



5.1 CORROSION PROTECTION FOR STRUCTURAL CONCRETE ELEMENTS

5.1.1 GENERAL

This policy establishes the locations in the state that are to be considered freeze-thaw areas. It also provides requirements regarding corrosion protection for structural concrete in freeze-thaw and other corrosive environments such as marine environments.

5.1.2 POLICY

Figure 1 provides the general locations of freeze-thaw areas in California.

Table 1 provides the limits of freeze-thaw areas by route and post-mile.

Table 2 provides minimum protective measures required for freeze-thaw areas.

The contract plans shall clearly identify locations where epoxy-coated reinforcement (ECR) is to be used.

If site-specific information indicates that corrosion of reinforcement from exposure to corrosive water spray is a concern outside the “splash zone,” then the limits of ECR shall be increased accordingly.

When the pH of soil/water at the structure location is less than 3.0, or when the sulfate content exceeds 15,000 ppm, additional measures for corrosion protection shall be employed and authorized by the owner of the bridge.

When the project specific design criteria specifies a structure design life exceeding 75 years, or if the conditions encountered at the bridge site are not addressed in AASHTO-CA BDS 5.10.1, additional measures for corrosion protection shall be employed and authorized by the owner of the bridge.



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Table 1 - Freeze-thaw area limits by route and post-mile

County	Route	Post Mile Limits	County	Route	Post Mile Limits		
Alp	4, 88, 89	All	Pla	28, 49	All		
Ama	49	All		80	17.5 to 69.8		
	88	14.3 to 71.7		89, 174, 267	All		
But	70	20.5 to 48.1	Plu	36, 49, 70, 89, 147	All		
Cal	4	21.4 to 65.9	Riv	10	0.0 to 19.0		
	26	25.0 to 38.3		60	20.0 to 30.5		
	49	All		62	7.3 to 9.2		
DN	101	0.0 to 2.6; 12.5 to 22.5		74	49.0 to 84.0		
	199	15.0 to 36.4		79	31.3 to 40.5		
ED	49	All		243	All		
	50	15.0 to 80.4	SBd	2	All		
	89	All		10	34.0 to 39.2		
	193	13.0 to 27.0		15	13.0 to 32.0; 147.0 to 186.2		
Fre	168	40.0 to 65.9		18	7.0 to 73.8		
Hum	36	25.0 to 45.7		38	15.0 to 59.4		
	101	128.0 to 137.2		40	70.0 to 90.0		
	299	14.3 to 43.0		62	0.0 to 48.0		
Imp	8	0 to 3.5		138, 173, 189	All		
Iny	6, 168	All		247	0.0 to 42.0		
	395	73.0 to 129.4		330	29.5 to 44.2		
	5	0.0 to 10.0	SD	8	35.0 to 77.8		
	58	77.0 to 108.0		78	48 to 64.1		
	155	40.0 to 71.3		79	0.0 to 48.5		
	178	35.0 to 57.1	Sha	5	15.4 to 67.0		
Las	36, 44, 70, 139, 147, 299, 395	36		0.0 to 8.7			
LA	2	38.4 to 82.3		44, 89, 151	All		
	5	81.5 to 88.6		273	16.1 to 20.0		
	14	34.0 to 59.5	299	All			
Mad	41	32.0 to 45.7	Sie	49, 80, 89	All		
Mpa	41, 49	All	Sis	3, 5, 89, 96, 97, 139, 161	All		
	140	11.0 to 51.8	Teh	32	All		
Men	101	83.0 to 100.0		36	73.0 to 104.0		
Mod	139, 299, 395	All		89, 172	All		
Mno	6, 89, 108, 120, 158, 167, 168, 182, 203, 270, 395	All	Tri	3, 36, 299	All		
	Nev	20, 49, 80, 89, 174, 267	All	Tul	190	32.8 to 57.5	
		Tuo	49, 108	All	Ven	33	21.9 to 57.5
			120	8.8 to 56.5			
Yub	49	All					



Table 2 - Minimum protective measures required for freeze-thaw areas

Item	Protective Measure
Exposure factor (γ_e)	0.75
Sealing bent cap under deck expansion joint	Yes ^A
Epoxy coated reinforcement in approach slab	Yes
Polyester concrete overlay (1" minimum)	Yes ^B
Pourable joint seal allowed	No

Notes:

^AAvoid placing deck expansion joints where deck runoff might drain onto the top of bents. For bents under expansion joints, specify the application of Silane Waterproofing Treatment in accordance with Standard Special Provision 54-7. Application limits must be shown on all surfaces of the bent cap.

^BConsult with SM&I to determine the required overlay thickness

5.1.3 REFERENCES

1. Caltrans (2018), *Standard Specifications*, California Department of Transportation, Sacramento, CA.
2. AASHTO. (2017). *AASHTO LRFD Bridge Design Specifications*, 8th Edition, American Association of State Highway and Transportation Officials, Washington DC.