Rev. 10/19)

***Permit Code UM***

UM permits have been discontinued. All UM permits that are not expired are still in effect until the expiration date. No extensions are allowed.

UE permits must be issued for utility permittees requesting annual utility maintenance permit.