

# California High-Speed Train Project



## Request for Proposal for Design-Build Services

RFP No.: HSR 11-16  
Book 3, Part C, Subpart 1a

Updates to Design Criteria

Book 3, Part C, Subpart 1, Design Criteria have been revised in accordance with the tables provided in this document.

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## Chapter 1 – General

Section	Change	Page No.	Line No.	CP01 AD.#
1.1.4	Changed text from “shall” to “may”	1-2	4	AD.7
1.1.4	Deleted the following bullet point items: <ul style="list-style-type: none"> <li>• <i>Concept of Operations</i></li> <li>• <i>Rolling Stock Specifications</i></li> <li>• <i>Quality Control/Quality Assurance Procedure Manual</i></li> </ul>	1-2	11 to 13	AD.7



Chapter 3 – Trackway Clearances

Section	Change	Page No.	Line No.	CP01 AD.#
3.1	<p>Changed the entire section from:</p> <p><i>“This chapter provides design criteria for required clearances to the California High-Speed Train (HST) trackway and facilities. It includes an allowance for HST maintenance equipment and other equipment that may be operated within the HST tracks. The static, dynamic, fixed equipment, and structure gauge envelopes presented in this chapter have been developed to accommodate the following:</i></p> <ul style="list-style-type: none"> <li>• <i>The widest and tallest existing HST rolling stock currently under contemplation</i></li> <li>• <i>The Association of American Railroads Equipment Diagram - Plate F, which encapsulates all American conventional passenger equipment currently in service. It does not include Equipment Diagram – Plate H; therefore, it does not permit passage of double-stack container equipments, tri-level auto carriers, or other equipment having a height in excess of 17.00 feet”</i></li> </ul> <p>to:</p> <p><i>“This chapter provides design criteria for required clearances to the California High-Speed Train (HST) trackway and facilities. It includes an allowance for HST maintenance equipment and other equipment that may be operated within the HST tracks. Two sets of static, dynamic, fixed equipment, and structure gauge envelopes are presented in this chapter. They have been developed to accommodate the following:</i></p> <ul style="list-style-type: none"> <li>• <i>Tracks that will accommodate high-speed equipment only which includes:</i> <ul style="list-style-type: none"> <li>– <i>The widest and tallest existing HST rolling stock currently under contemplation</i></li> <li>– <i>International Union of Railway (UIC) GC Gauge</i></li> <li>– <i>Association of American Railroads (AAR) Plate C</i></li> </ul> </li> <li>• <i>Tracks that will also accommodate other passenger train equipment operating in California.”</i></li> </ul>	3-1	1 to 11	AD.5

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Section	Change	Page No.	Line No.	CP01 AD.#
3.3	<p>Changed the section's title and the first paragraph from:</p> <p><i>"3.3 Clearances to Overhead Structures and Third Party Facilities</i></p> <p><i>Clearance requirements for facilities owned and operated by a third party shall follow that third party's clearance requirements. Where the clearance required by third party facility overlaps with HST minimum clearance requirement the larger dimension shall be used."</i></p> <p>to:</p> <p><i>"3.3 Clearances to Overhead and Adjacent Structures and Facilities</i></p> <p><i>Minimum clearance requirements shall be as shown on Standard and Directive drawings where applicable. These drawings and the requirements in Tables 3-1 and 3-2 shall be used as guidance in developing clearances for situations and conditions not clearly defined in these drawings."</i></p>	3-2	2 to 4	AD.5
3.3.1	<p>Changed the first paragraph from:</p> <p><i>"Minimum vertical clearances measured above dedicated HST top of rail (TOR) shall be as shown on Standard and Directive Drawings and in Table 3-1. Minimum vertical clearances should be carried to a point 25 feet laterally from the centerline of closest track. At locations where superelevation is present, vertical clearances shall be measured from the top of highest rail."</i></p> <p>to:</p> <p><i>"Minimum vertical clearances shall be measured from the HST top of rail (TOR). Minimum vertical clearances should be carried to a point 25 feet laterally from the centerline of the most outside track."</i></p>	3-2	8 to 11	AD.5



Section	Change	Page No.	Line No.	CP01 AD.#										
3.3.1	<p>Table 3-1: Changed Table 3-1 to:</p> <table border="1" data-bbox="342 352 1094 722"> <thead> <tr> <th data-bbox="342 352 805 428"><i>Item</i></th> <th data-bbox="805 352 1094 428"><i>Minimum Vertical Clearance</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="342 428 805 501">Clearance from HST TOR to new structures</td> <td data-bbox="805 428 1094 501">27'-0"<sup>(1)</sup></td> </tr> <tr> <td data-bbox="342 501 805 575">Clearance from HST TOR to existing structures (V &gt; 125 mph)</td> <td data-bbox="805 501 1094 575">27'-0"<sup>(1)</sup></td> </tr> <tr> <td data-bbox="342 575 805 648">Clearance from HST TOR to existing structures (V ≤ 125 mph)</td> <td data-bbox="805 575 1094 648">24'-0"<sup>(1)</sup></td> </tr> <tr> <td data-bbox="342 648 805 722">HST tracks span over Road and/or Railroad (HST Overpass)</td> <td data-bbox="805 648 1094 722">See Note <sup>(2)</sup></td> </tr> </tbody> </table> <p>Notes:</p> <p><sup>(1)</sup> These clearances assume that the width of the grade separated structure above the HST track is no more than 160 feet. Structures wider than 160 feet require further Engineer approval.</p> <p><sup>(2)</sup> Clearances to be determined by agreements with the third party agency owning the facility.</p>	<i>Item</i>	<i>Minimum Vertical Clearance</i>	Clearance from HST TOR to new structures	27'-0" <sup>(1)</sup>	Clearance from HST TOR to existing structures (V > 125 mph)	27'-0" <sup>(1)</sup>	Clearance from HST TOR to existing structures (V ≤ 125 mph)	24'-0" <sup>(1)</sup>	HST tracks span over Road and/or Railroad (HST Overpass)	See Note <sup>(2)</sup>	3-2	-	AD.3
<i>Item</i>	<i>Minimum Vertical Clearance</i>													
Clearance from HST TOR to new structures	27'-0" <sup>(1)</sup>													
Clearance from HST TOR to existing structures (V > 125 mph)	27'-0" <sup>(1)</sup>													
Clearance from HST TOR to existing structures (V ≤ 125 mph)	24'-0" <sup>(1)</sup>													
HST tracks span over Road and/or Railroad (HST Overpass)	See Note <sup>(2)</sup>													
3.3.2	<p>Changed the first paragraph from:</p> <p><i>“Horizontal clearances for dedicated HST tracks shall be as shown on Standard and Directive Drawings and in Table 3-2.”</i></p> <p>to:</p> <p><i>“Minimum horizontal clearances shall be measured from the track centerline (TCL) of the closest HST track to the feature being cleared.”</i></p>	3-2	18 to 19	AD.5										

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Section	Change	Page No.	Line No.	CP01 AD.#														
3.3.2	<p>Table 3-2: Changed Table 3-2 to:</p> <table border="1" data-bbox="350 352 1097 842"> <thead> <tr> <th data-bbox="350 352 805 428"><i>Item</i></th> <th data-bbox="805 352 1097 428"><i>Minimum Horizontal Clearance</i></th> </tr> </thead> <tbody> <tr> <td data-bbox="350 428 805 533"><i>TCL to railroad corridor right-of-way</i></td> <td data-bbox="805 428 1097 533"><i>See Rolling Stock and Vehicle Intrusion Protection chapter</i></td> </tr> <tr> <td data-bbox="350 533 805 638"><i>TCL to highway edge of travel way</i></td> <td data-bbox="805 533 1097 638"><i>See Rolling Stock and Vehicle Intrusion Protection chapter</i></td> </tr> <tr> <td data-bbox="350 638 805 680"><i>TCL to face of permanent structure</i></td> <td data-bbox="805 638 1097 680"><i>25'-0" <sup>(2)</sup> <sup>(3)</sup></i></td> </tr> <tr> <td data-bbox="350 680 805 722"><i>TCL to edge of platform</i></td> <td data-bbox="805 680 1097 722"><i>5'-9" <sup>(1)</sup></i></td> </tr> <tr> <td data-bbox="350 722 805 800"><i>TCL to centerline of OCS poles, main gantry and strain gantry</i></td> <td data-bbox="805 722 1097 800"><i>See Standard and Directive Drawings</i></td> </tr> <tr> <td data-bbox="350 800 805 842"><i>TCL to face of fixed equipment</i></td> <td data-bbox="805 800 1097 842"><i>10'-0" <sup>(3)</sup></i></td> </tr> </tbody> </table> <p data-bbox="350 852 412 873"><i>Notes:</i></p> <p data-bbox="350 884 1097 1052"><i>(1) 5'-9" for preliminary design is based on the half-width of the widest passenger vehicle currently under consideration. Following determination of actual vehicle, the edge of platform shall be located 2-3/4 inches beyond the half-width of the vehicle at the elevation of the floor and at the same height above top of rail as the elevation of the vehicle floor.</i></p> <p data-bbox="350 1062 1097 1115"><i>(2) Protective structure may be required if horizontal clearance is less than 25 feet.</i></p> <p data-bbox="350 1125 1097 1157"><i>(3) See Appendix 3.C, 3.D, 3.G, and 3.H for constrained areas.</i></p>	<i>Item</i>	<i>Minimum Horizontal Clearance</i>	<i>TCL to railroad corridor right-of-way</i>	<i>See Rolling Stock and Vehicle Intrusion Protection chapter</i>	<i>TCL to highway edge of travel way</i>	<i>See Rolling Stock and Vehicle Intrusion Protection chapter</i>	<i>TCL to face of permanent structure</i>	<i>25'-0" <sup>(2)</sup> <sup>(3)</sup></i>	<i>TCL to edge of platform</i>	<i>5'-9" <sup>(1)</sup></i>	<i>TCL to centerline of OCS poles, main gantry and strain gantry</i>	<i>See Standard and Directive Drawings</i>	<i>TCL to face of fixed equipment</i>	<i>10'-0" <sup>(3)</sup></i>	3-3	-	AD.5
<i>Item</i>	<i>Minimum Horizontal Clearance</i>																	
<i>TCL to railroad corridor right-of-way</i>	<i>See Rolling Stock and Vehicle Intrusion Protection chapter</i>																	
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<i>TCL to face of permanent structure</i>	<i>25'-0" <sup>(2)</sup> <sup>(3)</sup></i>																	
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<i>TCL to face of fixed equipment</i>	<i>10'-0" <sup>(3)</sup></i>																	
3.3.3 (new)	<p data-bbox="350 1167 854 1199">Added a new section after Section 3.3.2:</p> <p data-bbox="350 1209 919 1251"><i>"3.3.3 Clearances to Third Party Facilities</i></p> <p data-bbox="350 1262 1097 1409"><i>Where facilities owned and operated by third parties are involved, the clearance requirement of this document and those of the third party shall be compared and the larger dimension used."</i></p>	3-3	after Line 7	AD.5														

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Section	Change	Page No.	Line No.	CP01 AD.#
3.4	<p>Changed the first paragraph from:</p> <p><i>“The static and dynamic envelopes in Appendix 3.C and 3.D define the maximum vehicle size and limits of vehicle movement excluding the pantograph. For additional space requirements for pantograph and OCS related facilities, see Appendix 3.E, Appendix 3.F, and the Overhead Contact System and Traction Power Return Systems chapter.”</i></p> <p>to:</p> <p><i>“The static and dynamic envelopes in Appendix 3.A and 3.E define the maximum vehicle size and limits of vehicle movement including the pantograph. For additional space requirements for pantograph and OCS related facilities, see the Overhead Contact System and Traction Power Return Systems chapter.”</i></p>	3-3	8 to 11	AD.5
3.4.1	Changed text in the first sentence from: “3.F” to: “3.H”	3-3	12	AD.5
3.4.1	Deleted text: “Composite” in the first bullet point.	3-3	13	AD.5
3.4.1	Deleted text: “Composite” in the second bullet point.	3-3	15	AD.5
3.4.1	<p>Changed the “Walkway Envelope” bullet point from:</p> <p><i>“• Walkway Envelope – Indicates the allowance for walkway space and its closest allowable proximity to the track. Appendix 3.A and 3.B illustrate the walkway envelope and its relationship to the structure gauge and other features for tangent and superelevated tracks. For clearance purposes, the centerline remains perpendicular to the plane across the top of rails on superelevated tracks. The walkway envelope shall be defined as follows:</i></p> <ul style="list-style-type: none"> <li><i>– The width shall be no less than 3.00 feet.</i></li> <li><i>– The vertical clear space shall be no less than 7.50 feet above the walkway surface.</i></li> </ul> <p><i>Where speeds are less than 50 miles per hour (mph), the offset to the trackside edge of the walkway envelope may be reduced by 1.00 foot. In the case of walkways in tunnels or adjacent to walls, additional offset for mounting of pipes and other fixtures shall be added to ensure that these features do not encroach into the walkway allowance.</i></p>	3-4	11 to 24	AD.5



Section	Change	Page No.	Line No.	CP01 AD.#
	<p><i>See Appendix 3.A for illustrations that show the required minimum structure gauges on straight (tangent) tracks. These envelopes form the basis for all further structure gauge requirements."</i></p> <p>to:</p> <ul style="list-style-type: none"> <li><i>"• Walkway Envelope – Indicates the allowance for walkway space and its closest allowable proximity to the track. The walkway envelope shall be defined as follows:</i> <ul style="list-style-type: none"> <li><i>– The width shall be no less than 3.00 feet.</i></li> <li><i>– The vertical clear space shall be no less than 7.50 feet above the walkway surface.</i></li> <li><i>– The top may be tapered symmetrically from full width at 6.00 feet above the walkway surface to 2.50 feet wide at the top of the envelope.</i></li> <li><i>– The trackside edge of the walkway shall clear the static envelope and should clear the dynamic envelope."</i></li> </ul> </li> </ul>			
3.4.2	<p>Changed text from:</p> <p><i>"Appendix 3.A and 3.B" to:</i></p> <p><i>"Appendix 3.C, 3.D, 3.G, and 3.H"</i></p>	3-4	28	AD.5
3.4.3	<p>Changed the Section's title from:</p> <p><i>"3.4.3 Effects of Radius Curvature" to:</i></p> <p><i>"3.4.3 Effects Due to Curve Radius"</i></p>	3-4	-	AD.5



Section	Change	Page No.	Line No.	CP01 AD.#
3.4.3	<p>Changed the first paragraph from:</p> <p><i>“Widening of the structure gauge shall consider lateral clearance requirements on curves for all of the candidate rolling stock. The maximum swing out of the mid car toward the inside of the curve and end of car toward the outside of the curve is derived using the formula:”</i></p> <p>to:</p> <p><i>“Due to swing out of the car ends beyond the bogie positions and swing in of the middle of the car body, the “swept path” of the vehicle body will be wider on curves than on tangent track. Only the car body itself swings out. The lower parts of the Static Envelope and Dynamic Envelope that represent the position of the bogies do not swing out. Since the normal mounting position of pantographs is over the bogies, the swept path of the pantograph does not increase on curves. Those parts of the envelopes representing space for the catenary do not increase on curves, as the catenary is mounted on the structure, not on the vehicle. See Appendix 3.A and 3.E for the location of affected points. The widening of the static and dynamic envelopes shall consider lateral clearance requirements on curves for all of the candidate rolling stock. The lateral dimensions determined by the formula below provide for the maximum swing out of the mid car toward the inside of the curve and end of car toward the outside of the curve.”</i></p>	3-4	30 to 32	AD.5
3.4.3	<p>Changed equation from:</p> <p><i>“EO (ft) = MO (ft.) = 550 / R (ft.) – 0.25 ft.”</i></p> <p>to:</p> <p><i>“EO (ft) = MO (ft.) = 550 / R (ft.)”</i></p>	3-5	1	AD.5
3.4.3	<p>Added the following paragraph:</p> <p><i>“For large radius curves, the widening may be neglected. The limitations of and methods of applicability of widening of sections is described in the notes of the Appendixes.”</i></p>	3-5	after 5	AD.5
3.4.3	<p>Deleted the following text:</p> <p><i>“Table 3-3 is provided for example purposes.”</i></p>	3-5	6	AD.5



Section	Change	Page No.	Line No.	CP01 AD.#
3.4.3	Deleted Table 3-3: Additional Width from Centerline on Curves and its content. Changed to: "Table 3-3 Not Used"	3-5	-	AD.5
3.4.3	Deleted the following text: <i>"For curve radii under 2,200 feet, horizontal dimensions shall be increased by the value determined by the formula: <math>EO (ft) = MO (ft.) = 550 / R (ft.) - 0.25 ft.</math> These increased dimensions shall be applied to the section before rotation to determine the effects of superelevation."</i>	3-5	13 to 17	AD.5
3.4.4	Deleted the following text: <i>"Walkways – If the walkway is on the outside of superelevated curves, the offset of the walkway should be the same as on straight track except along small radius curves that require widening of the clearance section. If the walkway is on the inside of the superelevated curve, the track side of the walkway shall be located at a point not lower than 6.00 feet above the walkway surface or top of rail, whichever is higher."</i>	3-6	16 to 20	AD.5
3.4.4	Changed the last paragraph from: <i>"Widening of Section – If the curve radius is small, widening of the section as described in Section 3.5.3 shall be done before the section is rotated. The rotated section shown on Appendix 3.B shows the location of points that may define offset requirement to various facilities located close to the tracks. Refer to the table in Appendix 3.B for an example of superelevation data. For the combined condition, the values can be calculated using the various formulae given, as the offset of the various points will vary with radius."</i> to: <i>"Widening of Section – The Structure Gauge and Fixed Equipment Envelope will not require widening on large radius curves. See notes on Appendix 3.C, 3.D, 3.G, and 3.H for widening requirements."</i>	3-6	21 to 26	AD.5



Section	Change	Page No.	Line No.	CP01 AD.#																					
3.5	<p>Changed text from:</p> <p><i>“desirable” to:</i></p> <p><i>“the increase is beneficial”</i></p>	3-6	29	AD.5																					
3.5	<p>Table 3-4: Changed Table 3-4 to:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th><b>Design Speed / Condition</b></th> <th><b>Recommended (feet)</b></th> <th><b>Minimum (feet)</b></th> </tr> </thead> <tbody> <tr> <td><i>V &gt; 160 mph</i></td> <td><i>16.50</i></td> <td><i>16.50</i></td> </tr> <tr> <td><i>90 mph &lt; V ≤ 160 mph</i></td> <td><i>16.50</i></td> <td><i>16.00</i></td> </tr> <tr> <td><i>V ≤ 90 mph <sup>(1)</sup></i></td> <td><i>16.50</i></td> <td><i>15.00</i></td> </tr> <tr> <td><i>With OCS poles located between tracks</i></td> <td><i>25.00</i></td> <td><i>22.00</i></td> </tr> <tr> <td><i>Between Main Track to Station Tracks or Sidings</i></td> <td><i>25.00</i></td> <td><i>25.00</i></td> </tr> <tr> <td><i>Tracks with inter-track fences</i></td> <td><i>22.00 <sup>(2)</sup></i></td> <td><i>18.00 <sup>(2)</sup></i></td> </tr> </tbody> </table> <p>Notes:</p> <p><sup>(1)</sup> <i>For track centers in yards, see the Track Geometry chapter. For yard facility requirements, see the Support Facilities chapter.</i></p> <p><sup>(2)</sup> <i>If the walkway is adjacent to the fence, then the distance in the condition “with OCS poles located between tracks” shall be used.</i></p>	<b>Design Speed / Condition</b>	<b>Recommended (feet)</b>	<b>Minimum (feet)</b>	<i>V &gt; 160 mph</i>	<i>16.50</i>	<i>16.50</i>	<i>90 mph &lt; V ≤ 160 mph</i>	<i>16.50</i>	<i>16.00</i>	<i>V ≤ 90 mph <sup>(1)</sup></i>	<i>16.50</i>	<i>15.00</i>	<i>With OCS poles located between tracks</i>	<i>25.00</i>	<i>22.00</i>	<i>Between Main Track to Station Tracks or Sidings</i>	<i>25.00</i>	<i>25.00</i>	<i>Tracks with inter-track fences</i>	<i>22.00 <sup>(2)</sup></i>	<i>18.00 <sup>(2)</sup></i>	3-7	-	AD.5
<b>Design Speed / Condition</b>	<b>Recommended (feet)</b>	<b>Minimum (feet)</b>																							
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<i>Between Main Track to Station Tracks or Sidings</i>	<i>25.00</i>	<i>25.00</i>																							
<i>Tracks with inter-track fences</i>	<i>22.00 <sup>(2)</sup></i>	<i>18.00 <sup>(2)</sup></i>																							
3.5.1	<p>Changed text in the last sentence of the third paragraph from:</p> <p><i>“14.25 feet” to:</i></p> <p><i>“14.75 feet”</i></p>	3-7	16	AD.5																					
3.6.3	<p>Added the following sentences at the end of the first paragraph:</p> <p><i>“The positioning of the additional clearance shall be based on the result of the analysis of the potential magnitude of and direction of ground movement at the location of the fault zone crossing. The length and width of the additional clearance zone shall be such that subsequent to movement of the fault there will be sufficient space so that the required track realignment will permit operation without a permanent speed restriction.”</i></p>	3-9	2	AD.5																					

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Section	Change	Page No.	Line No.	CP01 AD.#
3.6.5	<p>Changed the first paragraph from:</p> <p><i>“Space adjacent to turnouts shall be reserved for the mounting of switch machines to move the derail. An additional width of 4 feet shall be provided on the derailing side between a point 50 feet in advance of the derail to 50 feet beyond the derail for block derails or 250 feet beyond the derail for switch point derails.”</i></p> <p>to:</p> <p><i>“Space adjacent to derails shall be reserved for the mounting of switch machines to move the derail. An additional width of 4 feet shall be provided on the derailing side between a point 50 feet in advance of the derail to 50 feet beyond the derail for block derails or 300 feet beyond the derail for switch point derails. See the Trackwork chapter for criteria determining derail types and locations.”</i></p>	3-9	13 to 16	AD.5
Appx. 3.A to 3.F	<p>Appendixes 3.A through 3.F have been superseded in its entirety by revised Appendixes 3.A through 3.H.</p> <p>Provided revised Appendixes 3.A through 3.H in Addendum No. 5, Book 3, document titled “AD.5 - B.3, Pt C.1 - Design Criteria - Chapter 3 Appendixes.pdf”</p>	-	-	AD.5



## Chapter 4 – Track Geometry

Section	Change	Page No.	Line No.	CP01 AD.#
4.4.5.2	Deleted the following text: <i>"The maximum Ea shall not exceed 7 inches."</i>	4-5	21 to 22	AD.4
4.5.1	Changed heading title from: <i>"Maximum Grades"</i> to: <i>"Grades"</i>	4-10	-	AD.3
4.5.1	Added the following paragraph: <i>"Minimum gradient through cuts, tunnels, and trenches shall be 0.25 percent."</i>	4-10	b/w 24 and 25	AD.3
4.5.2.1	Changed text from: <i>"0.60 ft/sec<sup>2</sup>"</i> to: <i>"0.90 ft/sec<sup>2</sup>"</i>	4-11	5	AD.3
4.5.2.2	Changed heading title from: <i>"Vertical Curve Lengths"</i> to: <i>"Minimum Vertical Curve Lengths"</i>	4-11	-	AD.3
4.5.2.2	Changed the first sentence from: <i>"Vertical curve lengths (LVC), in feet, on lines carrying HSTs only shall be the longer of the following:"</i> to: <i>"The minimum vertical curve lengths (Lvc), in feet, on lines carrying HSTs only shall be the longer of the following:"</i>	4-11	6	AD.3
4.5.2.2	Changed equation from: $L_{VC} = 4.5 V$ or $L_{VC} = 2.15 V^2 (\Delta\%/100) / 0.60 \text{ ft/sec}^2$ , but not less than $400 \Delta\%$ to: $L_{VC} = 3.5 V$ or $L_{VC} = 2.15 V^2 (\Delta\%/100) / 0.90 \text{ ft/sec}^2$ , but not less than $200 \Delta\%$	4-11	8	AD.3
4.5.2.2	Deleted the following text: <i>"At a design speed of 250 mph, these formulas require the Lvc to be the longer of the following: <math>L_{VC} = 1,125 \text{ feet}</math> or <math>L_{VC} = 2,250\Delta\%</math>"</i>	4-11	12 to 13	AD.3



## Chapter 5 – Trackwork

Section	Change	Page No.	Line No.	CP01 AD.#
5.3.8	<p>Changed the first paragraph from:</p> <p><i>“Track shall be non-ballasted for all tracks having design speeds above 125 mph. Track shall be non-ballasted in long tunnels and on long aerial structures, regardless of speed. “Long” for the purposes of minimum length of track type sections means a length with a run time of over 1.8 seconds at the design speed.”</i></p> <p>to:</p> <p><i>“Homogeneity in track type is recommended. Frequent changes in trackform shall be avoided. The continuous minimum length of any trackform shall not be less than the minimum length of alignment segment for a run time of 1.8 seconds at the design speed of the segment, as specified in the Track Geometry chapter.”</i></p>	5-3	16 to 19	AD.5
5.8.1.1	<p>Changed the second paragraph from:</p> <p><i>“The designer shall analyze the existing subgrade and determine whether the material is considered suitable for the subgrade. If the existing subgrade is unsuitable, it shall be removed and replaced with approved backfill and shall be compacted in accordance with the Standard Specifications.”</i></p> <p>to:</p> <p><i>“The designer shall analyze the existing subgrade and determine whether the material is considered to be compressible, soft, loose, or otherwise unsuitable to support the design dead and live loads. If the existing subgrade is compressible, soft, loose, or otherwise unsuitable as described in the Standard Specifications, then it shall be either (1) removed and replaced with approved compacted backfill or (2) stabilized with ground improvement techniques to ensure settlement criteria in the Geotechnical chapter.”</i></p>	5-12	1 to 4	AD.3



Section	Change	Page No.	Line No.	CP01 AD.#
5.9.2	<p>Deleted the last paragraph:</p> <p><i>“The elastomer layer shall be not less than 1.00 inch in thickness, with the top and bottom plates in sum also being about 1.00 inch in thickness. Therefore, the fastener thickness shall be not less than 2.00 inches in thickness measured at the center of the rail seat. The top of rail to bottom of elastomer dimension shall be designed to be no less than 9.50 inches. The elastomer compression under the maximum design axle load shall not exceed 10 percent of the total thickness of the elastomer that is subject to deformation. The nominal plinth depth shall be taken as not less than 8 inches.”</i></p>	5-14	15 to 21	AD.3



## Chapter 6 – Rolling Stock and Vehicle Intrusion Protection

Section	Change	Page No.	Line No.	CP01 AD.#
6.3.1.2	Corrected text from: <i>"65 to 102 feet"</i> to: <i>"85 to 102 feet"</i>	6-2	27	AD.3
6.3.1.2	Added the following text between <i>"pier or a wall"</i> and <i>", a 6-foot high"</i> : <i>"(with the exception of a trench wall)"</i>	6-2	34	AD.3



## Chapter 7 – Civil

Section	Change	Page No.	Line No.	CP01 AD.#
7.7.2.6	Deleted the following text in the last paragraph: "Class A"	7-9	20	AD.4
7.7.2.6	Changed text from: "Caltrans Standard Drawing" to: "Caltrans Standard Drawing and Specifications"	7-9	21	AD.4
7.10.1.1	Changed paragraph from: <i>"Generally vehicular traffic lanes which accommodate buses, trucks, taxis, cars, and motorcycles shall be 16 feet wide, and traffic lanes for vehicles which exclude motorcycles shall be 12 feet wide. The minimum width of lanes shall be in accordance with the requirements of the authority having jurisdiction."</i> to: <i>"The minimum width of vehicular traffic lanes for maintenance and protection of traffic during construction shall be in accordance with the requirements of the authority having jurisdiction over the roadway. Vehicular traffic lanes adjacent to construction activities shall be 16 feet wide, which is inclusive of sufficient width for installation of temporary concrete railing (i.e., K-rail) and required buffer next to the temporary concrete railing. All other traffic lanes for vehicles shall be 12 feet wide unless required otherwise by jurisdictional authority."</i>	7-37	20 to 23	AD.4
7.10.3	Changed text from: "kept to a minimum" to: "avoided unless otherwise approved by the authority having jurisdiction"	7-38	8	AD.4



Chapter 8 – Drainage

Section	Change	Page No.	Line No.	CP01 AD.#																													
8.3	<p>Changed the second bullet point from:</p> <p><i>“Ensure Primary HST structures/facilities (see the Seismic chapter for Primary Structure classifications) are protected against 100- and 500- year flood events.”</i></p> <p>to:</p> <p><i>“Ensure Critical HST structures/facilities are protected against 100- and 500-year flood events.”</i></p>	8-2	17 to 18	AD.5																													
8.4.3	<p>Table 8-1: Changed Table 8-1 to:</p> <table border="1" data-bbox="326 722 1075 1593"> <thead> <tr> <th>Storm Facility</th> <th>Rural</th> <th>Urban</th> </tr> </thead> <tbody> <tr> <td>Drainage facilities crossing the track (e.g., culverts)</td> <td>2% (50-yr)<sup>(1)</sup></td> <td>1% (100-yr)<sup>(1)</sup></td> </tr> <tr> <td>Drainage facilities not crossing the track (e.g., parking lots, access roads, station drainage facilities)</td> <td>10% (10-yr)<sup>(1)</sup></td> <td>2% (50-yr)<sup>(1)</sup></td> </tr> <tr> <td>Ditches/storm drainage systems adjacent to the track</td> <td>4% (25-yr)<sup>(1)</sup></td> <td>2% (50-yr)<sup>(1)</sup></td> </tr> <tr> <td>Freeways – Minor Ramps and Frontage Roads</td> <td colspan="2" rowspan="2">10% (10-yr)<sup>(2)</sup></td> </tr> <tr> <td>Conventional Highways – High volume, multilane or urban with speeds 45 mph and under</td> </tr> <tr> <td>Freeways – Through traffic lanes, branch connections, and other major ramp connections</td> <td colspan="2" rowspan="2">4% (25-yr)<sup>(2)</sup></td> </tr> <tr> <td>Conventional Highways – High volume, multilane or low volume, rural with speeds over 45 mph</td> </tr> <tr> <td>All State Highways</td> <td colspan="2">2% (50-yr)<sup>(2)</sup></td> </tr> <tr> <td>Drainage systems crossing under bridge structure and on the right-of-way</td> <td>2% (50-yr)<sup>(1)</sup></td> <td>1% (100-yr)<sup>(1)</sup></td> </tr> <tr> <td>Critical HST Structures/Facilities</td> <td>Min 0.2% (500-yr)<sup>(3)</sup></td> <td>Min 0.2% (500-yr)<sup>(3)</sup></td> </tr> </tbody> </table> <p><b>Notes:</b>  <sup>(1)</sup> Based on Standard Engineering practices employed by other railroad operators within State of California.  <sup>(2)</sup> Caltrans HDM, Table 831.3 shall be referred to for Roadway Drainage Guidelines.  <sup>(3)</sup> For Critical HST Facilities, see Section 8.6.7.</p>	Storm Facility	Rural	Urban	Drainage facilities crossing the track (e.g., culverts)	2% (50-yr) <sup>(1)</sup>	1% (100-yr) <sup>(1)</sup>	Drainage facilities not crossing the track (e.g., parking lots, access roads, station drainage facilities)	10% (10-yr) <sup>(1)</sup>	2% (50-yr) <sup>(1)</sup>	Ditches/storm drainage systems adjacent to the track	4% (25-yr) <sup>(1)</sup>	2% (50-yr) <sup>(1)</sup>	Freeways – Minor Ramps and Frontage Roads	10% (10-yr) <sup>(2)</sup>		Conventional Highways – High volume, multilane or urban with speeds 45 mph and under	Freeways – Through traffic lanes, branch connections, and other major ramp connections	4% (25-yr) <sup>(2)</sup>		Conventional Highways – High volume, multilane or low volume, rural with speeds over 45 mph	All State Highways	2% (50-yr) <sup>(2)</sup>		Drainage systems crossing under bridge structure and on the right-of-way	2% (50-yr) <sup>(1)</sup>	1% (100-yr) <sup>(1)</sup>	Critical HST Structures/Facilities	Min 0.2% (500-yr) <sup>(3)</sup>	Min 0.2% (500-yr) <sup>(3)</sup>	8-4	-	AD.5
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Section	Change	Page No.	Line No.	CP01 AD.#
8.5.3	<p>Changed the first paragraph from:</p> <p><i>“Existing drainage facilities within the corridor shall not be negatively impacted due to the proposed design. When runoff is increased, existing culverts shall be upsized to allow for increase in flow.”</i></p> <p>to:</p> <p><i>“Existing drainage facilities within the corridor shall not be negatively impacted due to the proposed design. Where a transverse undercrossing is required to convey surface runoff, flood waters, and/or existing streams across the Authority’s right-of-way, the crossing shall be provided within a culvert. When runoff is increased, existing culverts shall be upsized to allow for increase in flow.”</i></p>	8-20	25 to 27	AD.9
8.5.3.2	<p>Changed the first sentence from:</p> <p><i>“Culverts shall be placed to allow for cross-passage of flood waters and where existing streams may exist.”</i></p> <p>to:</p> <p><i>“Culverts shall be placed to allow for cross-passage of surface runoff, flood waters, and where existing streams may exist.”</i></p>	8-21	22 to 23	AD.9



Section	Change	Page No.	Line No.	CP01 AD.#
8.6.7	<p>Changed the entire section from:</p> <p><i>“8.6.7 Facilities</i>  <i>HST facility sites, such as Traction Electrification System, Automatic Train Control, vent structures, Traction Power Supply Sites, parking lots, yards, etc., shall be designed to drain so that the Finish Floor Elevation or top of slab foundation of the facility sites remain 6 inches above a 500-year flood elevation or 2 feet above 100-year flood elevation, whichever is greater. Refer to the Utilities chapter for clearance requirements of storm drain facilities with adjacent infrastructure facilities”</i></p> <p>to:</p> <p><i>“8.6.7 Critical HST Structures/Facilities</i>  <i>HST critical facility sites, such as Traction Electrification System, Automatic Train Control, vent structures, Traction Power Supply Sites, and yards shall be designed to drain so that the Finish Floor Elevation or top of slab foundation of the facility sites remain 6 inches above a 500-year flood elevation or 2 feet above 100-year flood elevation, whichever is greater.”</i></p>	8-26	11 to 16	AD.5
8.6.9.2	<p>Added the following sentence at the end of the first paragraph:</p> <p><i>“Refer to the Utilities chapter for clearance requirements of storm drain facilities with adjacent infrastructure facilities.”</i></p>	8-27	12	AD.5

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## Chapter 9 – Utilities

Section	Change	Page No.	Line No.	CP01 AD.#
9.5.4.7	<p>Added new bullet point at the end of the bullet list:</p> <p><i>“• Casings carrying fluids and gases shall be properly vented. Vent pipes shall be of sufficient diameter, but in no case less than 2 inches in diameter, projecting through the ground surface beyond the Authority’s right-of-way line. Vent pipes shall extend no less than 4 feet above the ground surface. Top of vent pipes shall be fitted with a down-turned elbow, properly screened.”</i></p>	9-11	after 36	AD. 3
9.5.5.4	<p>Changed the first paragraph from:</p> <p><i>“Underground utilities within 5 feet of a CHST pier or abutment foundation shall be relocated in accordance with utility owner’s clearance requirements. Designer shall submit a utility protection and monitoring plan for utilities within 5 feet of excavation limits to the utility owner for review and approval.”</i></p> <p>to:</p> <p><i>“Underground utilities within 5 feet of a HST pier or abutment foundation shall be relocated in accordance with the requirements of this chapter and the utility owner’s clearance requirements. Existing utilities that do not need to be relocated shall be encased in accordance with the requirements of this chapter with the following exceptions:</i></p> <ul style="list-style-type: none"> <li><i>• Where utilities are within a jurisdictional authority’s roadway or railroad’s right-of-way.</i></li> <li><i>• Casings do not need to be designed per Cooper E-80 loading requirements but are subject to site specific loading requirements.</i></li> </ul> <p><i>Access manholes to utilities shall be relocated outside Authority’s right-of-way unless such manholes are located within roadways or access roads of other jurisdictional authorities.</i></p> <p><i>Designer shall submit a utility protection and monitoring plan for utilities within the zone of influence of excavation limits to the utility owner for review and approval.”</i></p>	9-13	14 to 17	AD.6



Section	Change	Page No.	Line No.	CP01 AD.#
9.5.5	<p>Changed the following sub-bullet item from:</p> <p><i>“– Maintain 1 foot minimum vertical separation from drainage conduits”</i></p> <p>to:</p> <p><i>“– Maintain 3 feet minimum vertical separation from drainage pipes”</i></p>	9-12	20	AD.3
9.5.6.2	<p>Changed the first paragraph from:</p> <p><i>“Accessible emergency shut-off valves shall be installed within effective distances on each side of the trackway as mutually agreed to by the Designer, the Authority, and the utility owner. These valves should be marked with signs for identification. Where pipelines are provided with automatic control shut-off valve stations at locations and within distances approved by the Authority, no additional valve shall be required. Valves shall not be located within the Authority’s right-of-way.”</i></p> <p>to:</p> <p><i>“Accessible emergency shut-off valve(s) shall be installed as close to the Authority’s right-of-way as practicable and as mutually agreed to by the Designer, the Authority, and the utility owner. These valves should be marked with signs for identification. Where there are existing automatic control shut-off valve stations at locations and within distances acceptable to the Authority, additional valve may not be required. Valves shall not be located within the Authority’s right-of-way.”</i></p>	9-14	23 to 28	AD.3



## Chapter 10 – Geotechnical

Section	Change	Page No.	Line No.	CP01 AD.#
All	Provided revised Chapter 10 in Addendum No. 7, Book 3, document titled "AD.7 - B3 - Pt C.1 - Design Criteria - Ch 10 Geotechnical rev 0.1.pdf"	-	-	AD.7



## Chapter 11 – Seismic

Section	Change	Page No.	Line No.	CP01 AD.#
All	Provided revised Chapter 11 in Addendum No. 7, Book 3, document titled "AD.7 - B3 - Pt C.1 - Design Criteria - Ch 11 Seismic rev 0.1.pdf"	-	-	AD.7



## Chapter 12 – Structures

Section	Change	Page No.	Line No.	CP01 AD.#
All	Provided revised Chapter 12 in Addendum No. 7, Book 3, document titled "AD.7 - B3 - Pt C.1 - Design Criteria - Ch 12 Structures rev 0.1.pdf"	-	-	AD.7
12.8.6.14 (rev 0.1)	<p>Changed the second paragraph from:</p> <p><i>"As a guide in design, the total long-term predicted camber growth, less deflection due to full dead load, shall be less than 1/5000 of the span length for prestressed concrete aerial structures measured 10,000 days after casting concrete."</i></p> <p>to:</p> <p><i>"The total long-term predicted camber growth, less deflection due to full dead load, shall be less than 1/5000 of the span length for prestressed concrete aerial structures measured 10,000 days after casting concrete."</i></p>	12-87	22 to 24	AD.9



## Chapter 20 – Traction Power Supply System

Section	Change	Page No.	Line No.	CP01 AD.#
20.9.3	<p>In the first set of bullet points, changed the third bullet point from:</p> <p style="padding-left: 40px;"><i>“• Consider, amongst other issues, the local flood, soil, and seismic conditions at each TPF and WPC site.”</i></p> <p>to:</p> <p style="padding-left: 40px;"><i>“• Consider, amongst other issues, the local flood, soil, and seismic conditions at each TPF and WPC site. Refer to the Drainage chapter for establishing the floor height above the 100-year and 500-year flood elevations. Refer to the Seismic and Structures chapters for specific requirements.”</i></p>	20-25	7 to 8	AD.6



Chapter 21 – Overhead Contact System and Traction Power Return System

Section	Change	Page No.	Line No.	CP01 AD.#
21.14.9	<p>Changed text from:</p> <p><i>"Notwithstanding the foregoing, the required vertical clearance for new structures without OCS conductor support attachments is to be 27 feet 0 (8.23 m). The required vertical clearance at existing structures to permit installation of the OCS conductors without support attachments is 24 feet (7.32 m)."</i></p> <p>to:</p> <p><i>"For minimum vertical clearances for new and existing structures, refer to the Trackway Clearances chapter."</i></p>	21-37 / 21-38	24 to 25 / 1 to 2	AD.3
21.14.9	<p>Deleted the following text:</p> <p><i>"These clearances assume the overhead structures are no more than 160 feet wide along track. Where the overhead structure is wider than 160 feet, OCS support attachments or OCS poles under the bridge might be needed. Additional vertical clearance might be required to install OCS poles under overhead structures. Additional vertical clearance might be required to install OCS poles under overhead structures."</i></p>	21-38	2 to 5	AD.3
21.16	<p>Corrected Figure 21-12 to the following:</p>	21-46	10	AD.3

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## Chapter 22 – Grounding and Bonding Requirements

Section	Change	Page No.	Line No.	CP01 AD.#
22.1	Added the following paragraph after the first paragraph: <i>"In principle, to assure the integrity of the grounding and bonding systems and the longevity of the system components, particularly for buried or encased elements, the bonding and grounding designs shall create duplicate electrical continuity paths and provide for redundancy in jumpers and bonds."</i>	22-2	after 6	AD.4
22.3.1.4	Changed text in the second paragraph from: <i>"Where epoxy coated rebar is used, weld damage shall be repaired and the epoxy coating reinstated, including over the weld itself."</i> to: <i>"Epoxy coated rebar cannot be used as a grounding conductor. Where epoxy coated rebar is used as the only type of reinforcement, alternate grounding measures, such as connecting grounding plates directly to a series of buried ground rods or a ground grid, shall be adopted to achieve the required ground resistance of 25 ohms. Where epoxy coated rebar is used in combination with black rebar, the black rebar shall be interconnected to provide an electrically continuous path, with connection(s) to grounding plate(s), but with no connection to the epoxy bar. The required ground resistance of 25 ohms shall be achieved, if necessary by connecting the grounding plate(s) directly to buried ground electrodes."</i>	22-6	7 to 8	AD.3
22.5.2.4	Added the following sentence at the end of the paragraph: <i>"For the Grounding and Bonding requirements at the Tunnel Portals for reinforced concrete paved areas of Train Surface Evacuation and Fire Control Zone see Section 22.5.6, and for the Emergency Walkways see Section 22.5.3."</i>	22-9	23	AD.3



Section	Change	Page No.	Line No.	CP01 AD.#
22.5.3	<p>Changed text from:</p> <p><i>"Where epoxy coated rebar is used, weld damage shall be repaired and the epoxy coating reinstated, including over the weld itself."</i></p> <p>to:</p> <p><i>"Epoxy coated rebar cannot be used as a grounding conductor. Where epoxy coated rebar is used as the only type of reinforcement, alternate grounding measures, such as connecting grounding plates directly to a series of buried ground rods or a ground grid, shall be adopted to achieve the required ground resistance of 25 ohms. Where epoxy coated rebar is used in combination with black rebar, the black rebar shall be interconnected to provide an electrically continuous path, with connection(s) to grounding plate(s), but with no connection to the epoxy bar. The required ground resistance of 25 ohms shall be achieved, if necessary by connecting the grounding plate(s) directly to buried ground electrodes."</i></p>	22-10	18 to 19	AD.3
22.5.4.1	<p>Added the following text after "...finished grade at the column.":</p> <p><i>"The jumpers, both internal between rebar and grounding plates and external between grounding plates, shall be a minimum size of 4/0 AWG copper, but alternate materials, such as aluminum angle of comparable electrical capacity, may be adopted. Appropriate measures shall be adopted where dissimilar metals are interconnected."</i></p>	22-10	30	AD.4
22.5.5	<p>Changed text from:</p> <p><i>"ground"</i> to:</p> <p><i>"a grounding plate"</i></p>	22-12	7	AD.4
22.5.5	<p>Changed text from:</p> <p><i>"ground"</i> to:</p> <p><i>"grounding plate"</i></p>	22-12	11	AD.4
22.5.5	<p>Changed text from:</p> <p><i>"ground"</i> to:</p> <p><i>"grounding plate"</i></p>	22-12	16	AD.4

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Section	Change	Page No.	Line No.	CP01 AD.#
22.5.5	Changed text from: <i>"ground"</i> to: <i>"grounding plate"</i>	22-12	18	AD.4
22.5.6.1	Changed text from: <i>"a bare copper grounding conductor in a PVC conduit shall be installed"</i> to: <i>"a bare grounding conductor shall be installed"</i>	22-13	11	AD.3
22.5.6.1	Added the following text between <i>"...driven ground rods."</i> and <i>"One end of the..."</i>  <i>"The grounding conductor shall be a minimum size of 4/0 AWG copper, but alternate materials, such as aluminum of comparable electrical capacity, may be adopted. Appropriate measures shall be adopted where dissimilar metals are interconnected."</i>	22-13	15 to 16	AD.3
22.5.9	Changed text from: <i>"a bare copper grounding conductor in a PVC conduit shall be installed"</i> to: <i>"a bare grounding conductor shall be installed"</i>	22-16	2	AD.3
22.5.9	Changed text from: <i>"...more than 500 foot intervals and with the conductor extending a minimum of 50 feet"</i> to: <i>"...more than 500-foot intervals. At these connection points, the grounding conductor shall be connected to buried electrodes, driven into the ground outside the trench structure, and each grounding point shall achieve a resistance of 25 ohms or less. To satisfy this requirement, the contractor may opt to install additional grounding plates on the top of the trench walls. The grounding conductor shall be extended a minimum of 50 feet"</i>	22-16	4 to 5	AD.3



Section	Change	Page No.	Line No.	CP01 AD.#
22.5.9	Changed text from: <i>"buried in earth"</i> to: <i>"(buried in earth)"</i>	22-16	5	AD.4
22.5.9	Added the following sentence after <i>"...to driven ground rods."</i> : <i>"The grounding conductor shall be a minimum size of 4/0 AWG copper, but alternate materials, such as aluminum angle of comparable electrical capacity, may be adopted. Appropriate measures shall be adopted where dissimilar metals are interconnected."</i>	22-16	5	AD.4
22.7.2	Deleted the following text: <i>",to the static wire, or to a grounding plate as appropriate for the location"</i>	22-24	30	AD.3

