

California High-Speed Train Project



TECHNICAL MEMORANDUM

Designer's Responsibilities and Utility Requirements for 30% Design Level TM 2.7.5

Prepared by: Signed document on file 02 Jun 11
Afshin Abtahi, PE Date

Checked by: Signed document on file 08 Jul 11
John Chirco, PE Date

Approved by: Signed document on file 09 Sep 11
Ken Jong, PE, Engineering Manager Date

Released by: Signed document on file 18 July 12
Hans Van Winkle, Program Director Date

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System Level Technical Reviews by Subsystem:

Systems:	<u>Signed document on file</u> Richard Schmedes	<u>26 July 11</u> Date
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Operations:	<u>Signed document on file</u> Joseph Metzler	<u>22 July 11</u> Date
Maintenance:	<u>Signed document on file</u> Joseph Metzler	<u>22 July 11</u> Date
Rolling Stock:	<u>Signed document on file</u> Frank Banko	<u>17 July 11</u> Date
Project Management Oversight:	<u>Signed document on file</u> Michael D. Lewis, P.E.	<u>24 June 2012</u> Date

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ABSTRACT

This Technical Memorandum provides guidance on the requirements and responsibilities for advancing the design of utilities to the 30% Design Level for the California High-Speed Train Project (CHSTP). This guidance offers standards and procedures for the location, assessment, protection and placement of underground and overhead utilities located within and in proximity of the California High-Speed Rail Authority right-of-way. Particular emphasis is placed on early identification, disposition and documentation of major existing and proposed utilities, including high-risk utilities, that impact CHSTP construction or operational activities.

The approach for assessing and addressing utility impacts is based on the desire to limit the number of transverse encroachments, eliminate longitudinal encroachments, and avoid maintenance of utilities from within the Authority's right-of-way. This document does not address storm drains and irrigation systems. This document also does not address the installation, relocation, or modification of traction power facilities.



1.0 INTRODUCTION

1.1 PURPOSE OF THE TECHNICAL MEMORANDUM

This Technical Memorandum provides guidance on the requirements, responsibilities and expectations for advancing the design of utilities to the 30% Design Level for the California High-Speed Train Project (CHSTP). It offers standards and procedures for the location, assessment, protection and placement of underground and overhead utilities located within and in proximity to the California High-Speed Rail Authority (Authority) right-of-way. Emphasis is placed on early coordination with utility owners for identification, disposition, documentation, and required design effort for protection or relocation of existing utilities and new utilities required for operation of the CHSTP.

This document does not address storm drains, irrigation systems or requirements to support construction activities. This document also does not address the installation, relocation, or modification of traction power facilities.

1.2 STATEMENT OF TECHNICAL ISSUE

The CHSTP corridor will cross numerous high and low risk utilities owned and maintained by public and private entities. This Technical Memorandum provides guidance on the identification and assessment of utilities impacted by high-speed rail construction and for the design of the relocation of existing and proposed utilities. The design and relocation of utilities shall follow the requirements of the public or private utility owners whose facility will be impacted by the CHSTP.

1.3 GENERAL INFORMATION

Utility design shall comply with the requirements of this Technical Memorandum and those of the California Public Utilities Commission, including but not limited to the General Orders, Public Utility Codes, Rules of Practice and Procedure, and the Policies and Guidelines. The designer is required to ensure that utility crossings, impacts, and relocations are in compliance with the applicable requirements of the California Public Utility Commission, Caltrans, Federal, State, local, and private and public agencies and utility owners.

This document does not supersede public and franchise utility agency design requirements. It is intended to serve as a supplement to agency requirements to ensure that minimum design requirements are achieved. Where the design criteria provided here conflicts with other referenced material or where the referenced material conflict with each other, the most stringent requirement that satisfies all of the documents and references shall govern.

1.3.1 Definition of Terms

The following technical terms and acronyms used in this document have specific connotations with regard to the California High-Speed Train system.

<u>Access Control</u>	Full or partial restriction of access of owners or occupants of abutting land to or from a highway or railway.
<u>Approximate Location</u>	The “approximate location of subsurface installations” being a strip of land not greater than 24-inches on either side of the exterior surface of the subsurface installation. “Approximate Location” does not define the utility depth.
<u>Area of Impact</u>	The area of required utility construction or relocation due to the CHSTP.
<u>Area of Influence</u>	The area parallel to and 900 feet transverse to the centerline of the nearest track, or as defined in the Environmental Document, whichever is greater.



<u>Betterment</u>	Improvements to the capacity and/or functionality of a utility system which are not required for safety, operation and construction of the CHSTP.
<u>High Risk Utility</u>	Facilities conducting or carrying the following materials, whether encased or not, are considered to be High Risk utilities: <ol style="list-style-type: none">1. Petroleum Products2. Oxygen3. Chlorine4. Toxic or flammable gases or liquids5. Natural gas pipelines of any size6. Underground electric supply lines, conductors or cables that have a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do not have concentric grounded or other effectively grounded metal shields or sheaths.7. Water in pressured pipeline greater than 8-inch diameter or pipelines with normal operating pressure greater than 80 psi8. Other utilities that could disrupt the operation of the CHSTP
<u>Low Risk Utility</u>	All other facilities that are not identified as High Risk Utilities are considered to be Low Risk Utilities
<u>Longitudinal</u>	A facility located parallel to and within proposed Highway or Authority's right-of-way.
<u>Major Utility</u>	Any subsurface, above ground, or overhead facility used for transmission, regardless of size, shape, or method of conveyance.
<u>Minor Utility</u>	Any subsurface, above ground, or overhead facility used as distribution lines or service laterals to individual parcels or properties
<u>Owner</u>	The owner of the utility or its authorized agent.
<u>Pothole / Test Pit</u>	An excavation to expose an underground facility.
<u>Private Utility</u>	Utility infrastructure owned by a private corporation or public or private entities which may not be regulated by the public or government agency.
<u>Probe</u>	Rods physically inserted in the ground to mechanically or electronically locate an underground facility without exposing the facility.
<u>Public Utility</u>	Utility infrastructure that is operated and maintained for public service. Public Utilities can be either publicly or privately owned and involve natural monopolies in sectors specially regulated by the California Public Utilities Commission.
<u>Quality Level</u>	A level of accuracy scale used for identifying the location of underground and above ground utility facility, used to develop capital projects, and for acquiring and managing that level of information during the project development process. Four levels of quality measurement are used ranging from Level A to Level D.
<u>Relocation</u>	The removal, rearrangement, and reinstallation of a utility facility required by a transportation improvement project.
<u>Right-of-Way</u>	A general term for a strip of land, or rights in a strip of land, used for highway, railway, public utility services, or other purposes. For the purpose of this technical memorandum, right-of-way is the Authority's proposed right-of-way.



<u>Service</u>	The portion of the electrical, gas, water, sewer and communication system that connects a customer, usually at the meter location, to the utility distribution or supply system.
<u>Sleeve (Casing)</u>	A pipe in which a pipeline or conduit is inserted.
<u>Transverse</u>	A facility passing from one side of the right-of-way to the other side of the right-of-way.

Acronyms

AAR	Association of American Railroads
AREMA	American Railway Engineering and Maintenance-of-Way Association
Caltrans	California Department of Transportation
Authority	California High-Speed Rail Authority
CHST	California High-Speed Train
CHSTP	California High-Speed Train Project
CPUC	California Public Utilities Commission
GO	General Order
CFR	Title 49 Code of Federal Regulations
DEIR/S	Draft Environmental Impact Report / Statement
FRA	Federal Railroad Administration
HDM	Caltrans Highway Design Manual
PDPM	Caltrans Project Development Procedures Manual
QL	Quality Level
OCS	Overhead Contact System

1.3.2 Units

The California High-Speed Train Project is based on U.S. Customary Units consistent with guidelines prepared by the California Department of Transportation and defined by the National Institute of Standards and Technology (NIST). U.S. Customary Units are officially used in the United States, and are also known in the US as “English” or “Imperial” units. In order to avoid confusion, all formal references to units of measure should be made in terms of U.S. Customary Units.



2.0 STATEMENT OF TECHNICAL TOPIC

2.1 GENERAL

In preparing the 30% Design Level plans, the designer shall follow the requirements of this technical memorandum and the following documents:

- California Department of Transportation, Highway Design Manual
- California Department of Transportation, Project Development Procedures Manual
- California Public Utility Commission General Orders, Public Utility Codes, Rules of Practice and Procedure, and the Policies and Guidelines.
- The Railway Engineering and Maintenance-of-Way Association Manual of the American Railway Engineering (AREMA Manual)
- National Fire Protection Standards

Design requirements for utility elements not specific to CHST operations will be governed by existing applicable standards, laws and codes.

It is noted that design criteria for utilities is generally developed by the utility owner. Where CHSTP design criteria conflicts with other referenced material or where the referenced material conflict with each other, the more stringent requirement that satisfies all of the documents and references shall govern. Significant effort may be required in urban areas to comply with the requirements of all of the utility owners.

2.2 POLICY CONSIDERATIONS

In developing this document, design assumptions were made that will require confirmation based on Authority policy. Potential approaches to addressing these issues are summarized in the following sections. Policy assumptions cited below are subject to change.

1. Utility design and construction shall protect the Authority's facilities and right-of-way against damage caused by the presence of a utility.
2. Caltrans utility policies and procedures will be adopted as CHSTP utility relocation policy and procedures, where applicable.
3. Exclude public and private utilities from within the high-speed rail right-of-way where it is feasible and reasonable.
 - Existing longitudinal utilities located within the proposed right-of-way shall be relocated to outside of the right-of-way unless they can be shown to meet the encroachment justification requirements. Longitudinal utility encroachments within the right-of-way are considered on a case-by-case basis.
 - New non-CHSTP utilities will not be permitted to be installed longitudinally within the access controlled areas of the right-of-way. This provision is established to provide the maximum degree of safety and to preserve railroad operations.
 - New utility installations and adjustments or relocation of existing utilities may be permitted to cross the right-of-way. Transverse utility encroachments shall comply with the encroachment justification requirements.
4. To the extent that it is feasible and reasonable, exclude access points for utilities from within access controlled right-of-way. This is intended to promote reliable high-speed train operation, minimize inconvenience to the traveling public, and eliminate conditions that may be detrimental to the safety of utility employees during maintenance of its facilities.
5. Satisfy requirements and criteria of the affected utility owners, however, no betterment shall be included unless specifically agreed between the utility owner and the Authority. Costs that are attributed to protection, relocation and modification of utilities shall be allocated based on the property rights of the utility owner and through negotiation with the Authority.
6. Utilities that transport hazardous materials are not permitted in a railroad tunnel under any circumstances.



2.2.1 Utility Agreements and Cost of Protection or Relocation

The Authority may develop and execute Design and Relocation Agreements with public or private utility entities that include protection or relocation of utilities within the right-of-way. The designer shall assist the Authority by providing coordination and technical support during preparation of these agreements.

For the purpose of developing construction cost estimates for the 30% Design Level, the designer shall assume that costs that are attributed to protection, relocation and modification of utilities will be borne by the Authority. The actual allocation of the cost will be established between the Authority and the utility owner based on utility owner's property rights.

2.2.2 Betterments

Utility betterments are not a part of the CHSTP project scope. The basis for utility design shall be related directly to the design, construction, and operations of the CHSTP. Proposed betterments to existing facilities shall be developed through cost-sharing with the respective utility agencies and owners.

2.2.3 Right-of-Way Encroachment

An encroachment is defined as a non-CHSTP facility, structure, or object that is located within the Authority right-of-way. Encroachments allow temporary or permanent use of Authority right-of-way by a utility, a public entity, or a private party. Encroachments include all public and private utilities within the right-of-way.

CHSTP policy is to exclude access to public and private utilities from within the access controlled high-speed rail right-of-way at all locations where it is feasible and reasonable.

Utilities that transport hazardous materials are not permitted in high-speed train tunnels.

Encroachment Justification

Access to utilities from within the Authority's right-of-way is considered to be an exception to CHSTP criteria and requires an approved design variance.

Where longitudinal or transverse encroachments and installations are required, the designer shall demonstrate the following conditions are satisfied:

- An alternate location is not feasible, from the standpoint of providing efficient utility services in a manner conducive to safety, durability, and economy of construction, maintenance and operation.
- The accommodation will not adversely affect the design, construction, operation, maintenance, safety, or stability of the CHST facility.
- The accommodation will not interfere with or impair the proposed use or future expansion of the CHST facility.
- The disapproval of the use of the right-of-way would result in an impact to the owner, the environment, or the public that cannot be mitigated.
- The utility is located in such a manner that it can be serviced, maintained, and operated without being accessed from the right-of-way and will not adversely affect safety or cause damage to the Authority facility.



Longitudinal Encroachments

Existing Utility Longitudinal Encroachments

Longitudinal utility encroachments within the right-of-way are considered on a case-by-case basis.

Existing longitudinal utilities located within the proposed right-of-way shall be relocated to the outside of the right-of-way unless they can be shown to meet the encroachment justification requirements noted above.

New Utility Longitudinal Encroachments

New non-CHSTP utilities will not be permitted to be installed longitudinally within the access controlled areas of the CHSTP. This provision is established to provide the maximum degree of safety and to preserve railroad operations. Any deviation from this requirement requires approval from the Authority.

Transverse Encroachments

New utility installations, and adjustments or relocation of existing utilities, may be permitted to cross the right-of-way. To the extent practicable, these shall cross on a line generally normal to, but not less than 60° (degrees) from the railroad longitudinal alignment. Transverse crossings of utilities that are at less than 60° from the railroad longitudinal alignment shall be classified as longitudinal encroachment. Transverse utility encroachments shall comply with the encroachment justification requirements noted above.

Air space leases for wireless communications facilities fall under the general guideline for transverse encroachments and shall be reviewed and approved by the Authority.

2.3 LAWS AND CODES

Criteria for design elements not specific to CHST operations will be governed by existing applicable standards, laws and codes. Applicable local building, planning and zoning codes and laws are to be reviewed for the stations as they may be located within multiple municipal jurisdictions, state rights-of-way, and/or unincorporated jurisdictions.

In the case of differing values, the standard followed shall be that which results in the satisfaction of all applicable requirements. In the case of conflicts, exception documentation for the conflicting standard is to be prepared and approval is to be secured as required by the agency requiring an exception, whether it is an exception to the standards of CHSTP or another agency having jurisdiction over the facility.

2.4 APPLICABILITY TO CODE OF FEDERAL REGULATIONS AND CALIFORNIA GOVERNMENT CODES

The designer shall follow the requirements of Title 49 Code of Federal Regulations (CFR) regarding minimum federal requirements for pipelines and transportation of hazardous material and particularly Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards", Part 195, "Transportation of Hazardous Liquids by Pipeline", and California Government Code, Section 51010 – 51019.1.

2.5 CLEARANCE REQUIREMENTS

The minimum requirements for utility clearance shall be as defined by the California Public Utilities Commission, Caltrans HDM and PDPM, AREMA, owners' requirements and this Technical Memorandum. The designer shall use the most stringent and conservative clearance requirements as determined from these documents. These requirements apply to CHSTP related facilities as well as those owned by others.



3.0 ASSESSMENT/ANALYSIS

3.1 GENERAL

In general, the identification of potential utility conflicts shall be coordinated with the Owner. The designer shall be responsible for identifying and assessing potential impacts and determining the limits of relocation. The designer is required to review and implement the Owner codes, requirements and guidelines, and coordinate with the Owner on whether the impacted utility can be protected in place or whether it requires relocation. Proposed utility protection, rearrangement or relocation shall be shown on composite plans along with existing utilities.

3.2 IDENTIFYING AND LOCATING EXISTING UTILITIES

The CHSTP requires the identification of all major public and private utility facilities situated within the area of influence of the CHSTP. Where the estimated area of impact to a utility goes beyond the area of influence, the plans shall show the location of such utilities for a distance of 300 feet beyond the limits of impact.

Public, private, major and minor utilities are defined as follows:

- Public utilities are utility infrastructures that are operated and maintained for public service. Public utilities can be either publicly or privately owned and involve natural monopolies in sectors specially regulated by the California Public Utilities Commission.
- Private utilities are utility infrastructures owned by a private corporation or public or private entities and may not be regulated by the public or government agency.
- Major utilities are any subsurface, above ground, or overhead facility used for transmission, regardless of size, shape, or method of conveyance.
- Minor utilities are defined as any subsurface, above ground, or overhead facility used as distribution lines or service laterals to individual parcels or properties.

The designer shall furnish verification maps to each utility owner detailing existing or potentially existing facilities within the project area. The designer shall request the utility owner to update the maps for all facilities including any abandoned facility. Based on the information provided by the Owner, the designer shall show the locations of all existing and proposed utility facilities, easements, and Owner's properties rights on the 30% Design Level plans.

3.3 IDENTIFYING AND LOCATING PROPOSED UTILITIES

Limited information may be available for utilities proposed by utility owners. The requirements for locating and the design of proposed utilities by others within Authority right-of-way shall follow the requirements of this Technical Memorandum, particularly pertaining to the encroachment requirements of proposed utilities.

3.4 IDENTIFICATION OF PROPOSED UTILITIES FOR OPERATION OF CHSTP

The CHSTP will require the installation and use of major and minor utility facilities, including electrical, telecommunications, television cable, water, wastewater, gas and petroleum facilities for the operation, maintenance, and communication of trains, stations, and rail facilities.

The designer shall identify proposed utility service lines to CHSTP facilities. The designer shall develop a naming convention for all new utilities for ease of identification and documentation. All required service lines shall be tabulated by location, type and size. This information shall be included in the 30% Design Level Plans.



3.5 IDENTIFICATION OF PROPOSED UTILITIES DURING CONSTRUCTION

Limited information may be available to the designers for identifying utility requirements needed for CHSTP construction. In urban areas, utilities will be readily available and the impacts of developing points of connection may be limited. In the less developed areas, where a required point of connection may be miles away, the impacts will be greater and attempt shall be made to account for this. At a minimum, the design shall provide a tabulation of the proposed points of new service connections and provide conceptual design on the continuation of these services along the alignment and/or to the construction staging areas. This information shall be included in the 30% Design Submittal.

3.6 QUALITY LEVELS FOR LOCATING UTILITIES

Quality Level criteria have been established in order to characterize the quality of subsurface and above ground utility information obtained for the project. The Quality Level system shall be used for managing the existing utility information during the project development process. Four quality levels of subsurface and above ground utility facility information are recognized as follows:

1. Quality Level A: Quality Level A represents the highest degree of accuracy. The information shown on the plans has been obtained by the actual exposure (or verification of previously exposed and surveyed utility facilities) of subsurface utilities, using excavation equipment to determine their precise horizontal and vertical positions as well as other utility facility attributes. (Denoted as QLA).
2. Quality Level B: Quality Level B represents the second highest degree of accuracy. The information shown on the plans has been obtained through the application of appropriate surface geophysical methods (i.e. underground cameras, radar, sonar, tone-outs, etc.) to identify the existence and appropriate surveyed horizontal position of subsurface utility facilities. Quality Level B data are reproducible by surface geophysical methods at any point of their depiction. No excavations to expose utilities need to be performed. (Denoted as QLB).
3. Quality Level C: Quality Level C represents the third highest degree of accuracy. The information shown on the plans has been obtained by surveying and plotting visible above-ground utility features and by using professional judgment. (Denoted as QLC).
4. Quality Level D: Quality Level D represents the lowest degree of accuracy. The information shown on the plans was derived solely from existing as-built plans, Caltrans records, and/or utility agency records or recollections. (Denoted as QLD).

Quality Level D has been established as the basis for acquiring utility information for the 15% Design Level phase of the CHSTP. During the development of 30% Design, the designer shall establish the need for additional location information and a higher Quality Level for all potential utilities that are in conflict with the CHSTP and submit the request to the Authority for approval.

In general, where adequate information about the general location of a utility does not exist, the designer can, for the purpose of construction cost estimating, assume total reconstruction of the utility. In cases where the relocation of such utility will cause a significant impact to the utility owner, the public, or the environment, QLC or higher may have to be employed. Prior to performing such utility location identification, the designer shall submit the request to and obtain the approval of the Authority. The designer shall also gather the Owner's property rights to advise the Authority of the Owner's potential responsibility in relocation cost.

3.7 DOCUMENTATION OF UTILITY INFORMATION

3.7.1 Utility Company Correspondence

The designer shall directly correspond with utility owners to request any related utility data within the area of influence of CHSTP. In order to determine the extent of any relocation, the designer shall also request design criteria and other ancillary requirements for the establishment of utility



line and grade. The designer shall also request information on utilities that are proposed by the utility owner.

3.7.2 Retention of Records

Documents and correspondence pertaining to utility facilities within the area of influence of the CHSTP, regardless of format (i.e., email, paper, etc.), shall be stored in the project files and a record log shall be maintained, updated and made available upon request. The log shall include the name, address, and contact information for the owners of utilities located within the area of influence of the CHSTP, refer to Exhibits B-1 and B-4. It shall also list the initial and subsequent dates that the correspondence occurred and identify any material sent or received. Sample Utility Owner Contact Information and Utility Owner Contact Log matrices are provided in Exhibits B-2 and B-3, respectively.

Electronic files, including emails, drawings, and other documentation shall be maintained as part of the retention of records and shall be made available to the Authority in advance of procurement for the final design. If during the course of the project, the Authority establishes specific document control procedures for the CHSTP, the designer shall update and revise the log to follow the established protocol.

3.7.3 Composite Plans

Existing utilities and utilities proposed to be protected or relocated shall be shown on a master utility CADD file and shall be plotted on a composite improvement plan. Preparation of separate utility plans may be required if the composite plan becomes too congested. The composite drawing shall show major project features, including other subterranean infrastructure. Composite utility drawings shall be used to conduct coordination with utility owners to initiate the design effort for protection or relocation of their facilities during the 30% Design Level activities. Composite drawings for 30% Design Level shall include utilities and storm drains on the same plan in order to allow adequate review of potential conflicts.

3.7.4 Utility Inventory with Preliminary Disposition

For the 30% Design Level, the designer shall update the matrix of existing, protected, and relocated utilities compiled during the 15% Design Level. The matrix shall identify potential conflict, utility type, location, material, age, length of the facility, and Owner's property rights for each of its utilities. Exhibit B-1 provides a sample matrix.

3.8 ASSESSING EXISTING UTILITY IMPACTS

The designer shall protect, adjust, or relocate existing utilities based on the requirements for accomplishing the design, construction, and operation of the CHSTP.

3.8.1 Identification of Impacts

For utilities requiring relocation, removal, installation, or other impacts associated with the CHSTP, the plans shall identify the approximate limits of the anticipated impact. The 30% Design Level shall provide sufficient information regarding the limits of impact in order to allow for utility owner reviews, obtaining planning level approvals, initiation of detailed design and for determining the cost of relocation or protection. Upon confirmation that utilities need to be protected or relocated, the Designer shall prepare a draft letter to utility owner(s) to provide their property rights for the impacted utilities. Designer shall submit this draft letter to the Authority for transmittal to utility owners.

3.8.2 Relocation

To the extent that it is feasible and reasonable, utilities located within the right-of-way shall be relocated to outside of the right-of-way. Relocation of utilities shall be limited to areas in direct conflict with the CHSTP construction and right-of-way, but may require the complete abandonment or removal and the reconstruction of a utility facility. If it is determined that the



utility needs to be relocated, the Designer shall prepare and transmit the draft Notice(s) for relocation to the Authority for review and issuance to utility owner(s). Issuance of the Notice to utility owner will follow the approval of the Environmental Document.

3.8.2.1 Underground Utilities

Underground facilities located within the right-of-way, except for electrical and communication lines, shall be encased within a steel casing pipe (3/8" minimum thickness) with welded joints. Where a portion of the utility line crosses under tracks that are at-grade, in retained cut/fill, or in underground structures or is located within 45 feet of the nearest track centerline, the utility design shall meet the requirements of Exhibit A. When the facility or portions of it do not come closer than 45 feet from the nearest HST track centerline, requirements for encasement and burial depths shall be determined on a case-by-case basis.

In addition, High and Low Risk facilities shall comply with the following requirements:

High Risk Facilities

- Maintain 500 feet minimum horizontal separation from flammable gas or hazardous liquid utility to other High Risk facilities
- Maintain 50 feet minimum horizontal separation from non-flammable gas or hazardous liquid utility to other High Risk facilities
- Maintain 5 feet minimum horizontally separation from other Low Risk facilities
- Maintain 20 feet minimum horizontal separation from load carrying structural elements

Low Risk facilities

- Maintain 3 feet minimum horizontal separation from other Low Risk facilities
- Maintain 5 feet minimum horizontal separation from load carrying structural elements and 3 feet minimum horizontal separation from other structures
- Maintain 1 foot minimum vertical separation from drainage conduits

The above clearances are minimum requirements. The designer shall verify the adequacy of these standards. Deviation from standards requires an approved design variance. The Design Variance process is presented in Technical Memorandum.1.1.8 – Design Variance Guidelines.

Electrical and communication lines within the right-of-way shall comply with the above requirements except that a duct bank can be used in lieu of steel casing pipe. All underground electrical facilities within the planned construction area shall meet the minimum clearance requirements as defined in CPUC General Orders.

Typical clearance requirements for underground utilities are illustrated in Exhibits A-1 through A-5

3.8.2.2 Overhead Utilities

Overhead utilities shall cross the tracks at local street overpasses. Such utilities shall either be contained within the overpass structure, or if it is attached to the outside of the overpass structure, it will be encased in a steel casing sleeve. Where electrical lines with voltage less than 30kV and communication lines cannot be accommodated in an overpass structure, they shall be relocated underground per clearance requirements established in this Technical Memorandum. Clearances for overhead electrical lines with voltage higher than 30kV shall be governed by CPUC GO95 or National Electrical Safety Code wire to wire clearance requirements, whichever is more stringent, and shall be modified to a more stringent construction method. At the span, where the wires cross the OCS conductors, the utility shall be double-dead-ended to avoid a single point of failure so that the wires are not dropped onto the tracks.



3.8.2.3 Above Ground Utilities

Above ground utilities shall be moved outside of the right-of-way or conform to the requirements of Sections 2.5.1 and 2.5.2, “Underground Utilities” and “Overhead Utilities”. In shared right-of-ways, where design and location of existing utilities may be governed by existing agreements, and where relocation of the utility will have significant impact with respect to cost, environment or public inconvenience, the designer shall investigate the use of fencing, walls, cages, or other sources of protection in order to separate or isolate the utility from CHSTP features.

3.8.2.4 Location of Proposed Utilities

To the extent that is reasonable and feasible, proposed utilities that are not related to the operation and maintenance of CHSTP shall be located outside the right-of-way. The location, design, and construction of relocated or proposed utilities shall meet the requirements of CPUC General Order 95 and the provisions of this Technical Memorandum.

3.8.3 Adjustment and Protection of Existing Utilities within Authority Right-of-Way

Where it is not practical to remove, relocate, and/or abandon an existing utility that is located within the right-of-way, adjustment and/or protection of the utility may be required. Adjustment and/or protection of subsurface, above ground, or overhead facilities to accommodate the CHSTP shall be limited to the areas of impacts directly associated with the design and construction of the CHSTP. The designer shall make adjustment to and/or protect the existing utility components for permanent and temporary CHSTP facilities which may include the reconstruction of certain elements within the right-of-way to accommodate the permanent rail and ancillary features. The designer shall coordinate with utility owner to establish the requirements for protection of the existing facilities that cannot be relocated.

3.8.4 Abandonment of Utilities

Utilities that are to be abandoned shall be shown on plans. Where possible, the abandonment shall include total removal of the facility within or adjacent to Authority right-of-way. Where total removal is not practical, voids inside conduits, casings and pipes shall be filled with an approved method to avoid collapse of the abandoned facilities in the future.

3.8.5 Probable Construction Quantities and Costs

The design engineer shall prepare an estimate of probable quantities for utility impacts that will include, but not limited to, temporary and permanent utility relocations, temporary and permanent protection, adjustments, encasements, removals of utility features, easements, and right-of-way. The quantity estimate shall include identification of appropriate materials and units of measurement. If the relocation is performed by the Owner, the designer shall obtain and review the relocation cost developed by the Owner and include any additional cost that is not reflected in the Owner’s cost estimate. Refer to TM.1.1.22, 30% Design Cost Estimating Methodology, for further guidance on quantification and estimation of construction cost including utility relocations.

3.8.6 Permitting and Approvals

The designer shall prepare permit applications for utility protection or relocation that are in conflict with the CHSTP. Designers shall document the requirements of utility owners and support the Authority in preparation of Design and Relocation Agreements, Cooperative Agreements or Interagency Agreements.

3.8.7 Construction Activities, Staging and Sequencing

The construction staging and sequencing of the CHSTP shall be closely coordinated with the utility owners where protection, adjustments, or relocations are required. The designer shall consider probable construction activities and make provisions to avoid or minimize utility impacts during construction operations.



Where temporary utility protection, adjustments, or relocations are required to successfully complete the construction of the CHSTP, the designer shall develop 30% Design Level plans to adequately estimate costs and enable the Owner review of and concurrence with the proposed facilities. No disconnection or suspension of distribution for major utilities will be permitted without concurrence and approval by the owning utility agency/owner and/or the CPUC. Temporary relocation of utility features that require long lead times shall be avoided.

3.8.8 Post-30% Design Level Plans

The focus of this technical memorandum and that of 30% Design Level plans is assessment of impacts to major and minor utilities. The designer shall be responsible to provide sufficient information at the 30% Design Level to support the procurement of a final utility design services.



4.0 SUMMARY AND RECOMMENDATIONS

The general guidance provided in this Technical Memorandum is that where it is reasonable and feasible, utilities shall be removed and/or relocated to outside of the Authority right-of-way. Where utilities are to remain within the right-of-way, minimum design criteria for 30% Design Level have been provided in Section 6.0.



5.0 SOURCE INFORMATION AND REFERENCES

This assessment considered the following source documents:

1. The Manual for Railway Engineering of the American Railway Engineering and Maintenance of Way Association (AREMA Manual), Chapter 1, Part 5 (2002).
2. California Department of Transportation, Highway Design Manual
3. California Department of Transportation, Project Development Procedures Manual
4. California Public Utility Commission, Public Utility Codes
5. California Public Utility Commission, Rules of Practice and Procedure
6. California Public Utility Commission, Policies and Guidelines.
7. California Public Utilities Commission General Order No. 26-D, 28, 95, 103, 112-E, 128 and 131-D
8. Code of Federal Regulations / 49 CFR
9. California Government Codes / Section 5101-51019.1
10. Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data CI/ASCE 38-02
11. CHSTP Basis of Design, R3
12. CHSTP Technical Memorandum TM 0.5 Coordination with Caltrans
13. CHSTP Technical Memorandum TM 1.1.8 Design Variance Guidelines



6.0 UTILITY REQUIREMENTS FOR 30% DESIGN LEVEL

6.1 GENERAL

6.1.1 Regulations, Codes, Standards and Guidelines

The CHSTP shall follow design criteria of the following documents for 30% Design Level utility engineering:

- Title 49 Code of Federal Regulations (CFR)
- California Government Codes / Section 5101-51019.1
- California Public Utilities Commission (CPUC) General Orders, Public Utility Codes, Rules of Practice and Procedure, and the Policies and Guidelines
- National Fire Protection Standards (NFPA)
- California Department of Transportation, Highway Design Manual (Caltrans HDM)
- California Department of Transportation, Project Development Procedures Manual (Caltrans PDPM)
- The Railway Engineering and Maintenance-of-Way Association Manual of the American Railway Engineering (AREMA Manual)
- Provisions of this Technical Memorandum
- Requirements of individual utility owners

In the case of differing values, the standard followed shall be that which results in the satisfaction of all applicable requirements. In the case of conflicts, exception documentation for the conflicting standard shall be prepared and approval is to be secured as required by the Owner or an agency requiring an exception, whether it is an exception to the standards of the CHSTP or another Owner or agency.

6.1.2 Terms and Acronyms

The following technical terms and acronyms used in this document have specific connotations with regard to the California High-Speed Train system.

<u>Access Control</u>	Full or partial restriction of access of owners or occupants of abutting land to or from a highway or railway.
<u>Approximate Location</u>	The "approximate location of subsurface installations" being a strip of land not greater than 24-inches on either side of the exterior surface of the subsurface installation. "Approximate Location" does not define the utility depth.
<u>Area of Impact</u>	The area of required utility construction or relocation due to the CHSTP.
<u>Area of Influence</u>	The area parallel to and 900 feet transverse to the centerline of the nearest track, or as defined in the Environmental Document, whichever is greater.
<u>Betterment</u>	Improvements to the capacity and/or functionality of a utility system which are not required for safety, operation and construction of the CHSTP.
<u>High Risk Utility</u>	Facilities conducting or carrying the following materials, whether encased or not, are considered to be High Risk utilities: <ol style="list-style-type: none"> 1. Petroleum Products 2. Oxygen 3. Chlorine



4. Toxic or flammable gases or liquids
5. Natural gas pipelines of any size
6. Underground electric supply lines, conductors or cables that have a potential to ground of more than 300 volts, either directly buried or in duct or conduit, which do not have concentric grounded or other effectively grounded metal shields or sheaths.
7. Water in pressured pipeline greater than 8-inch diameter or pipelines with normal operating pressure greater than 80 psi
8. Other utilities that could disrupt the operation of the CHSTP

<u>Low Risk Utility</u>	All other facilities that are not identified as High Risk Utilities are considered to be Low Risk Utilizes
<u>Longitudinal</u>	A facility located parallel to and within proposed Highway or Authority's right-of-way.
<u>Major Utility</u>	Any subsurface, above ground, or overhead facility used for transmission, regardless of size, shape, or method of conveyance.
<u>Minor Utility</u>	Any subsurface, above ground, or overhead facility used as distribution lines or service laterals to individual parcels or properties
<u>Owner</u>	The owner of the utility or its authorized agent.
<u>Pothole / Test Pit</u>	An excavation to expose an underground facility.
<u>Private Utility</u>	Utility infrastructure owned by a private corporation or public or private entities which may not be regulated by the public or government agency.
<u>Probe</u>	Rods physically inserted in the ground to mechanically or electronically locate an underground facility without exposing the facility.
<u>Public Utility</u>	Utility infrastructure that is operated and maintained for public service. Public Utilities can be either publicly or privately owned and involve natural monopolies in sectors specially regulated by the California Public Utilities Commission.
<u>Quality Level</u>	A level of accuracy scale used for identifying the location of underground and above ground utility facility, used to develop capital projects, and for acquiring and managing that level of information during the project development process. Four levels of quality measurement are used ranging from Level A to Level D.
<u>Relocation</u>	The removal, rearrangement, and reinstallation of a utility facility required by a transportation improvement project.
<u>Right-of-Way</u>	A general term for a strip of land, or rights in a strip of land, used for highway, railway, public utility services, or other purposes. For the purpose of this technical memorandum, right-of-way is the Authority's proposed right-of-way.
<u>Service</u>	The portion of the electrical, gas, water, sewer and communication system that connects a customer, usually at the meter location, to the utility distribution or supply system.
<u>Sleeve (Casing)</u>	A pipe in which a pipeline or conduit is inserted.
<u>Transverse</u>	A facility passing from one side of the right-of-way to the other side of the right-of-way.



Acronyms

AAR	Association of American Railroads
AREMA	American Railway and Maintenance-of-Way Association
Caltrans	California Department of Transportation
Authority	California High-Speed Rail Authority
CHST	California High-Speed Train
CHSTP	California High-Speed Train Project
CPUC	California Public Utilities Commission
GO	General Order
CFR	Title 49 Code of Federal Regulations
DEIR/S	Draft Environmental Impact Report / Statement
FRA	Federal Railroad Administration
HDM	Caltrans Highway Design Manual
PDPM	Caltrans Project Development Procedures Manual
QL	Quality Level
OCS	Overhead Contact System

6.2 RIGHT-OF-WAY ENCROACHMENT

An encroachment is defined as any structure or object of any kind located within the right-of-way but not part of the CHSTP facility. Encroachments allow temporary or permanent use of Authority right-of-way by a utility, a public entity, or a private party. Encroachments include all public and private utilities within the right-of-way.

CHSTP policy is, to the extent that is reasonable and feasible, exclude access points for utilities from within access controlled right-of-way. This policy is intended to provide a safe environment for operation of the CHSTP, minimize the disruption to the traveling public, and assure safety of utility employees during maintenance of utility facilities.

High Risk facilities will not be allowed in a tunnel or through any underground/subgrade guideway under any circumstances.

6.2.1 Encroachment Justifications

Access to utilities from within the Authority right-of-way is an exception to CHSTP criteria.

Where longitudinal or transverse encroachments and installations are required, the designer shall ensure the following:

1. An alternate location is not feasible, from the standpoint of providing efficient utility services in a manner conducive to safety, durability, and economy of maintenance and operations.
2. The accommodation will not adversely affect the design, construction, operation, maintenance, safety, or stability of the railway facility.
3. The accommodation will not interfere with or impair the proposed use or future expansion of the railway facility.
4. The disapproval of the use of the right-of-way does not result in an immitigable impact to the owner, the environment, or the public.
5. The utility be located in such a manner that it can be serviced, maintained, and operated without being accessed from the railroad right-of-way and will not adversely affect safety or cause damage to the Authority facility.



Longitudinal Encroachments

Existing Utility Longitudinal Encroachments

Longitudinal utility encroachments within the railroad right-of-way are considered on a case-by-case basis.

Existing longitudinal utilities located within the existing or proposed right-of-way shall be relocated to the outside of the right-of-way unless they can be shown to meet the encroachment justification requirements noted above.

New Utility Longitudinal Encroachments

New non-CHSTP utilities will not be permitted to be installed longitudinally within the access controlled area of the CHSTP. Any deviation from this requirement requires approval from the Authority.

Transverse Encroachments

New utility installations, and adjustments or relocation of existing utilities, may be permitted to cross the Authority right-of-way. To the extent feasible and practicable, they shall cross on a line generally normal to, but not less than 60° (degrees) from the railroad longitudinal alignment. Transverse crossings that are at less than 60° from the railroad longitudinal alignment shall be classified as longitudinal encroachment.

Transverse utility encroachments shall comply with the encroachment justification requirements noted above.

With the exception of high voltage transmission lines and the utilities that can be placed in roadway structures going over the CHST facilities, all utility transverse crossings shall be undergrounded.

Air space leases for wireless communications facilities fall under the general guideline for transverse encroachments and are to be reviewed and approved by the Authority which may develop special guidelines for wireless communication facilities.

6.3 IDENTIFICATION OF EXISTING UTILITIES

6.3.1 General

In general, the identification of potential utility conflicts shall be coordinated with the Owner. The designer shall be responsible for identifying and assessing potential impacts and determining the limits of relocation. The designer is required to review and implement the Owner codes, requirements and guidelines, and coordinate with the Owner on whether the impacted utility can be protected in place or whether it requires relocation. Proposed utility protection, rearrangement or relocation shall be shown on composite plans along with existing utilities.

6.3.2 Identifying and Locating Existing Utilities

The CHSTP requires the identification of all major public and private utility facilities situated within the area of influence of the CHSTP. Where the estimated area of impact to a utility goes beyond the area of influence, the plans shall show the location of such utilities for a distance of 300 feet beyond the limits of impact.

Public, private, major and minor utilities are defined as follows:

- Public utilities are utility infrastructures that are operated and maintained for public service. Public utilities can be either publicly or privately owned and involve natural monopolies in sectors specially regulated by the California Public Utilities Commission.
- Private utilities are utility infrastructures owned by a private corporation or public or private entities and may not be regulated by the public or government agency.



- Major utilities are any subsurface, above ground, or overhead facility used for transmission, regardless of size, shape, or method of conveyance.
- Minor utilities are defined as any subsurface, above ground, or overhead facility used as distribution lines or service laterals to individual parcels or properties.

The designer shall furnish verification maps to each utility owner detailing existing or potentially existing facilities within the project area. The designer shall request the utility owner to update the maps for all facilities including any abandoned facility. Based on the information provided by the Owner, the designer shall show the locations of all existing and proposed utility facilities, easements, and Owner's properties rights on the 30% Design Level plans.

6.3.3 Identifying and Locating Proposed Utilities

Limited information may be available for utilities proposed by utility owners. The requirements for locating and the design of proposed utilities by others within Authority right-of-way shall follow the requirements of this Technical Memorandum, particularly pertaining to the encroachment requirements of proposed utilities.

6.3.4 Identification of Proposed Utilities for Operation of CHSTP

The CHSTP will require the installation and use of major and minor utility facilities, including electrical, telecommunications, television cable, water, wastewater, gas and petroleum facilities for the operation, maintenance, and communication of trains, stations, and rail facilities.

The designer shall identify proposed utility service lines to CHSTP facilities. The designer shall develop a naming convention for all new utilities for ease of identification and documentation. All required service lines shall be tabulated by location, type and size. This information shall be included in the 30% Design Level Plans.

6.3.5 Identification of Proposed Utilities for Construction

Limited information may be available to the designers for identifying utility requirements needed for CHSTP construction. In urban areas, utilities will be readily available and the impacts of developing points of connection may be limited. In the less developed areas, where a required point of connection may be miles away, the impacts will be greater and attempt shall be made to account for this. At a minimum, the design shall provide a tabulation of the proposed points of new service connections and provide conceptual design on the continuation of these services along the alignment and/or to the construction staging areas. This information shall be included in the 30% Design Submittal.

6.3.6 Quality Levels for Locating Utilities

Quality Level criteria have been established in order to characterize the quality of subsurface and above ground utility information obtained for the project. The Quality Level system shall be used for managing the existing utility information during the project development process. Four quality levels of subsurface and above ground utility facility information are recognized as follows:

1. Quality Level A: Quality Level A represents the highest degree of accuracy. The information shown on the plans has been obtained by the actual exposure (or verification of previously exposed and surveyed utility facilities) of subsurface utilities, using excavation equipment to determine their precise horizontal and vertical positions as well as other utility facility attributes. (Denoted as QLA).
2. Quality Level B: Quality Level B represents the second highest degree of accuracy. The information shown on the plans has been obtained through the application of appropriate surface geophysical methods (i.e. underground cameras, radar, sonar, tone-outs, etc.) to identify the existence and appropriate surveyed horizontal position of subsurface utility facilities. Quality Level B data are reproducible by surface geophysical methods at any point of their depiction. No excavations to expose utilities need to be performed. (Denoted as QLB).



3. Quality Level C: Quality Level C represents the third highest degree of accuracy. The information shown on the plans has been obtained by surveying and plotting visible above-ground utility features and by using professional judgment. (Denoted as QLC).
4. Quality Level D: Quality Level D represents the lowest degree of accuracy. The information shown on the plans was derived solely from existing as-built plans, Caltrans records, and/or utility agency records or recollections. (Denoted as QLD).

Quality Level D has been established as the basis for acquiring utility information for the 15% Design Level phase of the CHSTP. During the development of 30% Design, the designer shall establish the need for additional location information and a higher Quality Level for all potential utilities that are in conflict with the CHSTP and submit the request to the Authority for approval.

In general, where adequate information about the general location of a utility does not exist, the designer can, for the purpose of construction cost estimating, assume total reconstruction of the utility. In cases where the relocation of such utility will cause a significant impact to the utility owner, the public, or the environment, QLC or higher may have to be employed. Prior to performing such utility location identification, the designer shall submit the request to and obtain the approval of the Authority. The designer shall also gather the Owner's property rights to advise the Authority of the Owner's potential responsibility in relocation cost.

6.4 DOCUMENTATION OF UTILITY INFORMATION

6.4.1 Utility Company Correspondence

The designer shall directly correspond with utility owners to request any related utility data within the area of influence of CHSTP. In order to determine the extent of any relocation, the designer shall also request design criteria and other ancillary requirements for the establishment of utility line and grade. The designer shall also request information on utilities that are proposed by the utility owner.

6.4.2 Retention of Records

Documents and correspondence pertaining to utility facilities within the area of influence of the CHSTP, regardless of format (i.e., email, paper, etc.), shall be stored in the project files and a record log shall be maintained, updated and made available upon request. The log shall include the name, address, and contact information for the owners of utilities located within the area of influence of the CHSTP, refer to Exhibit B-1 and B-4. It shall also list the initial and subsequent dates that the correspondence occurred and identify any material sent or received. Sample Utility Owner Contact Information and Utility Owner Contact Log matrices are provided in Exhibits B-2 and B-3, respectively.

Electronic files, including emails, drawings, and other documentation shall be maintained as part of the retention of records and shall be made available to the Authority in advance of procurement for the final design. If during the course of the project, the Authority establishes specific document control procedures for the CHSTP, the designer shall update and revise the log to follow the established protocol.

6.4.3 Composite Plans

Existing utilities and utilities proposed to be protected or relocated shall be shown on a master utility CADD file and shall be plotted on a composite improvement plan. Preparation of separate utility plans may be required if the composite plan becomes too congested. The composite drawing shall show major project features, including other subterranean infrastructure. Composite utility drawings shall be used to conduct coordination with utility owners to initiate the design effort for protection or relocation of their facilities during the 30% Design Level activities. Composite drawings for 30% Design Level shall include utilities and storm drains on the same plan in order to allow adequate review of potential conflicts.



6.4.4 Utility Inventory with Preliminary Disposition

For the 30% Design Level, the designer shall update the matrix of existing, protected, and relocated utilities compiled during the 15% Design Level. The matrix shall identify potential conflict, utility type, location, material, age, length of the facility, and Owner's property rights for each of its utilities. Exhibit B-1 provides a sample matrix.

6.5 ASSESSING EXISTING UTILITY IMPACTS

The designer shall protect, adjust, or relocate existing utilities based on the requirements for accomplishing the design, construction, and operations of the CHSTP.

6.5.1 Identification of Impacts

For utilities requiring relocation, removal, installation, or other impacts associated with the CHSTP, the plans shall identify the approximate limits of the anticipated impact. The 30% Design Level shall provide sufficient information regarding the limits of impact in order to allow for utility owner reviews, obtaining planning level approvals, initiation of detailed design and for determining the cost of relocation or protection. Upon confirmation that utilities need to be protected or relocated, the Designer shall prepare a draft letter to utility owner(s) to provide their property rights for the impacted utilities. Designer shall submit this draft letter to the Authority for transmittal to utility owners.

6.5.2 Relocation

To the extent that it is feasible and reasonable, utilities located within the right-of-way shall be relocated to outside of the right-of-way. Relocation of utilities shall be limited to areas in direct conflict with the CHSTP construction and right-of-way, but may require the complete abandonment or removal and the reconstruction of a utility facility. If it is determined that the utility needs to be relocated, the Designer shall prepare and transmit the draft Notice(s) for relocation to the Authority for review and issuance to utility owner(s). Issuance of the Notice to utility owner will follow the approval of the Environmental Document.

6.6 CLEARANCE REQUIREMENTS

The minimum requirements for utility clearance shall be as defined by the California Public Utilities Commission, Caltrans HDM and PDPM, AREMA, owners' requirements and this Technical Memorandum. The designer shall use the most stringent and conservative clearance requirements as determined from these documents. These requirements apply to CHST related facilities as well as those owned by others.

6.6.1 Underground Utilities

In at-grade sections of the CHSTP, where a portion of the utility line crosses under tracks or is located within 45 feet of the nearest track centerline, the utility shall be encased. The casing under the track shall be a minimum of 6 feet below top of rail and a minimum of 3 feet below the flow of the ditch next to the track. Refer to Exhibit A-1 through A-5 for other clearances requirements. When the utility or portions of it do not come closer than 45 feet from the nearest CHST track centerline, requirements for encasement and burial depths shall be determined on a case-by-case basis.

In addition, high and low risk facilities shall comply with the following requirements:

High Risk facilities

- Maintain 500 feet minimum horizontal separation from flammable gas or hazardous liquid utility to other High Risk facilities
- Maintain 50 feet minimum horizontal separation from non-flammable gas or hazardous liquid utility to other High Risk facilities



- Maintain 5 feet minimum horizontal separation from other Low Risk facilities
- Maintain 20 feet minimum horizontal separation from load carrying structural elements

Low Risk facilities

- Maintain 3 feet minimum horizontal separation from other Low Risk facilities
- Maintain 5 feet minimum horizontal separation from load carrying structural elements and 3 feet minimum horizontal separation from other structures
- Maintain 1 foot minimum vertical separation from drainage conduits

The above clearances are minimum requirements. The designer shall verify the adequacy of these standards. Deviation from standards requires design exceptions.

Electrical and communication lines within the right-of-way shall comply with the above requirements except that a duct bank can be used in lieu of steel casing pipe. All underground electrical facilities within the planned construction area shall meet the minimum clearance requirements as defined in CPUC General Orders.

At aerial sections of CHSTP, underground utilities within 5 feet of a CHSTP pier or abutment foundations shall be relocated in accordance with utility owner clearance requirements. Designer shall submit a utility protection and monitoring plan for utilities within 5 feet of excavation limits to the Authority for review and approval.

At trench sections of the CHSTP, 8 feet or less from the original ground, the utilities shall cross under CHSTP trench sections in casing and top of casing shall be at minimum 8 feet below top of rail. Where the CHSTP trench section is deep, utilities shall cross over the trench section in a utility bridge that spans the entire width of trench section. The bottom of the utility bridge structure shall be a minimum of 27 feet from top of rail. Refer to Utility Standard Drawings for clearances requirements in trench sections.

At tunnels, no utilities can be placed within 2 feet of the outside perimeter of the tunnel.

6.6.2 Overhead Utilities

Overhead utilities shall cross the tracks at local street overpasses. Such utilities shall either be contained within the overpass structure, or if it is attached to the outside of the overpass structure, it will be encased in a steel casing sleeve. Where electrical lines with voltage less than 30kV and communication lines cannot be accommodated in an overpass structure, they shall be relocated underground per clearance requirements established in this Technical Memorandum. Clearances for overhead electrical lines with voltage higher than 30kV shall be governed by CPUC GO95 or National Electrical Safety Code wire to wire clearance requirements, whichever is more stringent, and shall be modified to a more stringent construction method. At the span, where the wires cross the OCS conductors, the utility shall be double-dead-ended to avoid a single point of failure so that the wires are not dropped onto the tracks.

6.6.3 Above Ground Utilities

In exclusive Authority right-of-way, all above ground utilities shall be moved outside of the right-of-way or conform to the requirements of Sections 6.3.1 and 6.3.2, "Underground Utilities" and "Overhead Utilities". In shared right-of-ways, where design and location of existing utilities may be governed by existing agreements, and where relocation of the utility will have significant impact with respect to cost, environment or public inconvenience, the designer shall investigate the use of fencing, walls, cages, or other sources of protection in order to separate or isolate the utility from CHSTP features.

6.6.4 Location of Proposed Utilities

To the extent that is reasonable and feasible, proposed utilities that are not related to the operation and maintenance of CHSTP shall be located outside the Authority right-of-way. The



location, design, and construction of relocated or proposed utilities shall meet the requirements of CPUC General Orders and the provisions of this Technical Memorandum.

6.6.5 Adjustment and Protection of Existing Utilities within Authority Right-of-Way

Where it is not practical to remove, relocate, and/or abandon an existing utility that is located within the right-of-way, adjustment and/or protection of the utility may be required. Adjustment and/or protection of subsurface, above ground, or overhead facilities to accommodate the CHSTP shall be limited to the areas of impacts directly associated with the design and construction of the CHSTP. The designer shall make adjustment to and/or protect the existing utility components for permanent and temporary CHSTP facilities which may include the reconstruction of certain elements within the right-of-way to accommodate the permanent rail and ancillary features. The designer shall coordinate with utility owner to establish the requirements for protection of the existing facilities that cannot be relocated.

6.6.6 Abandonment of Utilities

Utilities that are to be abandoned shall be shown on plans. Where possible, the abandonment shall include total removal of the facility within or adjacent to Authority right-of-way. Where total removal is not practical, voids inside conduits, casings and pipes shall be filled with an approved method to avoid collapse of the abandoned facilities in the future.

6.6.7 Probable Construction Quantities and Costs

The design engineer shall prepare an estimate of probable quantities for utility impacts that will include, but not limited to, temporary and permanent utility relocations, temporary and permanent protection, adjustments, encasements, removals of utility features, easements, and right-of-way. The quantity estimate shall include identification of appropriate materials and units of measurement. If the relocation is performed by the Owner, the designer shall obtain and review the relocation cost developed by the Owner and include any additional cost that is not reflected in the Owner's cost estimate. Refer to TM.1.1.22, 30% Design Cost Estimating Methodology, for further guidance on quantification and estimation of construction cost including utility relocations.

6.6.8 Permitting and Approvals

The designer shall prepare permit applications for utility protection or relocation that are in conflict with the CHSTP. Designers shall document the requirements of utility owners and support the Authority in preparation of Design and Relocation Agreements, Cooperative Agreements or Interagency Agreements.

6.6.9 Construction Activities, Staging and Sequencing

The construction staging and sequencing of the CHSTP shall be closely coordinated with the utility owners where protection, adjustments, or relocations are required. The designer shall consider probable construction activities and make provisions to avoid or minimize utility impacts during construction operations.

Where temporary utility protection, adjustments, or relocations are required to successfully complete the construction of the CHSTP, the designer shall develop 30% Design Level plans to adequately estimate costs and enable the Owner review of and concurrence with the proposed facilities. No disconnection or suspension of distribution for major utilities will be permitted without concurrence and approval by the owning utility agency/owner and/or the CPUC. Temporary relocation of utility features that require long lead times shall be avoided.

6.6.10 Design Variances

Where the requirements of this technical memorandum cannot be met, the Design Variance process shall be followed. The Design Variance protocol is presented in Technical Memorandum.1.1.8 Design Variance Guidelines. Where the requirements of an owner/agency



cannot be achieved, the designer shall obtain a design variance from the entity having jurisdiction.

6.7 POST-30% DESIGN LEVEL PLANS

The focus of this technical memorandum and that of 30% Design Level plans is assessment of impacts to major and minor utilities. The designer shall be responsible to provide sufficient information at the 30% Design Level to support the procurement of a final utility design services.



APPENDIX A: TRANSVERSE SUBSURFACE UTILIT ENCROACHMENT

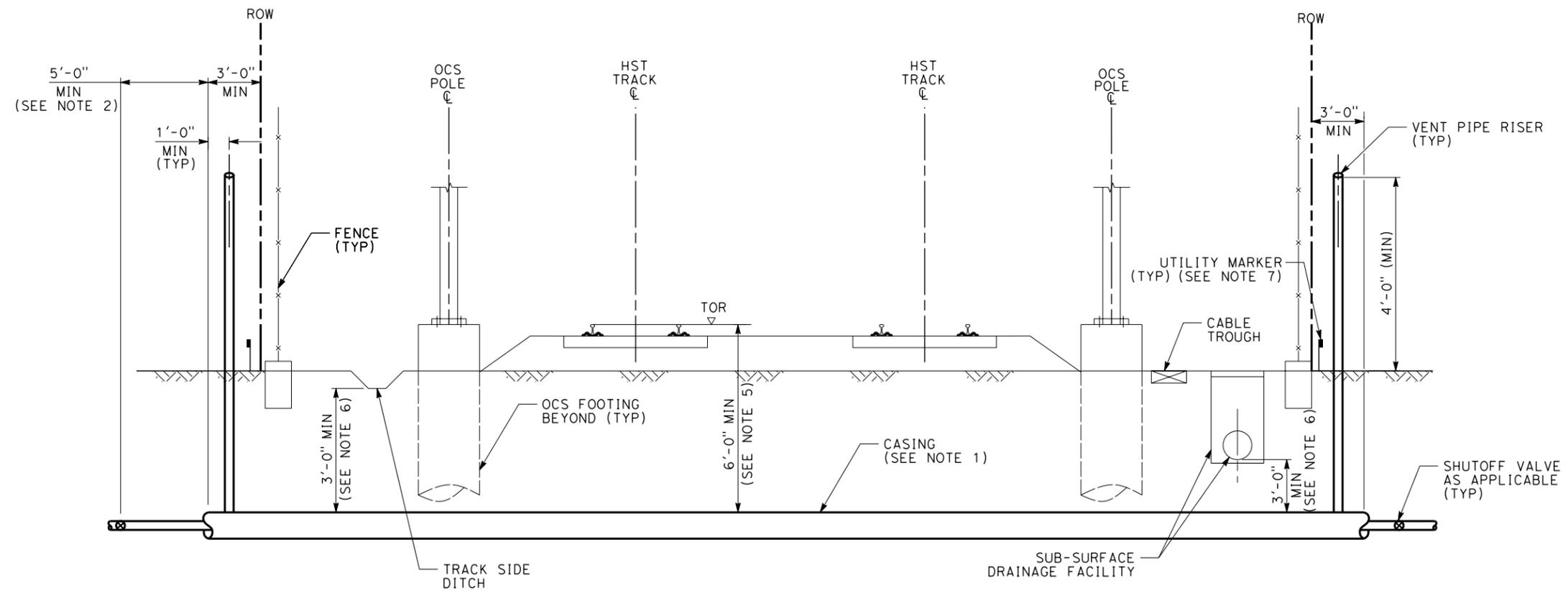
- Exhibit A-1 Utility Crossing Clearances At Grade
- Exhibit A-2 Utility Crossing Clearances Retained Cut Trench
- Exhibit A-3 Utility Crossing Clearances Trench
- Exhibit A-4 Utility Crossing Clearances Cut And Cover Tunnels
- Exhibit A-5 Utility Crossing Clearances Around Tunnels And Cross-Passages



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NOTES:

1. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL
2. SHUTOFF VALVE MUST BE ACCESSIBLE FROM OUTSIDE THE RIGHT OF WAY. IT MAY NOT BE REQUIRED ON BOTH SIDES.
3. THE CASTING SHALL CONTINUE 3 FEET BEYOND THE RIGHT OF WAY.
4. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HSR SUBSURFACE ELEMENTS.
5. MINIMUM CLEARANCE FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 10'-6" BELOW TOP OF RAIL.
6. MINIMUM CLEARANCE FOR UNDERGROUND WIRE LINE CROSSING, OVER 750 VOLTS, SHALL BE 4'-0" AND FOR GAS TRANSMISSION PIPELINE CROSSING SHALL BE 6'-0" BELOW DRAINAGE FACILITIES.
7. UTILITY MARKER TO INDICATE LOCATION OF UTILITY CROSSING AT RIGHT-OF-WAY.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
 DRAWN BY
T. DOUNG
 CHECKED BY
S. MILITELLO
 IN CHARGE
J. CHIRCO
 DATE
02/17/2012

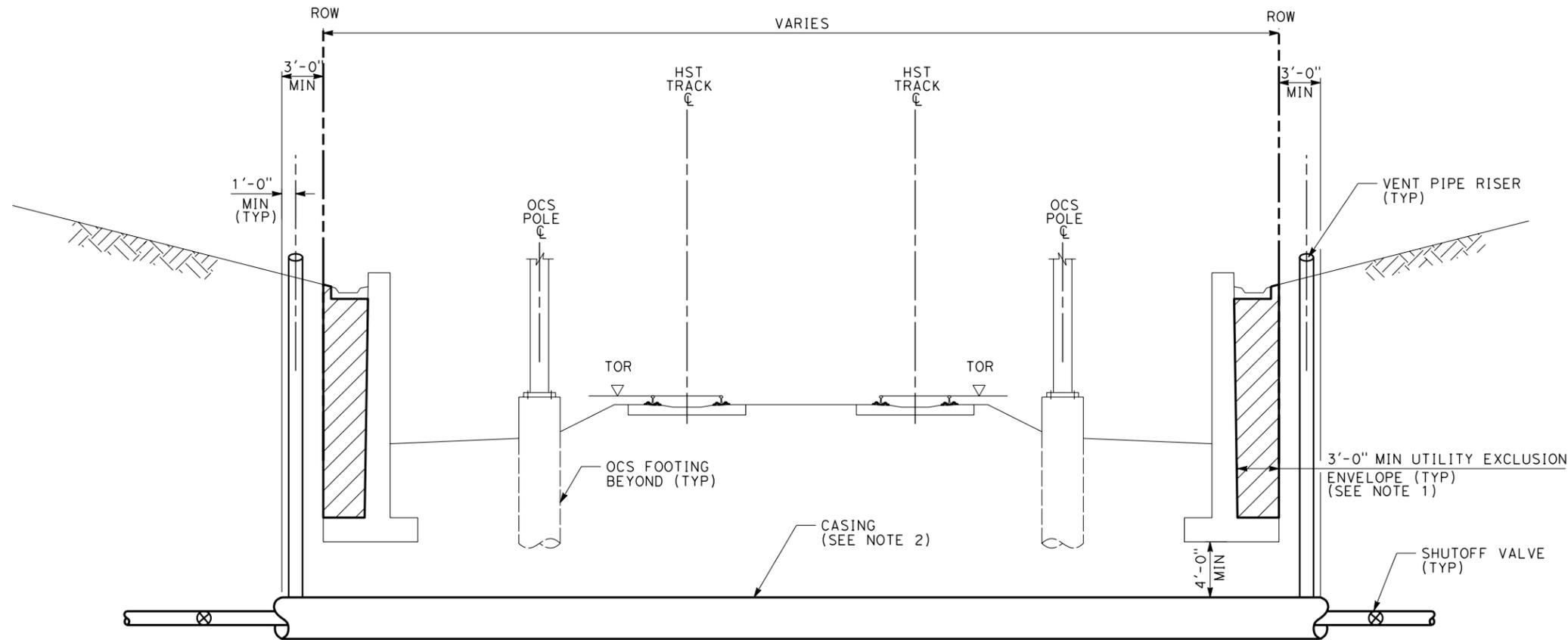


CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
 UTILITY CROSSING CLEARANCES
 AT GRADE

CONTRACT NO.
13259
 DRAWING NO.
TM 2.7.5 A-1
 SCALE
NO SCALE
 SHEET NO.

NOTE:

1. NO UTILITIES ABOVE THE WALL FOOTINGS.
2. FOR ADDITIONAL REQUIREMENTS, SEE AREMA MANUAL.
3. TRANSVERSE UTILITIES SHALL BE LOCATED AWAY FROM MANHOLES, OCS FOOTINGS, AND OTHER HSR SUBSURFACE ELEMENTS.



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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
 DRAWN BY
D. SO
 CHECKED BY
S. MILITELLO
 IN CHARGE
J. CIRCO
 DATE
02/17/2012

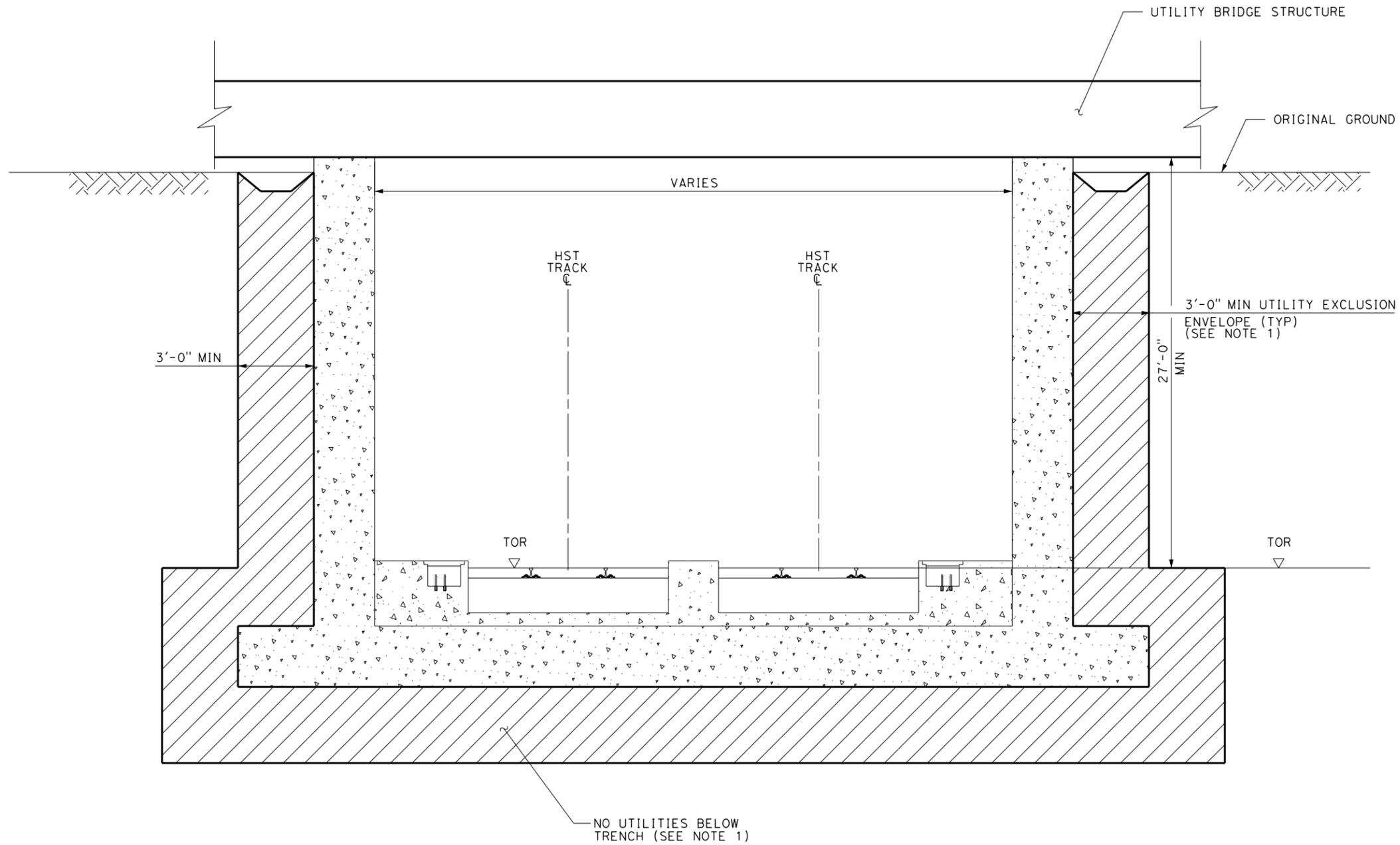


CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
 UTILITIES CROSSING CLEARANCES
 RETAINED CUT TRENCH

CONTRACT NO.
 13259
 DRAWING NO.
 TM 2.7.5 A-2
 SCALE
 AS SHOWN
 SHEET NO.

NOTE:

1. NO UTILITIES ABOVE THE WALL FOOTINGS AND TRENCH DEEPER THAN 8'-0" FROM ORIGINAL GROUND.



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REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
 DRAWN BY
H. NGUYEN
 CHECKED BY
S. MILITELLO
 IN CHARGE
J. CHIRCO
 DATE
02/17/2012

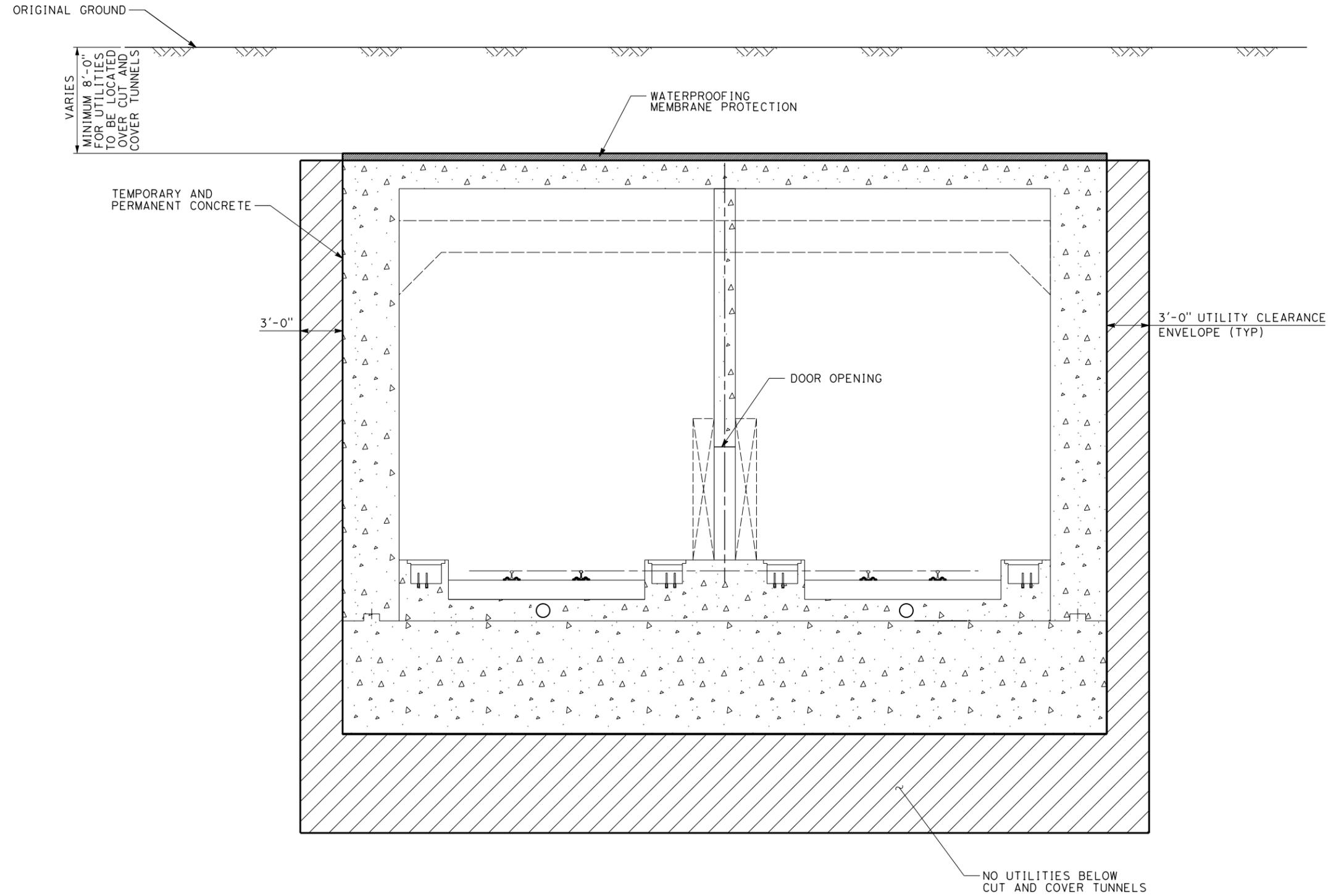


CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
 UTILITY CROSSING CLEARANCES
 TRENCH

CONTRACT NO.
 13259
 DRAWING NO.
 TM 2.7.5 A-3
 SCALE
 AS SHOWN
 SHEET NO.

NOTES:

1. BOTTOM OF UTILITY PIPE OR CASING SHALL BE A MINIMUM OF 12 INCHES ABOVE THE WATERPROOFING MEMBRANE.



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REV	DATE	BY	CHK	APP	DESCRIPTION

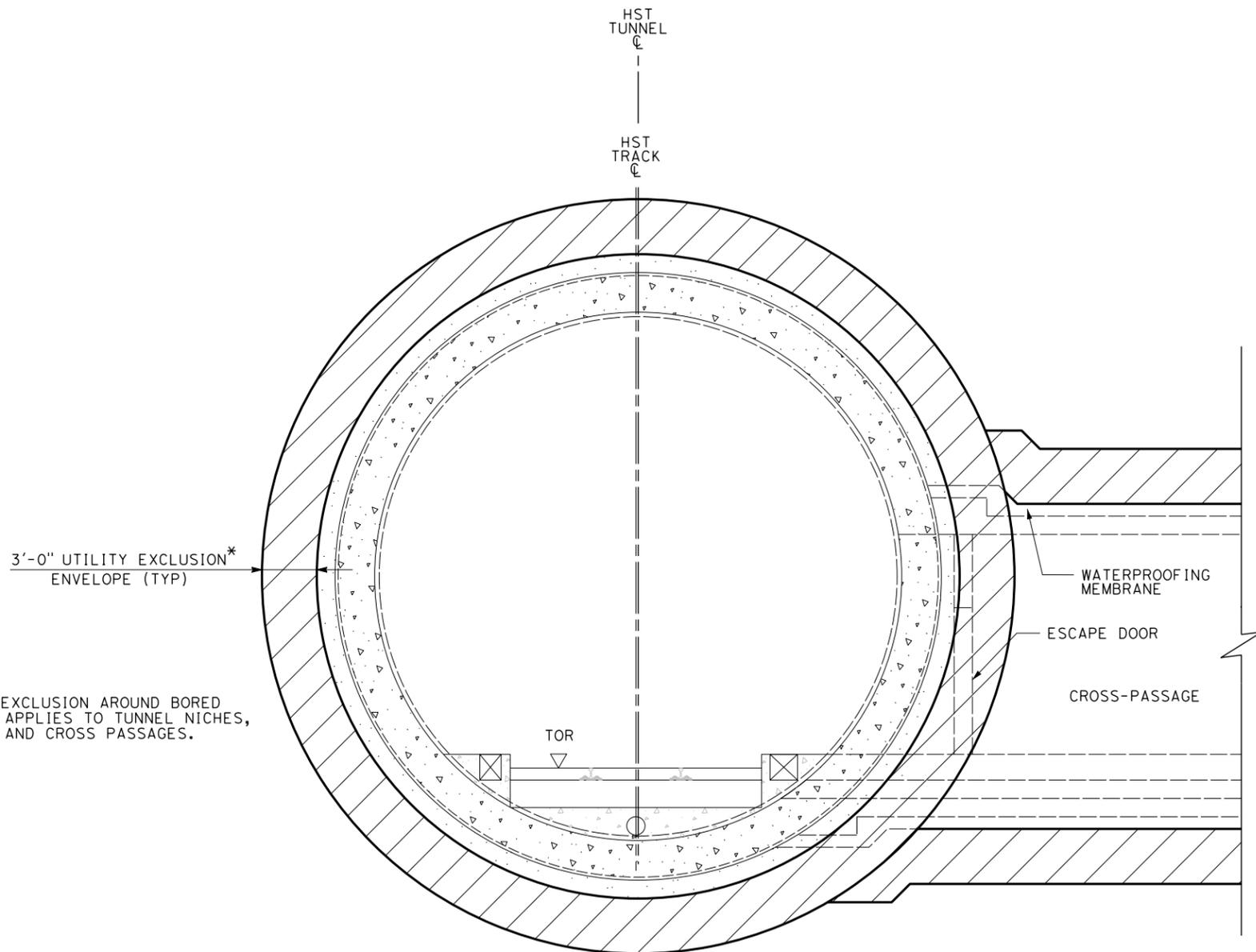
DESIGNED BY
A. ABTAHI
 DRAWN BY
T. DOUNG
 CHECKED BY
S. MILITELLO
 IN CHARGE
J. CHIRCO
 DATE
02/17/2012



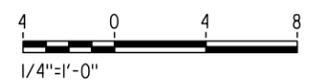
CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
 UTILITY CROSSING CLEARANCES
 CUT AND COVER TUNNELS

CONTRACT NO.
 13259
 DRAWING NO.
 TM 2.7.5 A-4
 SCALE
 AS SHOWN
 SHEET NO.

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* 3'-0" UTILITY EXCLUSION AROUND BORED TUNNELS ALSO APPLIES TO TUNNEL NICHES, ENLARGEMENTS AND CROSS PASSAGES.



REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY
A. ABTAHI
 DRAWN BY
D. SO
 CHECKED BY
S. MILITELLO
 IN CHARGE
J. CHIRCO
 DATE
02/17/2012



CALIFORNIA HIGH-SPEED TRAIN PROJECT
UTILITIES DIRECTIVE
 UTILITY CLEARANCE ENVELOPE
 AROUND TUNNELS AND CROSS-PASSAGES

CONTRACT NO.
 13259
 DRAWING NO.
 TM 2.7.5 A-5
 SCALE
 AS SHOWN
 SHEET NO.

APPENDIX B: SAMPLE UTILITY LOGS

Exhibit B-1	Utility Information Log
Exhibit B-2	Utility Owner Contact Information
Exhibit B-3	Utility Owner Contact Log
Exhibit B-4	Utility Log Index



Exhibit B-4
Utility Log Index

Heading	Explanation
No.	Sequentially number each entry
Region	Regional Consultant
Owner	Utility Owner
Station	Stationing along the alignment to locate the facility
Facility Type	Type of utility being conveyed
Quality Level	Quality Level used in locating and identifying the utility ("A" is the highest accuracy; "D" is the lowest)
Size	Size of utility facility
Units	Units of measure for the size of utility
Length	Length of utility being impacted-Use separate entries for abandonment and relocated utilities
% Cost Allocation	Percentage of construction cost to be borne by CHSRA (requires input by CHSRA)
Disposition	State the type of work being performed (Abandoned, relocated)
Contact	Name of a contact person representing the Owner
Address	Street Address of the Owner
City	Owner's City location
Zip	Zip Code of the Owner's contact location
Phone	Phone number for Owner's representative
Fax	Fax number for Owner's representative
Email	Email address for Owner's representative
No. of Impacts	Number of utilities belonging to this owner that is being impacted by CHSTP
Agreement	Indicate whether an agreement should be entered into with this owner
Date	Date of contact with Owner
Correspondence Type	Type of correspondence with Owner (phone, fax, letter, email)
Correspondence Subject	Request for Maps/ Potholing Request/ Specify other subjects
Description	Description of the discussion and/or request. Include reference to email or letter dates