California High-Speed Train Project

TECHNICAL MEMORANDUM

Codes, Regulations, Design Standards and Guidelines
TM 1.1.1

Prepared by:	*Signed document on file* Cecily Way	29 June 09 Date
Checked by:	*Signed document on file* John Chirco	8 July 09 Date
Approved by:	*Signed document on file* Ken Jong, PE, Engineering Manager	10 July 09 Date
Released by:	*Signed document on file* Anthony Daniels, Program Director	10 July 09 Date

Revision	Date	Description
0	10 Jul 09	Initial Release for 15%, R0

Prepared by

for the California High-Speed Rail Authority

System Level Technical and Integration Reviews

The purpose of the review is to ensure:

- Technical consistency and appropriateness
- Check for integration issues and conflicts

System level reviews are required for all technical memoranda. Technical Leads for each subsystem are responsible for completing the reviews in a timely manner and identifying appropriate senior staff to perform the review. Exemption to the System Level technical and integration review by any Subsystem must be approved by the Engineering Manager.

System Level Technical Reviews by Subsystem:

Systems:	*Signed document on file* Eric Scotson	07 July 09 Date
Infrastructure:	*Signed document on file* John Chirco	30 Jun 09 Date
Operations:	*Signed document on file* Paul Mosier	04 July 09 Date
Maintenance:	*Signed document on file* Paul Mosier	04 July 09 Date
Rolling Stock:	*Signed document on file* Frank Banko	26 Jun 09 Date

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ABSTRACT

This technical memorandum identifies system-wide regulations, codes, and design standards to be incorporated, as applicable, into the design of the California High-Speed Train Project (CHSTP). It is intended to be used by designers to ensure that the preliminary design addresses applicable design requirements. Regional and local regulations, codes and standards are to be identified and incorporated as applicable by designers.

This technical memorandum serves as a basis for developing the CHSTP design manual and:

- Establishes a hierarchy for the application of design requirements
- Presents guidance for resolving conflicting design requirements
- References protocols to address design variance

Additional system-wide regulations, codes and design standards may be identified and incorporated as applicable as the CHSTP progresses to the 30% Design Level.

6.0 DESIGN MANUAL CRITERIA

6.1 CODES, REGULATIONS, DESIGN STANDARDS AND GUIDELINES

CHSTP design criteria are generally intended for the design of high-speed train system elements. Design of elements not specific to high-speed train design may be governed by applicable existing laws, codes, and standards. This document presents existing regulations, codes, standards and guidelines that are to be incorporated into the design of the high-speed train project, as applicable. Regulations, codes, and standards include international, federal, state, and industry regulations, codes and standards. The regulations, codes, and standards presented herein will serve as a regulatory requirements and guidance for the project and will be included in the CHSTP Design Manual. Regional and local requirements are to be identified and incorporated as applicable by the designer. Any additional system-wide codes, regulations, standards and guidelines will be provided by the Authority.

Codes, regulations, standards and guidelines each provide a different level of mandate and guidance. A code is a type of legislation that covers a system of law on a specific subject matter to define a procedure or performance requirement. Regulations are rule and administrative code issued by governmental agencies that impose specific requirements and at times mandate permits or approvals by the agency (generally to ensure health and safety of the public). Although regulations are not laws, they have the force of law as they are adopted under authority granted by statutes. Standards are uniform criteria, methods, processes and practices developed by a regulatory body, agency, industry association, or organizations such as trade unions and trade associations, or other professional affiliations, that represent accepted requirement or a benchmark to measure against. Guidelines are non-mandatory, recommended, and supplemental information regarding generally acceptable methods to satisfy provisions of a regulation, code, or standard. Generally, codes and regulations are legally mandated within applicable jurisdictions. Standards and guidelines provide guidance and may be required by an agency but are not legally mandated. Standards may additionally be required for regulatory approvals.

6.1.1 Regulations and Codes

Existing federal and state regulations and codes govern passenger and freight rail systems in the United States. These regulations are typically for the basis of design and govern the operation of conventional rail networks and are not specifically applicable to the basis of design nor do they govern the operation of high-speed train systems with speeds over 150 mph. As such, international regulations and codes provide additional guidance. Other regulations and codes apply to the design of CHSTP buildings and facilities and are not specific to design of the CHST system.

Regulations and codes to be incorporated into CHSTP design, where appropriate, are presented in the following sections.

6.1.1.1 International

- Technical Specifications for Interoperability (TSI) concerning Trans-European High-Speed Rail
- European Standards (EN for European Norms)
    - European Committee for Standardization (CEN)
    - European Committee for Electrotechnical Standardization (CENELEC)
    - European Telecommunications Standard Institute (ETSI)
- Ministerial Ordinance for provide the technical standard about railway ((Shinkansen) [Tentative]
- International Building Code (IBC)
- International Union of Railways (UIC) Code
- Uniform Building Code (UBC)

6.1.1.2 Federal

- Americans with Disabilities Act (ADA)
- Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)
- Code of Federal Regulations (CFR), specifically 49 CFR Parts 200-299
- U.S. Environmental Protection Agency (EPA) Laws, Regulations, Guidance and Dockets, and Executive Orders
- National Electric Code (NEC)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA) Codes and Standards

6.1.1.3 State

- California Building Standards Code (CBSC), Title 24 of CCR
- California Business and Professions Code
- California Code of Regulations (CRR)
- California Public Utilities Commission (CPUC) General Orders (GO)

6.1.2 Standards

Standards have been developed by governments, industries, and operators for design and construction to ensure consistency and compatibility among various elements of a rail system. In some cases, fulfilment of standards may be required to secure regulatory approvals from the Army Corps of Engineers, Division of the State Architect, Office of the State Fire Marshall, California Coastal Commission, Caltrans, and other agencies and authorities. The following are applicable standards:

6.1.2.1 International

- British Standards Institute (BSI) Standards
- International Organization for Standardization (ISO)
- RFI (Italian Railway Network) Standards
- SIA (Swiss Building Code) Standards
- SNCF (French National Railway) Design Standards
- The Interpretive Criteria (Shinkansen) [Tentative]

6.1.2.2 Federal

- American National Standards Institute (ANSI)
- Federal Emergency Management Agency (FEMA) Guidelines
- Federal Highway Administration (FHWA) Guidelines
- National Earthquake Hazards Reduction Program (NEHRP)
- US Army Corps of Engineers Guidelines
- US Bureau of Land Management Surveying Manual
- United States Geological Survey (USGS) Standards

6.1.2.3 State

- California Disabled Accessibility Guidebook (CalDAG)
- Caltrans Bridge Design Manuals, including Bridge Design Specification (CBDS), Bridge Design Practices Manual (CBPD), Bridge Design Aids Manual (CBDA), Bridge Design Details Manual (CBDD), Bridge Memo to Designers Manual (CMTD), Standard Specifications, Standard Plans, Seismic Design Memorandum, Caltrans Seismic Design Criteria ver. 1.4 (CSDC))
- Caltrans CADD Standards and Users Manual

- Caltrans Highway Design Manual
- Caltrans Plans Preparation Manual and other guidelines for report preparation
- Caltrans Project Development Procedures Manual
- Caltrans Standard Plans and Specifications
- Caltrans Surveys Manual
- Caltrans Transportation Management Planning Guidelines
- Caltrans User's Guide to Photogrammetric Products and Services
- Caltrans Right of Way Manual, and Forms and Exhibits
- Other Right of Way Publications

6.1.2.4 Industry

- American Association of State Highway and Transportation Officials (AASHTO) Guidance
- American Concrete Institute (ACI) Building Code Requirements
- American Institute of Steel Construction (AISC) Steel Construction Manual
- American Public Transit Association (APTA) Guidance
- American Railway Engineering and Maintenance of Way Association (AREMA) Manual and Portfolio of Trackwork Plans
- American Society for Photogrammetry and Remote Sensing (ASPRS) Manual
- American Society for Testing and Materials (ASTM) Standards
- American Society of Civil Engineers (ASCE) Guidelines
- American Welding Society (AWS) Codes
- Amtrak Standards and Guidelines
- Burlington Northern Santa Fe (BNSF) Railway Engineering Standards
- Institute of Electrical and Electronics Engineers (IEEE) Standards
- Peninsula Corridor Joint Powers Board (Caltrain) Design Criteria and Engineering Standards
- Southern California Regional Rail Authority (SCRRA) Engineering Standards
- Union Pacific (UP) Railroad Engineering Standards

6.1.3 Regional Ordinances and Governance Bodies

State projects are not subject specifically to regional and local codes. Because the Authority is an agency of the state government, development of facilities within the state's right-of-way shall fall under the jurisdiction of the Division of the State Architect (DSA) and the State Fire Marshall along with input and coordination with local jurisdictions. As regional ordinances and governance bodies are geography-based, guidance will not be applicable along all segments of the CHST system. However, the high-speed train system will connect and integrate with other passenger rail and transit services and will communities and high-speed train stations. As such, consideration of regional and local codes, standards and requirements is necessary. It is the obligation of the Designer to identify regional ordinances and government bodies applicable to sections they are designing.

6.1.3.1 Local Jurisdiction

Regulations, codes, and standards of local governing bodies shall be considered along with site specific permit and operational requirements. The following are representative local agencies, organizations and services that may have specific design standards and specifications, operational and facility requirement that should be considered in the design of CHSTP facilities.

- Air Quality Districts
- Bicycle Coalitions
- City, County, Municipal, Codes and Ordinances

- City, County, Municipal Utilities Codes and Standards
- Congestion Management Agencies
- County Transportation Authorities
- Departments of Public Works
- Fire Departments
- Freight Railroads
- Local Flood Control Districts
- Local Transit Agencies
- Passenger Rail Agencies
- Parks and Recreation Departments
- Public Utilities Commission(s)
- Regional Comprehensive Planning Agencies
- Regional Council of Governments
- Regional Environment Agencies and Commissions
- Regional Water Quality Control Boards
- School Districts
- Waste Management entities

Applicable ordinances of counties, cities and unincorporated jurisdictions where CHSTP facilities are located shall be included in the design as determined by the designer.

6.2 DESIGN REQUIREMENTS BY SUBSYSTEM

Initial CHSTP design criteria will be issued in technical memoranda that provide guidance and procedures for use in advancing the preliminary engineering of the high-speed train facilities. Supplementary guidance for the design of CHSTP facilities are defined in numerous codes, regulations, standards and guidelines. Codes, regulations, design standards and guidelines to be incorporated into CHSTP design as applicable are summarized in Table 6-1. Note that many of the listed documents include additional material for incorporation by reference.

Table 6-1 – Codes, Regulations, Design Standards and Guidelines to Incorporate into Design as Applicable

Sub-Systems	Codes and Regulations	Standards and Guidelines
General	• Code of Federal Regulations (CFR) 49 Parts 200-299 • State of California Board for Professional Engineers and Land Surveyors, Land Surveyors Act (Business & Professional Code 8700-8805) • U.S. Environmental Protection Agency (EPA) Laws, Regulations, Guidance and Dockets, and Executive Orders	• Manual for Railway Engineering of the American Railway Engineering and Maintenance-of-Way Association (AREMA Manual) • Caltrans Highway Design Manual, Chapter 80: Application of Design Standards • Caltrans Project Development Procedures Manual
INFRASTRUCTURE		
Alignment (Plan and Profile)	• Technical Specifications for Interoperability for the Trans-European High-Speed Rail System (TSI) • CFR49 Part 213, Track Safety Standards, generally and also in particular Subpart G –Train Operations at Track Classes 6 and Higher. • CFR49 Part 214, Railroad Workplace Safety. • California Public Utilities Commission (PUC) General Order (GO) 26: Clearances On Railroads And Street Railroads As To Side And Overhead Structures, Parallel Tracks And Crossings • CPUC GO 95: Overhead Electric Line Construction. Generally and also see in particular Section VII, Detailed Construction Requirements for Trolley and Electric Railway Contact and Feeder Conductors and Their Supporting Messengers, Span Wires, Etc. (Class T Circuits) • CPUC GO 118: Regulations Governing the Construction, Reconstruction, and Maintenance of Walkways Adjacent to Railroad Trackage and the Control of Vegetation Adjacent Thereto • CPUC GO 164: Rules And Regulations Governing State Safety Oversight Of Rail Fixed Guideway Systems • UIC (International Union of Railways) Code 703 – Layout Characteristics of Lines Used by Fast Passenger Trains	• Caltrans Manuals and Standards, including Highway Design Manual and Section VII, Detailed Construction Requirements for Trolley and Electric Railway Contact and Feeder Conductors and Their Supporting Messengers, Span Wires, Etc. (Class T Circuits) • AREMA Manual, in particular Chapter 1: Roadway and Ballast , Chapter 5: Track, Chapter 17: High Speed Rail Systems, Chapter 28: Clearances ,Chapter 33: Electrical Energy Utilization • Comité Européen de Normalisation – European Committee for Standardization (CEN standard) • UIC – Design of new lines for speeds of 300 – 350 km/h • Caltrans Surveys Manual • Caltrans User's Guide to Photogrammetric Products and Services • United States Bureau of Land Management's Manual of Surveying Instructions • United States Geological Survey (USGS) National Map Accuracy Standards • Manual of Photogrammetry, American Society of Photogrammetry and Remote Sensing • Caltrans Plans Preparation Manual, including Caltrans CADD Standards, Caltrans Surveys Manual (Chapter 4, Survey Datums) Caltrans EZ Guide, CADD Users Manual • Burlington Northern Santa Fe (BNSF) Railway Engineering Standards • Union Pacific (UP) Railroad Engineering Standards • Southern California Regional Rail Authority (SCRRA) Engineering Standards • Peninsula Corridor Joint Powers Board (Caltrain) Design Criteria and Engineering Standards
Temporary Construction Facilities	• Applicable codes and regulations to be defined	• Applicable standards and guidelines to be defined

Sub-Systems	Codes and Regulations	Standards and Guidelines

Stations	• 49 CFR Part 213, Track Safety Standards
	• 49 CFR Parts 27, 37 and 38, Transportation for Individuals with Disabilities
	• California Public Utilities Commission (PUC) General Orders (GO), including:
	  • GO 26: Clearances On Railroads And Street Railroads As To Side And Overhead Structures, Parallel Tracks And Crossings
	  • GO 164: Rules And Regulations Governing State Safety Oversight Of Rail Fixed Guideway Systems
	• Technical Specifications for Interoperability for the Trans-European High-Speed Rail System (TSI)
	• Americans with Disabilities Act (ADA)
	• ADA Guidelines for Buildings and Facilities (ADAAG)
	• National Fire Protection Association (NFPA) 130: Standard for Fixed Guideway Transit and Passenger Rail Systems
	• NFPA 101: Life Safety Code
	• International Building Code (IBC)
	• Uniform Building Code (UBC)
	• California Code of Regulations (CCR), Title 24, California Building Standards Code
		• American National Standards Institute (ANSI) 117.1 – standard for accessible design for persons with disabilities
		• SCRRA Engineering Standards
		• Caltrain Design Criteria and Engineering Standards
		• Amtrak Station Program & Planning Standards and Guidelines
		• California Disabled Accessibility Guidebook (CalDAG)
		• AREMA Manual, in particular Chapter 4: Rail, Chapter 5: Track, and Portfolio of Trackwork Plans
		• UP Railroad Engineering Standards
		• BNSF Railway Engineering Standards

Sub-Systems	Codes and Regulations	Standards and Guidelines
Bridges and Elevated Structures	• 49 CFR Part 213, Appendix C - Statement of Agency Policy on the Safety of Railroad Bridges • NFPA Codes and Standards including 130 - Standard for Fixed Guideway Transit and Passenger Rail Systems • California Code of Regulations (CCR) Title 24, California Building Standards Code • American Concrete Institute (ACI) 318, Building Code Requirements for Reinforced Concrete • American Welding Society (AWS), Structural Welding Code, Steel, 1996 ANSI/AWS D1.1-96 and Bridge Welding Code ANSI/AASHTO/AWSD1.5-95	• European Standard EN 1990 annexe A2: Application to Bridges Federal Railroad Administration (FRA) requirements for containment of high-speed trains on aerial structures • AREMA Manual • American Institute of Steel Construction (AISC), Steel Construction Manual • American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 2007, with California Amendments • Caltrans Bridge Design Manuals, including: Bridge Design Specification (CBDS), Bridge Design Practices Manual (CBPD), Bridge Design Aids Manual (CBDA), Bridge Design Details Manual (CBDD), Bridge Memo to Designers Manual (CMTD), Standard Specifications, Standard Plans, Seismic Design Memorandum, Caltrans Seismic Design Criteria ver. 1.4 (CSDC)) • European Standard EN 1991-2:2003 Traffic Loads on Bridges • European Standard EN 1990 Annex A2: Application to Bridges • Federal Emergency Management Agency (FEMA) 356 - Prestandard and Commentary for the Seismic Rehabilitation of Buildings • National Earthquake Hazards Reduction Program (NEHRP) – Recommended Provisions for Seismic Regulations for New Buildings and Other Structures • Federal Highway Administration (FHWA) Seismic Retrofitting Manual for Highway Structures: Part 1-Bridges and Part 2-Retaining Structures, Slopes, Tunnels, Culverts, and Roadways • Applied Technology Council (ATC) 32 – Improved Seismic Design Criteria for California Bridges: Provisional Recommendations

Sub-Systems	Codes and Regulations	Standards and Guidelines
Tunnels	• California Public Utilities Commission (CPUC) General Order (GO) 26: Clearances On Railroads And Street Railroads As To Side And Overhead Structures, Parallel Tracks And Crossings • CPUC GO 95: Overhead Electric Line Construction. Generally and also see in particular Section VII, Detailed Construction Requirements for Trolley and Electric Railway Contact and Feeder Conductors and Their Supporting Messengers, Span Wires, Etc. (Class T Circuits) • CPUC GO 118: Regulations Governing the Construction, Reconstruction, and Maintenance of Walkways Adjacent to Railroad Trackage and the Control of Vegetation Adjacent Thereto • NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems • Swiss code SIA 197/1:2004, "Projets de tunnels – Tunnel ferroviaires" • Technical Specification for Interoperability (TSI) relating to 'safety in railway tunnels' in the trans-European conventional and high-speed rail system • International Union of Railways (UIC) Code 779-11-R and 779-9-R • American Concrete Institute (ACI) 318, Building Code Requirements for Reinforced Concrete • American Welding Society (AWS): Structural Welding Code, Steel, 1996 ANSI/AWS D1.1-96 and Bridge Welding Code ANSI/AASHTO/AWSD1.5-95 • California Code of Regulations (CCR) Title 24, California Building Standards Code	• Rete Ferroviaria Italiana (RFI, Italian railway network) Design Handbook, Safety Standards for New Railway Tunnels • Comité Européen de Normalisation (CEN), European Committee for Standardization Standard • UIC – Design of new lines for speeds of 300 – 350 km/h • Societe Nationale des Chemins de fer francais (SNCF, French National Railway) – High-speed railway design standards (2007 edition) • AREMA Manual, in particular Chapter 17: High Speed Rail Systems and Chapter 28: Clearances • BNSF Railway Engineering Standards • UP Railroad Engineering Standards • Southern California Regional Rail Authority (SCRRA) Engineering Standards • Caltrain Design Criteria and Engineering Standards • Amtrak Design Criteria • American Institute of Steel Construction (AISC), Steel Construction Manual • American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 2007, with California Amendments • Caltrans Bridge Design Manuals, including: Bridge Design Specification (CBDS), Bridge Design Practices Manual (CBPD), Bridge Design Aids Manual (CBDA), Bridge Design Details Manual (CBDD), Bridge Memo to Designers Manual (CMTD), Standard Specifications, Standard Plans, Seismic Design Memorandum, Caltrans Seismic Design Criteria ver. 1.4 (CSDC)) • European Standard EN 1991-2:2003 Traffic Loads on Bridges • European Standard EN 1990 Annex A2: Application to Bridges • Federal Emergency Management Agency (FEMA) 356 - Prestandard and Commentary for the Seismic Rehabilitation of Buildings • National Earthquake Hazards Reduction Program (NEHRP) – Recommended Provisions for Seismic Regulations for New Buildings and Other Structures • Federal Highway Administration (FHWA) Seismic Retrofitting Manual for Highway Structures: Part 1-Bridges and Part 2-Retaining Structures, Slopes, Tunnels, Culverts, and Roadways • Applied Technology Council (ATC) 32 – Improved Seismic Design Criteria for California Bridges: Provisional Recommendations

Sub-Systems	Codes and Regulations	Standards and Guidelines
Buildings	• Americans with Disabilities Act (ADA) • ADA Guidelines for Buildings and Facilities (ADAAG) • National Fire Protection Association (NFPA) 130 • California Code of Regulations (CCR) Title 24, California Building Standards Code • California Public Utility Commission (CPUC) General Orders (GO) • International Building Code (IBC) • Uniform Building Code (UBC) • American Concrete Institute (ACI) 318, Building Code Requirements for Reinforced Concrete • American Welding Society (AWS) Structural Welding Code, Steel, 1996 ANSI/AWS D1.1-96 and Bridge Welding Code ANSI/AASHTO/AWSD1.5-95	• California Disabled Accessibility Guidebook (CalDAG) • American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 2007, with California Amendments • AREMA Manual • American Institute of Steel Construction (AISC), Steel Construction Manual • Caltrans Bridge Design Manuals, including: Bridge Design Specification (CBDS), Bridge Design Practices Manual (CBPD), Bridge Design Aids Manual (CBDA), Bridge Design Details Manual (CBDD), Bridge Memo to Designers Manual (CMTD), Standard Specifications, Standard Plans, Seismic Design Memorandum, Caltrans Seismic Design Criteria ver. 1.4 (CSDC)) • European Standard EN 1991-2:2003 Traffic Loads on Bridges • European Standard EN 1990 Annex A2: Application to Bridges • Federal Emergency Management Agency (FEMA) 356 - Prestandard and Commentary for the Seismic Rehabilitation of Buildings • National Earthquake Hazards Reduction Program (NEHRP) – Recommended Provisions for Seismic Regulations for New Buildings and Other Structures • Federal Highway Administration (FHWA) Seismic Retrofitting Manual for Highway Structures: Part 1-Bridges and Part 2-Retaining Structures, Slopes, Tunnels, Culverts, and Roadways • Applied Technology Council (ATC) 32 – Improved Seismic Design Criteria for California Bridges: Provisional Recommendations
Grading	• International Union of Railways (UIC) Code 719 R “Earthworks and Track-bed Layers for Railway Lines”	• AREMA Manual • Caltrans Highway Design Manual • Caltrans Standard Specification • International Organization for Standardization (IS0) • Comité Européen de Normalisation (CEN. European Standards Committee) • U.S. Army Corp of Engineers Technical and Design Guides • American Society for Testing and Materials (ASTM) Standards • British Standards Institute (BSI) Standards • Union Internationale des Chemins de fer (UIC, International Union of Railways)
Hydrology/Hydraulics / Drainage	• Applicable codes and regulations to be defined	• Applicable standards and guidelines to be defined
Utilities	• CPUC General Orders	• Caltrans Highway Design Manual • Caltrans Project Development Procedures Manual • AREMA Manual

Sub-Systems	Codes and Regulations	Standards and Guidelines
Geotechnical	• Applicable codes and regulations to be defined	• American Society for Testing and Materials (ASTM) Standards per FHWA, Caltrans, and AREMA • American Society of Civil Engineers (ASCE), "Geotechnical Baseline Reports for Construction – Suggested Guidelines" • FHWA Checklist and Guidelines for Review of Geotechnical Reports and Preliminary Plans and Specifications • Caltrans Guidelines for Preparing Geotechnical Design Reports • Caltrans Guidelines for Structures Foundations Reports
Right of Way	• Applicable codes and regulations to be defined	• Applicable standards and guidelines to be defined
Construction Cost Estimate	• Applicable codes and regulations to be defined	• Federal Transit Agency - Standard Cost Categories • International Association for the Advancement of Cost Engineering (AACE) - Recommended Practice No. 10S-90 – Cost Engineering Terminology
SYSTEMS		
Traction Power	• CPUC General Orders (GO) including GO95: Overhead electric line construction will require Amendments to cover 2 x 25 kV (or 25kV) • National Electrical Code (NEC) • National Electrical Safety Code (NESC) • NFPA Codes and Standards	• AREMA Manual • Institute of Electrical and Electronics Engineers (IEEE) 80: Safety in Substation Grounding and other applicable standards
PUC/Electric Power Connections	• CPUC General Orders (GO) including GO95: Overhead electric line construction will require Amendments to cover 2 x 25 kV (or 25kV) • National Electrical Code (NEC) • National Electrical Safety Code (NESC) • NFPA Codes and Standards	• AREMA Manual • Institute of Electrical and Electronics Engineers (IEEE) 80: Safety in Substation Grounding and other applicable standards
Overhead Contact System (OCS)	• Technical Specifications for Interoperability for the Trans-European High-Speed Rail System (TSI) • CPUC General Orders (GO) including GO95: Overhead electric line construction will require Amendments to cover 2 x 25 kV (or 25kV) • GO26-D: Clearances on railroads and street railroads as to side and overhead structures, parallel tracks and crossings	• AREMA Manual • Amtrak Design Guidelines • Caltrain Design Criteria and Engineering Standards
Communications	• Applicable codes and regulations to be defined	• Applicable standards and guidelines to be defined
Trackside Services	• Applicable codes and regulations to be defined	• Applicable standards and guidelines to be defined

6.3 REQUIREMENT PRECEDENCE AND RESOLUTION OF CONFLICTS

6.3.1 Precedence by Jurisdiction

CHSTP design criteria and standards shall supersede industry standards as they pertain to high-speed train system elements. CHSTP design standards and guidelines may differ from federal and state codes and standards. Regional and local guidance are to be considered but are not mandated. In the case of differing values, the standard followed shall be that which results in the satisfaction of all applicable requirements. Where high-speed trains operate within another railroad or transportation operator's corridor, the requirements of the CHSTP and the owner/operator's standards shall be met.

6.3.2 Precedence by Type of Requirement

In general, applicable regulations and codes take precedence over standards. In the case of differing values between the governing regulations, codes, and standards, the criterion followed shall be that which results in the satisfaction of all applicable requirements. Standards shall be mandated as required for securing regulatory approval.

6.3.3 Resolution of Conflicting Requirements

In the case of conflicts, documentation of the conflicting requirements is to be prepared. The designer shall submit their recommendation for a new design criteria or adoption of one of the conflicting regulations or standards for approval to the Authority. In the case of differing values, conflicts in the various requirements for design, or discrepancies in application of the design standards, the criteria followed shall be that which results in the highest level of satisfaction for all requirements or that is deemed as the most appropriate by the California High-Speed Rail Authority (Authority). The designer shall meet this goal by assessing the appropriate industry standards and proposing project-specific design criteria or use of existing standards in order to meet project objectives and satisfy regulatory requirements.

In cases where the conflict can not be resolved through the use of the common standard or a new project specific design criteria, the Authority shall work with the designer to establish a solution. This may be achieved by preparing a variance request for the conflicting design criteria and securing an approval from the governing regulatory agency. In some cases, this will lead to new regulations, codes, or industry standards.

6.4 PROTOCOLS FOR DESIGN VARIANCE AND EXCEPTION APPROVALS

Variances, or exceptions, to applicable federal and state codes and regulations and design standards require written approval by the agency or authority having jurisdiction.

Technical Memorandum TM 1.1.18 - Design Variance Guidelines defines the procedure for identifying, preparing, requesting, and documenting a design variance from CHSTP Standard Drawings, Standard Specifications, and Minimum Design Criteria as well as other adopted standards or design guidelines.

Application for variance requests, including the preparation of required supporting documentation, is the responsibility of the designer, unless otherwise directed by the Authority.