

# **REVISIONS TO THE SCDOT BRIDGE DESIGN MANUAL**

**(MARCH 2020)**

The *SCDOT Bridge Design Manual* is revised herein to be compliant with *AASHTO LRFD Bridge Design Specifications, 8<sup>th</sup> edition*. The changes are listed in the following tables.

**List of changes to SCDOT Bridge Design Manual**

<b>SCDOT BDM SECTION #</b>	<b>LINE # (omit if full section)</b>	<b>OLD contents (omit if all inclusive)</b>	<b>changed to</b>
12.6.1.3	1	48H:1V (2.08%)	50H:1V (2%)
12.6.1.3	3,7,12	2.08%	2.00%
12.6.1.3	8,9,10		Delete Item 1
12.6.1.6	14	bike lanes will have a cross slope of 24H:1V (4.16%).	See SCDOT Roadway Design Manual for bike lanes cross slope
12.6.1.6	15	48H:1V (2.08%).	50H:1V (2%)
Figure 12.6.3 - 12.6.7		48H:1V	50H:1V
14.3	1,3	LRFD Article 5.7.3.5	LRFD Article 5.6.3.4
15.1.2	1	LRFD Article 5.7	LRFD Article 5.6
15.1.2	3	LRFD Article 5.7.2.2	LRFD Article 5.6.2.2
15.1.2	4	LRFD Article 5.7.3.2.5	LRFD Article 5.6.3.2.5
15.1.2	5	LRFD Article 5.7.3.2.1	LRFD Article 5.6.3.2.1
15.1.3.1			Delete entire Section (Referenced Article Deleted from AASHTO)
15.1.3.2	1	LRFD Article 5.7.3.3.2	LRFD Article 5.6.3.3
15.1.3.2	5	LRFD Equation 5.7.3.3.2-1	LRFD Equation 5.6.3.3-1
15.1.4	1	LRFD Article 5.8	LRFD Article 5.7
15.1.4	11	LRFD Article 5.6.3	LRFD Article 5.8.2
15.1.4	12	LRFD Article 5.13.2	Delete Reference (Referenced Article Deleted from AASHTO)
15.1.4	13	LRFD Article 5.8.3	LRFD Article 5.7.3
15.1.4	16	LRFD Equation 5.8.3.3-1	LRFD Equation 5.7.3.3-1
15.1.4	17	LRFD Equation 5.8.3.3-2	LRFD Equation 5.7.3.3-2
15.1.4	19	LRFD Equation 5.8.3.3-2	LRFD Equation 5.7.3.3-2
15.1.4	22	LRFD Equation 5.8.3.3-3	LRFD Equation 5.7.3.3-3
15.1.4	24	LRFD Equation 5.8.3.3-4	LRFD Equation 5.7.3.3-4
15.1.4	32	LRFD Article 5.8.3.4.2	LRFD Article 5.7.3.4.2
15.1.4	33	LRFD Article 5.8.2.5	LRFD Article 5.7.2.5
15.1.4	34	LRFD Table 5.8.3.4.2-1	LRFD Equation 5.7.3.4.2-1
15.1.4	35	LRFD Table 5.8.3.4.2-2	LRFD Equation 5.7.3.4.2-2
15.1.4	36	LRFD Article 5.8.3.4.1	LRFD Article 5.7.3.4.1
15.1.4	39	LRFD Equation 5.8.2.4-1	LRFD Equation 5.7.2.3-1
15.1.4	41	LRFD Equation 5.8.2.5-1	LRFD Equation 5.7.2.5-1
15.1.4	44	LRFD Article 5.8.3.2	LRFD Article 5.7.3.2
15.1.4	46	LRFD Article 5.8.3.5	LRFD Article 5.7.3.5

**List of changes to SCDOT Bridge Design Manual ( continued)**

15.1.4	50	LRFD Article 5.8.2	LRFD Article 5.7.2
15.1.4	50	LRFD Article 5.8.3.6	LRFD Article 5.7.3.6
15.1.5	1	LRFD Article 5.6.3	LRFD Article 5.8.2
15.1.7	1, 3	LRFD Article 5.7.3.4	LRFD Article 5.6.7
15.3.1.2	1	LRFD Article 5.12.3	LRFD Article 5.10.1
15.3.1.5	14, 15		Add the following sentence to the end of the paragraph: “Steel studs, stirrups or diaphragm reinforcement extended into the decks are not considered as deck reinforcement.”,
15.3.1.6.1			See Bridge Design Memo DM0320*
15.3.1.6.3			See Bridge Design Memo DM0320*
Figure 15.3-4			See Bridge Design Memo DM0320*
Figure 15.3-5			See Bridge Design Memo DM0320*
Figure 15.3-6			See Bridge Design Memo DM0320*
15.3.1.7			See Bridge Design Memo DM0320*
15.3.1.7.1	4	Mechanical	Ultimate mechanical
15.3.1.7.2			See Bridge Design Memo DM0320*
15.3.1.7.4			See Bridge Design Memo DM0320*
15.3.1.7.6			See Bridge Design Memo DM0320*
15.3.1.8	1	LRFD Articles 5.11.2.3 and 5.11.5.2.1	LRFD Articles 5.10.8.2.3 and 5.10.8.4.2a
15.4.1	1	LRFD Article 5.14.4	LRFD Article 5.12.2
15.4.1.4	1	LRFD Articles 5.7.3.3.2, 5.10.8, and 5.14.4.1	LRFD Articles 5.6.3.3, 5.10.6, and 5.12.2.1
15.4.1.4	4	LRFD Articles 5.7.3.3.2 and 5.10.8	LRFD Articles 5.6.3.3 and 5.10.6
15.4.1.4	7	LRFD Article 5.14.4.1	LRFD Article 5.12.2.1
15.4.1.4	10	LRFD Equation 5.14.4.1-1	LRFD Equation 5.12.2.1-1
15.4.2	1	LRFD Article 5.7.3.6.2	LRFD Article 5.6.3.5.2
15.4.4	1	LRFD Article 5.14.4.1	LRFD Article 5.12.2.1
15.4.5	1	LRFD Articles 5.6.2 and 5.10.8	LRFD Articles 5.5.1.1 and 5.10.6
Figure 15.4-1			Delete 3 <sup>rd</sup> Line in Table
15.4.6	8	LRFD Article 5.11.1.2	LRFD Article 5.10.8.1.2
15.4.9	1	LRFD Article 5.14.4.1	LRFD Article 5.12.2.1
15.4.11	1,2	LRFD Article 5.11.1.2	LRFD Article 5.10.8.1.2
15.4.11	4	LRFD Article 5.11.1.2.3	LRFD Article 5.10.8.1.2c

\*Refer to “Revisions to the SCDOT Bridge Design Manual (Reinforcing).pdf”

**List of changes to SCDOT Bridge Design Manual ( continued)**

15.5.3.1	1,3	LRFD Article 5.9.4	LRFD Article 5.9.2.3
15.5.3.3	17	LRFD Article 5.9.4	LRFD Article 5.9.2.3
15.5.3.4	1	LRFD Article 5.9.5	LRFD Article 5.9.3
15.5.3.5	1	LRFD Article 5.11.4	LRFD Article 5.9.4.3
15.5.3.5	10	LRFD Equation 5.11.4.2-1	LRFD Equation 5.9.4.3.2-1
15.5.3.5	13	LRFD Article 5.11.4.3	LRFD Article 5.9.4.3.3
15.5.6.4	1	LRFD Article 5.8.4	LRFD Article 5.7.4
15.5.6.4	2-10		Delete the Section and use referenced LRFD Article above
15.5.7	1	LRFD Article 5.13.2.2	LRFD Article 5.12.4
16.2.1.3.5	3	ASTM A325	ASTM F3125 (for Grade A325)
16.2.1.5	2	LRFD Table 6.6.2-1	LRFD Table 6.6.2.1-2
16.2.2	3	A325 (Type 1)	ASTM F3125, Grade A325 (Type 1)
16.2.2	4	A325 (Type 3)	ASTM F3125, Grade A325 (Type 3)
16.4.1.2	5,20	LRFD Equation 6.6.1.2.5-2	LRFD Equation 6.6.1.2.5-3
16.4.1.2	7-10		Delete definition of "n" and use value defined in AASHTO LRFD Article 6.6.1.2.5.
16.4.1.3	54,57	LRFD Equation 6.6.1.2.5-2	LRFD Equation 6.6.1.2.5-3
16.7.1	3,4	A325 (Type 3)	ASTM F3125, Grade A325 (Type 3)
16.7.1	4	A325 (Type 1)	ASTM F3125, Grade A325 (Type 1)
17.1.2	1,3	LRFD Article 5.12	LRFD Article 5.14
17.4.2	14, 15	For flat slabs and cored slabs, the bottom reinforcing steel that is parallel to the roadway shall be #7 bars at 6 in on center.	For flat slabs and cored slabs, the bottom reinforcing steel that is parallel to the roadway shall be #9 bars at 6 in on center.
17.4.2	19, 20	All approach slabs shall be doweled to the end bent or pavement rest with #6 bars at 12 in on center.	All approach slabs shall be doweled to the end bent or pavement rest with #6 bars minimum at 12 in on center.
17.5.1	7	LRFD Article 5.8.4	LRFD Article 5.7.4
19.2.4	1	LRFD Articles 10.7.1.10, 10.7.1.11, and 10.7.1.12	SCDOT Geotechnical Design Manual
19.2.4	4-9	Piles shall be a minimum of 10 ft in length. At end bents, if the depth to suitable rock strata is less than 10 ft, typical practice is to drive the piles in holes cored in the rock and backfill with Class 4000 DS Concrete. A minimum core depth of 5 ft into scour-resistant rock is recommended. The minimum tip elevation shall reflect the elevation where the required ultimate pile capacity can be obtained, the penetration required to resist lateral pile loads, and the penetration of any overlying unsuitable soil strata, as specified in LRFD Article 10.7.1.11.	Piles shall be a minimum of 10 ft in length. At end bents, if the depth to suitable rock strata is less than 10 ft, typical practice is to drive or place the piles in holes cored in the rock and backfilled with Class 4000 DS Concrete. A minimum core depth of 5 ft into scour-resistant rock is recommended. The minimum tip elevation shall reflect the elevation where the required ultimate pile capacity can be obtained, the penetration required to resist lateral pile loads, and the penetration of any overlying unsuitable soil strata, as specified in the SCDOT Geotechnical Design Manual.

List of changes to SCDOT Bridge Design Manual ( continued)			
19.2.6.2	1	LRFD Article 10.7.1.5	LRFD Article 10.7.1.2
19.2.6.7	1,2	Minimum spacing requirements are not related to group effect. Group effects are specified in LRFD Articles 10.7.3.7.3 and 10.7.3.10.	Reference: SCDOT Geotechnical Design Manual
19.2.6.10	1	LRFD Article 10.7.1.13	SCDOT Geotechnical Design Manual
19.2.6.11	1	LRFD Article 10.7.1.14	SCDOT Geotechnical Design Manual
19.3.2	1-4	The LRFD Specifications provides procedures to estimate the axial resistance of drilled shafts in cohesive soils and cohesionless soils in LRFD Articles 10.8.3.3 and 10.8.3.4, respectively. In both cases, the resistance is the sum of the shaft and tip resistances. LRFD Article 10.8.3.5 discusses the determination of axial resistance of drilled shafts in rock.	Reference: SCDOT Geotechnical Design Manual
19.3.3	10	LRFD Article 5.7.4.4	LRFD Article 5.6.4.4
19.3.3	10-12	If the drilled shaft is extended above ground to form an interior bent or part of a bent, it should be analyzed and designed as a column.	If a drilled shaft is extended above ground, above the scour line, or through liquefiable soil, structurally design the shaft as a column and detail the longitudinal reinforcing steel with a maximum spacing of 8 inches center-to-center. For oversized drilled shafts, if analysis indicates potential hinging zone below ground, appropriate detailing shall be provided.
19.5.4	1	LRFD Articles 5.8.3, 5.13.3.6, and 5.13.3.8	LRFD Articles 5.7.3, 5.12.8.6, and 5.12.8.8
19.5.6.1	1	LRFD Article 10.6.3.1.5	SCDOT Geotechnical Design Manual
19.5.6.2	1	LRFD Article 10.6.3.2.5	SCDOT Geotechnical Design Manual
19.5.7	1	LRFD Article 10.6.3.3	SCDOT Geotechnical Design Manual
19.5.8	1	LRFD Articles 3.12.6, 10.6.2.2, and 10.7.2.3	LRFD Article 3.12.6, 10.6.2.4, and SCDOT Geotechnical Design Manual
19.5.9	1	LRFD Articles 5.10.8 and 5.13.3	LRFD Articles 5.10.6 and 5.12.8
19.5.9	12,20	LRFD Article 5.13.3	LRFD Article 5.12.8
19.5.9	18	LRFD Article 5.8.3.4	LRFD Article 5.7.3.4
Figure 19.5-2	note	LRFD Article 10.6.3.1.5	LRFD Article 10.6.1.3
20.1.8	1	LRFD Article 5.6.3	LRFD Article 5.8.2

**List of changes to SCDOT Bridge Design Manual ( continued)**

20.3.4	8	LRFD Article 5.6.3	LRFD Article 5.8.2
20.3.5	10	LRFD Article 5.7.4.3	LRFD Article 5.6.4.3
20.3.7	1	LRFD Article 5.7.4	LRFD Article 5.6.4
20.3.7	4	LRFD Article 5.7.4.3	LRFD Article 5.6.4.3
20.3.7	6	LRFD Article 5.7.4.1	LRFD Article 5.6.4.1
21.1.1.2	2	$\Delta T = \alpha L (T_{MaxDesign} - T_{MinDesign})$ LRFD Equation 3.12.2.3-1	$\Delta T = 1.2\alpha L (T_{MaxDesign} - T_{MinDesign})$ modified LRFD Equation 3.12.2.3-1 Where, 1.2 is the load factor.
21.1.1.12			Delete Examples 21.1-1 and 21.1-2
21.2.1.3	3	$\Delta T = \alpha L (T_{MaxDesign} - T_{MinDesign})$ LRFD Equation 3.12.2.3-1	$\Delta T = 1.2\alpha L (T_{MaxDesign} - T_{MinDesign})$ modified LRFD Equation 3.12.2.3-1 Where, 1.2 is the load factor.
21.2.1.8	5, 6	For beveled bearing plates, maintain a minimum of 1 in thickness at the edge of the bearing plate.	For beveled bearing plates, use a minimum thickness of 1 ½ inches at the centerline of bearing while maintaining 1 inch minimum at the low side of the bevel.
21.2.3	21, 22	The designer shall check the bearing against horizontal walking in accordance with LRFD Article 14.7.6.4	The designer shall check the bearing against horizontal walking.
DM 0108	21	LRFD Article 5.14.1.4.9	LRFD Article 5.12.3.3.9
DM 0108	26-27	The requirements of LRFD Articles 5.14.1.4.6, 5.14.1.4.7, and 5.14.1.4.8 shall apply.	The requirements of LRFD Articles 5.12.3.3.6, 5.12.3.3.7, and 5.12.3.3.8 shall apply.
DM 0108	35,42	LRFD Article 5.9.4	LRFD Article 5.9.2.3