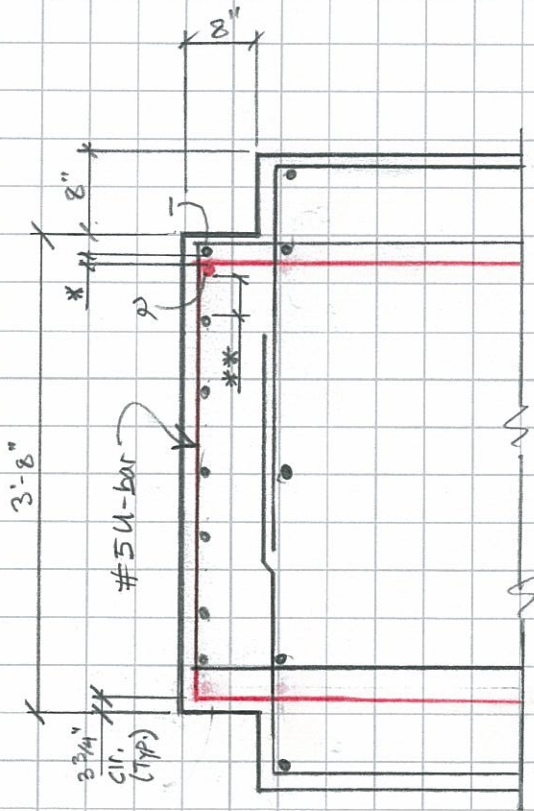


Problem : #11 footing dowel mislocated such that there is insufficient clearance to the #5 U bar.

Solution : Cut #11 bar and drill & epoxy new bar of same size next to former. See detail below.

The minimum column design ratio without this bar is $1.4e > 1.0$. Conservatively anchor new dowel bar into footing with epoxy adhesive.



- Cut bars @ 1 (#11)
- Drill and dowel new #11 bars at 2
- shift U-bar to achieve 3 3/4" clear at each end of 8" reveal
- Adjust lapped column bars as required to accommodate shift of U-bar.

Embedment

Assume HILTI HIT-RE 500 Epoxy Adhesive Anchoring System

Embedment depth to develop 125% of yield strength of #11 bar

$$l_e = 9 \frac{1}{2}'' (1.25) = 11.875$$

Say 12"

Part Section @ Pier 3 Column

- * 1" clear between 1 & 2. (Min.)
- ** 2 1/8" clear (Min.)

4.2.7 HIT-RE 500 Epoxy Adhesive Anchoring System

HIT-RE 500 Ultimate Bond Strength and Steel Strength for Rebar in Concrete¹

Nominal Rebar Size	Embed. Depth in. (mm)	Concrete Compressive Strength						Grade 60 Rebar	
		$f'_c = 2000 \text{ psi (13.8 MPa)}$			$f'_c = 4000 \text{ psi (27.6 MPa)}$				
		Ultimate Bond Strength lb (kN)	Embed. to Develop Yield Strength ¹ in. (mm)	Embed. to Develop Tensile Strength ¹ in. (mm)	Ultimate Bond Strength lb (kN)	Embed. to Develop Yield Strength ¹ in. (mm)	Embed. to Develop Tensile Strength ¹ in. (mm)	Yield Strength lb (kN)	Tensile Strength lb (kN)
#3	3-3/8 (86)	10105 (45.0)	2-1/4 (57)	3-3/8 (86)	10810 (48.1)	2-1/8 (54)	3-1/4 (84)	6600 (29.4)	9900 (44.0)
	4-1/2 (114)	10920 (48.6)			10810 (48.1)				
#4	4-1/2 (114)	15980 (71.1)	3-3/8 (86)	5-5/8 (143)	18540 (82.5)	3 (76)	4-3/8 (111)	12000 (53.4)	18000 (80.1)
	6 (152)	18830 (83.8)			18655 (83.0)				
#5	5-5/8 (143)	20630 (91.8)	5-1/8 (130)	8-7/8 (225)	27790 (123.6)	3-7/8 (98)	5-3/4 (146)	18600 (82.7)	27900 (124.1)
	7-1/2 (191)	24870 (110.6)			31155 (138.6)				
#6	6-3/4 (171)	33695 (149.9)	5-3/8 (136)	9-3/8 (238)	44675 (198.7)	4 (102)	6 (152)	26400 (117.4)	39600 (176.2)
	9 (229)	38960 (173.3)			44870 (200.0)				
#7	7-7/8 (200)	40525 (180.3)	7 (178)	12-3/8 (314)	59340 (264.0)	4-7/8 (124)	7-1/4 (184)	36000 (160.1)	54000 (240.2)
	10-1/2 (267)	48460 (215.6)			61720 (274.6)				
#8	9 (229)	63940 (284.4)	8-1/4 (210)	12-7/8 (327)	72820 (323.9)	5-7/8 (149)	8-7/8 (225)	47400 (210.9)	71100 (316.3)
	12 (305)	69610 (309.7)			72950 (324.5)				
#9	10-1/8 (257)	72245 (321.4)	8-1/2 (216)	13 (330)	81235 (361.4)	7-1/2 (191)	12 (305)	60000 (266.9)	90000 (400.4)
	13-1/2 (343)	94205 (419.1)			104060 (462.9)				
#10	11-1/4 (286)	92000 (409.3)	9-3/8 (238)	17-7/8 (454)	96725 (430.3)	8-7/8 (225)	14 (356)	76200 (339.0)	114300 (508.5)
	15 (381)	95850 (426.4)			97070 (431.8)				
#11	12-3/8 (314)	118615 (527.6)	9-7/8 (251)	18-3/4 (476)	123120 (547.7)	9-1/2 (241)	16-1/2 (419)	93600 (416.4)	140400 (624.6)
	16-1/2 (419)	123570 (549.7)			161675 (719.2)				

¹ Based on comparison of average ultimate adhesive bond test values versus minimum yield and ultimate tensile strength of rebar. For more information, contact Hilti.