
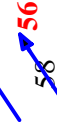








$$\phi A_s f_s d = 0.75 \times 0.22 \times 60 \times 16 = 158.4$$

Eq 11-5

Eq 11-3

distance x (ft)	M _u (64-3x)x-150 (k-ft)	V _u -6x+64 (**) (kips)	$\frac{ V_u d }{M_u} \leq 1$	ϕV_c (*)	V _u - ϕV_c (kips)	$s = \frac{158.4}{V_u - \phi V_c}$ (in)	V _u - ϕV_c (kips)	$s = \frac{158.4}{V_u - \phi V_c}$ (in)
0	-150	64 	0.500	20.53	35.47	4.47	37.33	4.24
1	-89	58 	0.839	22.45	33.55	4.72	37.33	4.24
d=16"=1.33'	-70	56 	1.067 	23.36	32.64	4.85	37.33	4.24
2	-34	52 	1.0 	23.36	28.64	5.53	33.33	4.75
3	15	46 	1.0 	23.36	22.64	7.00	27.33	5.80
4	58	40	0.920	22.91	17.09	9.27	21.33	7.43
5	95	34	0.477	20.42	13.58	11.66	15.33	10.33
6	126	28	0.296	19.40	8.60	18.42	9.33	16.97
7	151	22	0.194	18.83	3.17	49.92	3.33	47.53
8	170	16	0.125	18.44	-	-	-	-
9	183	10	0.073	18.14	-	-	-	-

(*)

$$\phi V_c = \phi \left(1.9 \sqrt{f'_c} + 2500 \rho_w \frac{V_u d}{M_u} \right) b_w d = 0.75 \times (1.9 \sqrt{5000} + 2500 \times 0.01705 \times \frac{V_u d}{M_u}) \times 11 \times 16 \leq 3.5 \phi \sqrt{f'_c} b_w d \text{ Eq. 11-5}$$

$$\leq 0.75 \times 3.5 \sqrt{5000} \times 11 \times 16$$

$$\rho_w = \frac{A_s}{b_w d} = \frac{3}{16 \times 11} = 0.01705$$

(**)

$$17.734 + 5.627 \frac{V_u d}{M_u} \leq 32.67$$

According to Sect. 11.1.3.1 of ACI

$$V_u(x < d) = V_u(x = d) \rightarrow V_u(x < d = 16 \text{ inches}) = V_u(x = 16 \text{ inches or } x = 16/12 \text{ ft}) = -6 \times \left(\frac{16}{12}\right) + 64 = 56 \text{ kips}$$