Appendix I – Design Standards Risk Assessment

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5.A.2.2 Design Standards Risk Assessment

Table 21 summarizes the non-standard features associated with all Build Alternatives. These design exceptions will require approval from Caltrans during subsequent project development phases.

Table 21: Design Standards Risk Assessment

Design Standards Risk Assessment			
Alternative	Design Standard from Highway Design Manual Tables 82.1A & 82.1B	Probability of Nonstandard Design Feature Approval (None, Low, Medium, High,)	Justification for Probability Rating
2, 4, 4 Option B	*M201.1* Table 201.1 shows the minimum standards for stopping sight distance related to design speed for motorists.	High	Vertical Stopping Sight Distance is not met at three locations on the existing I-5 mainline an is expected to be maintained with the project.
		Medium	Vertical Stopping Sight Distance is not met on the proposed new SB I-5 off-ramp to EB El Toro Rd. (Alternative 2 only)
2, 4, 4 Option B	*M202.2(1)* Based on the above emax, superelevation rates from Tables 202.2A through 202.2E shall be used with the minimum curve radii and design speed (Vd). If the superelevation rate is not a whole number, the superelevation rate may be rounded up to the next whole number. If less than standard superelevation rates are approved (see Index 82.1), Figure	Low	The standard for superelevation rate is not met on the proposed NB I-5 on-ramps.
		Low	The standard for superelevation rate is not met on the proposed new SB I-5 off-ramp to EB El Toro Rd. (Alternative 2 only)
		Low	The standard for superelevation rate is not met on the proposed new SB I-5 off-ramp to WB El Toro Rd. (Alternative 2 only)
		Low	The standard for superelevation rate is not met on the proposed new SB I-5 hook off-ramps to WB El Toro Rd. (Alternative 4, Alternative 4 Option B)

	202.2 shall be used to determine superelevation based on the curve radius and maximum comfortable speed.	Medium	The standard for superelevation rate is not met on the proposed new SB I-5 Collector Distributor System. (Alternative 4, Alternative 4 Option B)
2	*M203.1* Horizontal alignment shall provide at least the minimum stopping sight distance for the chosen design speed at all points on the highway, as given in Table 201.1 and explained in Index 201	Medium	Horizontal Stopping Sight Distance is not met on the proposed new SB I-5 off-ramp to EB El Toro Rd.
2, 4, 4 Option B	*M301.1* The minimum lane width on two-lane and multilane highways, ramps, collector-distributor roads, and other appurtenant roadways shall be 12 feet, except as follows: •For conventional State highways with posted speeds less than or equal to 40 miles per hour and AADTT (truck volume) less than 250 per lane that are in urban, city or town centers (rural main streets), the minimum lane width shall be 11 feet. The preferred lane width is 12 feet.	High	The standard lane width is not met on the existing I-5.
		High	The standard lane width is not met on the existing WB El Toro Rd.

	Where a 2-lane conventional State highway connects to a freeway within an interchange, the lane width shall be 12 feet. Where a multilane State highway connects to a freeway within an interchange, the outer most lane of the highway in each direction of travel shall be 12 feet. *M308.1* Where a multilane local facility connects to a freeway within an interchange, the outer most lane in each direction of the local facilities shall be 12 feet		
2, 4, 4 Option B	*M302.1* The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulder on highways. *M308.1* Where a local facility crosses over or under a freeway or expressway and connects to the State	High	The standard shoulder width/horizontal clearance is not met on the existing NB and SB I-5 mainline median due to existing sign posts.
		High	The standard left and right shoulder widths are not met on the existing NB and SB I-5.

	facility (such as ramp terminal intersections), the minimum design standards for the cross section of the local facility shall be at least equal to those for a conventional highway with the exception that the outside shoulder width shall match the approach roadway, but not less than 4 feet, and as shown below. If gutter pans are used, the minimum shoulder width shall be 3 feet wider than the width of the gutter pan being used. *M309.1 (3)(a)* the minimum horizontal clearance to all objects, such as bridge rails and safety-shaped concrete barriers, as well as sandfilled barrels, metal beam guardrail, etc., on all freeway and expressway facilities, including auxiliary lanes, ramps, and collector roads, shall be equal to the standard	High	The standard left shoulder width is not met on SB I-5 off-ramp to WB El Toro Rd. (Alternative 2 only)
		Medium	The standard left shoulder width is not met on the proposed new SB I-5 off-ramp to EB El Toro Rd. (Alternative 2 only)
		Low	The standard left and right shoulder width are not met on the NB I-5 on-ramp. (Alternative 2 only)
		High	The standard outside shoulder width is not met on SB I-5 hook off-ramp 2. (Alternative 4, Alternative 4 Option B)
		High	The standard left and right shoulder widths are not met on the existing El Toro Rd.

	shoulder width of the highway facility as stated in Table 302.1		
2, 4, 4 Option B	*M305.1* In areas where restrictive conditions prevail the minimum median width shall be 22 feet.	High	The existing median width of I-5 mainline is less than 22 feet, and will require exception to transition to a standard median width within the project limits.
2, 4, 4 Option B	*M504.3(3)* The minimum distance (curb return to curb return) between ramp intersections and local road intersections shall be 400 feet.	High	The existing non-standard distance between NB I-5 off-ramp and El Toro Rd/ Swartz Dr. intersection will be maintained with the project.
		High	The existing non-standard distance between NB I-5 on-ramp and El Toro Rd/ Bridger Rd intersection will be maintained with the project (Alternative 4 only)
4, 4 Option B	*M504.7* The minimum weaving length, measured as shown on Figures 504.2A and 504.2B shall be 2,000 feet in urban areas, 5,000 feet outside urban areas, and 5,000 feet between freeway-to-freeway interchanges and other interchanges.	High	The minimum weaving length is not met on the proposed new SB Collector Distributor system due to the existing constrained conditions between interchanges and right of way constraints.
2, 4, 4 Option B	*M504.8* For new construction or major reconstruction, access rights shall be acquired on the	High	Bridger Road has an intersection at El Toro Road across from the NB I-5 off-ramp and NB I-5 loop on-ramp. Access control on the opposite side of the ramps does not currently exist.

	opposite side local road from ramp terminals to preclude the construction of future driveways or local roads within the ramp intersection.	High	Paseo de Valencia has an intersection at Avenida De La Carlota across from the SB I-5 hook off-ramp and SB I-5 hook on-ramp. Access control on the opposite side of the ramps does not currently exist.
2, 4, 4 Option B	*A201.7* On freeways and expressways the decision sight distance values in Table 201.7 should be used at lane drops and at off-ramp noses to interchanges, branch connections, roadside rests, vista points, and inspection stations.	High	The existing non-standard decision sight distance at I-5/NB I-5 El Toro Rd off-ramp will remain unchanged with the project.
2, 4, 4 Option B	*A202.5(1)* A superelevation transition should be designed in accordance with the diagram and tabular data shown in Figure 202.5A to satisfy the requirements of safety, comfort and pleasing appearance.	High	Constrained conditions at ramp termini and ramp gores prevent a standard superelevation transition. At a minimum, a superelevation transition rate of 6%/100' will be used.
2, 4, 4 Option B	*A202.5 (2)* Two-thirds of the superelevation runoff should be on the tangent and one-third within the curve.	High	Constrained conditions at ramp termini and ramp gores prevent a standard superelevation transition.
4, 4 Option B	*A202.6* Superelevation of compound curves should follow the procedure as shown in Figure 202.6.	High	Constrained conditions at ramp termini and ramp gores on the proposed new SB I-5 hook on-ramps and the proposed SB Collector Distributor system prevent a

	Where feasible, the criteria in Index 202.5 should apply.		standard superelevation of compound curves.
4, 4 Option B	*A203.5* Where compound curves are necessary, the shorter radius should be at least two-thirds the longer radius when the shorter radius is 1,000 feet or less. On one-way roads, the larger radius should follow the smaller radius.	Medium	On proposed new SB I-5 Collector Distributor System, the smaller radius follows the larger radius due to constrained conditions between the I-5 and the existing properties.
2, 4, 4 Option B	*A204.4* For algebraic grade differences of 2 percent and greater, and design speeds equal to or greater than 40 miles per hour, the minimum length of vertical curve in feet should be equal to 10V, where V = design speed.	High	Existing constrained conditions at ramp termini prevent standard vertical curve length at sag curve. Will mitigate with street lighting.
2, 4, 4 Option B	*A304.1* For new construction, widening, or where slopes are otherwise being modified, embankment (fill) slopes should be 4:1 or flatter.	Medium	Existing 2:1 side slopes at several constrained locations may be maintained with the project.
2, 4, 4 Option B	*A304.1(e)* In light grading where normal slopes catch in distance less than 18 feet from the edge of the shoulder, a uniform catch point, at least 18 feet	High	The standard will not be met in various locations throughout the project limits where grading is provided.

	from the edge of the shoulder, should be used."		
2, 4, 4 Option B	*A310.2* In urban areas and in mountainous terrain, the width of the outer separation should be a minimum of 26 feet from edge of traveled way to edge of traveled way.	High	The existing non-standard width of the outer separation between SB I-5 & Avenida De La Carlota will remain with the project.
		High	The existing non-standard width of the outer separation between NB I-5 & Bridger Rd will remain with the project.
2, 4, 4 Option B	*A504.3(1)(d)* Depending on approach geometry and speed, the lane drop transition between the limit line and the 6-foot separation point should be accomplished with a taper of between 30:1 and 50:1 (longitudinal to lateral)	High	Existing non-standard lane drop transition at the existing NB I-5 loop on-ramp will be remained with the project.
		Medium	Proposed non-standard lane drop transition at SB I-5 hook on-ramps would be needed to provide sufficient storage length behind ramp meter limit line. (Alternative 4, Alternative 4 Option B)
2	*A504.3(2)(a)* Due to the operational benefits of an auxiliary lane, the merge from the metered entrance ramp to the freeway should include an auxiliary lane with a minimum length of 300 feet beyond the ramp convergence point.	High	Non-standard auxiliary lane at NB I-5 loop on-ramp and SB I-5 hook on-ramp will remain unchanged with the project.
2, 4, 4 Option B	*A504.8* Access right shall be acquired along interchange ramps to their junction with the nearest public	High	The non-standard access control from the NB I-5 off-ramp to El Toro Rd will remain unchanged with the project.

	road. At such junctions, or new construction, access control should extend 100 feet beyond the end of the curb return or ramp radius in urban areas.		

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