Bridge Design Details 13.1 September 2025

Reinforcement

The details and guidelines in this chapter are based on Section 5, Concrete Structures of AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017 with California Amendments. The information provided is for ASTM A706 Grade 60 reinforcement with a nominal yield strength (f_y) of 60.0 kips per square inch.

Bar Size Designation	Nominal Diameter (d_b) (in.)	*Deformation Diameter (in.)	Area (Sq in.)	Weight (Lb/Ft)
#3	0.375	0.44	0.11	0.376
#4	0.500	0.56	0.20	0.668
#5	0.625	0.69	0.31	1.043
#6	0.750	0.88	0.44	1.502
#7	0.875	1.00	0.60	2.044
#8	1.000	1.13	0.79	2.670
#9	1.128	1.25	1.00	3.400
#10	1.270	1.44	1.27	4.303
#11	1.410	1.63	1.56	5.313
#14	1.693	1.88	2.25	7.650
#18	2.257	2.50	4.00	13.600

***Use deformation diameter when calculating clearances.**

Table 13.1.1 ASTM Standard Reinforcing Bar Data

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Hooks and Bends

The following figures and tables show the minimum requirements for hooked and bent reinforcing bars. The dimensions of standard hooks and standard bends need not be shown in the structure plans. Dimensions follow Standard Specification 52-1.03C and ACI Building Code requirements.

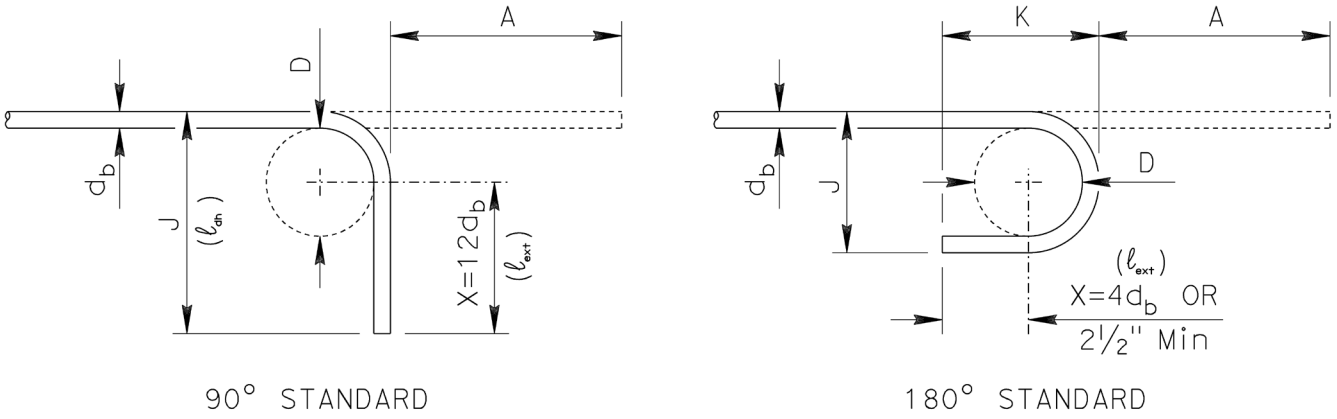

Figure 13.2.1 Hook and Bend Details for Primary Reinforcement

Bar Size #	D	90° STANDARD			180° STANDARD			
		X	J	A	X	J	K	A
3	2 ¼"	4 ½"	6"	5"	2 ½"	3"	4"	5"
4	3"	6"	8"	6 ¾"	2 ½"	4"	4 ½"	6"
5	3 ¾"	7 ½"	10"	8 ½"	2 ½"	5"	5"	6 ¾"
6	4 ½"	9"	1' - 0"	10"	3"	6"	6"	8 ¼"
7	5 ¼"	10 ½"	1' - 2"	11 ¾"	3 ½"	7"	7"	9 ½"
8	6"	1' – 0"	1' - 4"	1' - 1 ½"	4"	8"	8"	11"
9	9"	1' - 1 ½"	1' - 7 ¼"	1' - 3 ¾"	4 ½"	11 ¼"	10 ¼"	1' - 2 ¾"
10	10 ¼"	1' - 3 ¼"	1' - 9 ½"	1' - 5 ¾"	5"	1' - 0 ¾"	11 ½"	1' - 4 ¾"
11	11 ¼"	1' - 5"	2' - 0"	1' - 7 ¾"	5 ¾"	1' - 2"	1' - 0 ¾"	1' - 6 ½"
14	1' - 5"	1' - 8 ¼"	2' - 6 ½"	2' - 0 ¾"	6 ¾"	1' - 8 ¼"	1' - 5"	2' - 1 ¾"
18	1' - 10 ½"	2' - 3"	3' - 4 ¾"	2' - 9"	9"	2' - 3"	1' - 10 ½"	2' - 10 ½"

Notes:

1. The values shown in the table are rounded to the nearest ¼ inch.
2. The "A" dimensions are provided to simplify the calculation of rebar quantities.

Table 13.2.1 Hook and Bend Dimensions for Primary Reinforcement

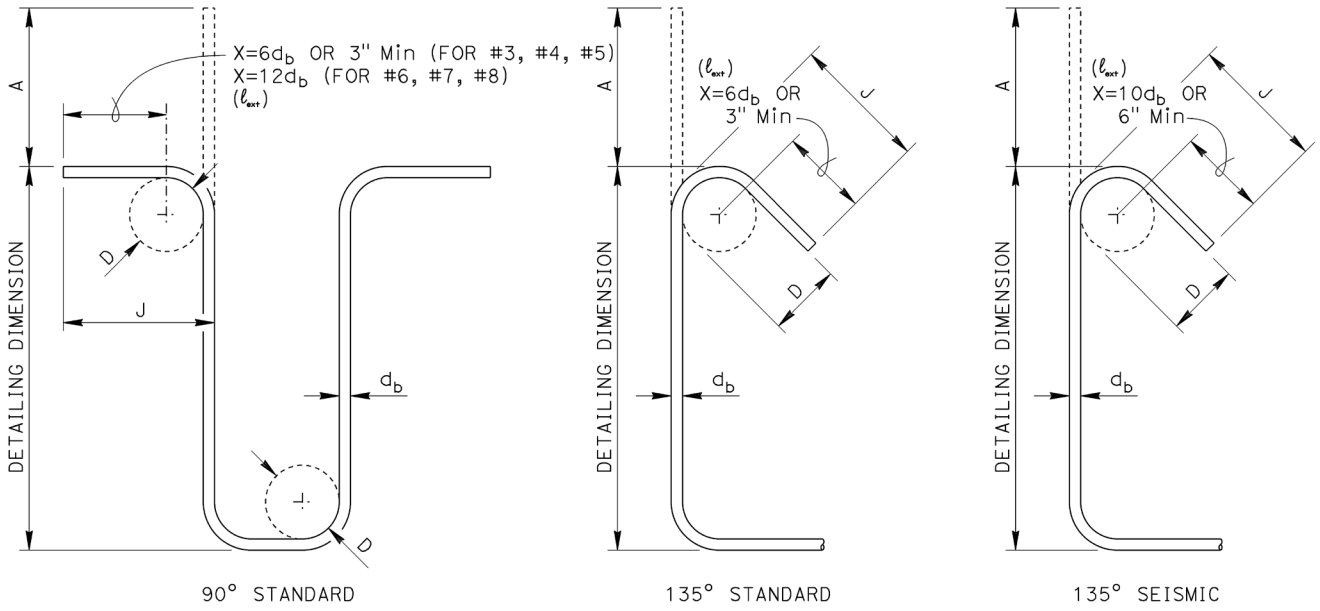

Figure 13.2.2 Hook and Bend Details for Stirrups and Ties

Bar Size #	D	90° STANDARD			135° STANDARD			135° SEISMIC		
		X	J	A	X	J	A	*X	J	A
3	1 ½"	3"	3 ½"	2 ½"	3"	4 ¼"	4"	6"	7 ¼"	7"
4	2"	3"	4 ½"	3 ½"	3"	4 ½"	4 ½"	6"	7 ½"	7 ½"
5	2 ½"	3 ¾"	5 ¾"	4 ¼"	3 ¾"	5 ¾"	5 ½"	6 ¼"	8 ¼"	8"
6	4 ½"	9"	1' - 0"	10"	4 ½"	7 ½"	7 ¾"	7 ½"	10 ½"	10 ¾"
7	5 ¼"	10 ½"	1' - 2"	11 ¾"	5 ¼"	8 ¾"	9"	8 ¾"	1' - 0 ¼"	1' - 0 ½"
8	6"	1' - 0"	1' - 4"	1' - 1 ½"	6"	10"	10 ¼"	10"	1' - 2"	1' - 2 ¼"

Notes:

1. The values shown in the table are rounded to the nearest ¼ inch.
2. The "A" dimensions are provided to simplify the calculation of rebar quantities.
3. For 180-degree hook and bend details for standard ties, refer to Table 13.2.1.

* The "X" dimensions shown for 135° seismic hooks exceed the requirements in AASHTO and are based on recommendations from the Reinforced Concrete Committee. The hook lengths for 135° seismic hooks must be shown in the structure plans because they are longer than the hook lengths for 135° standard hooks.

Table 13.2.2 Hook and Bend Dimensions for Stirrups and Ties