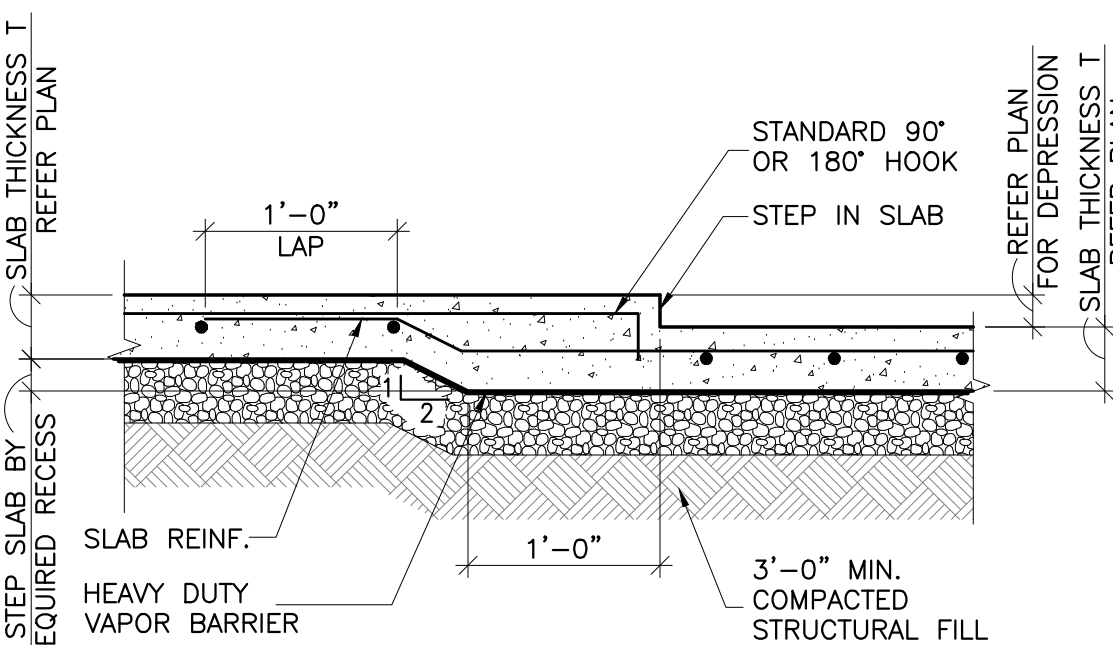
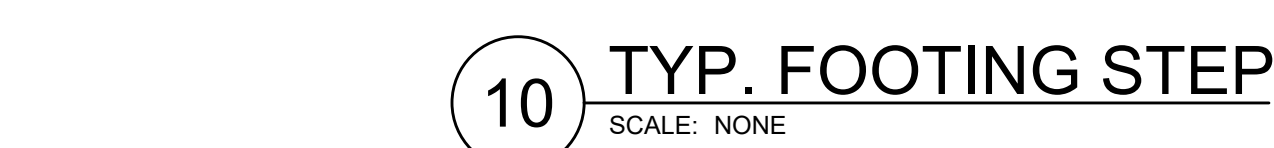
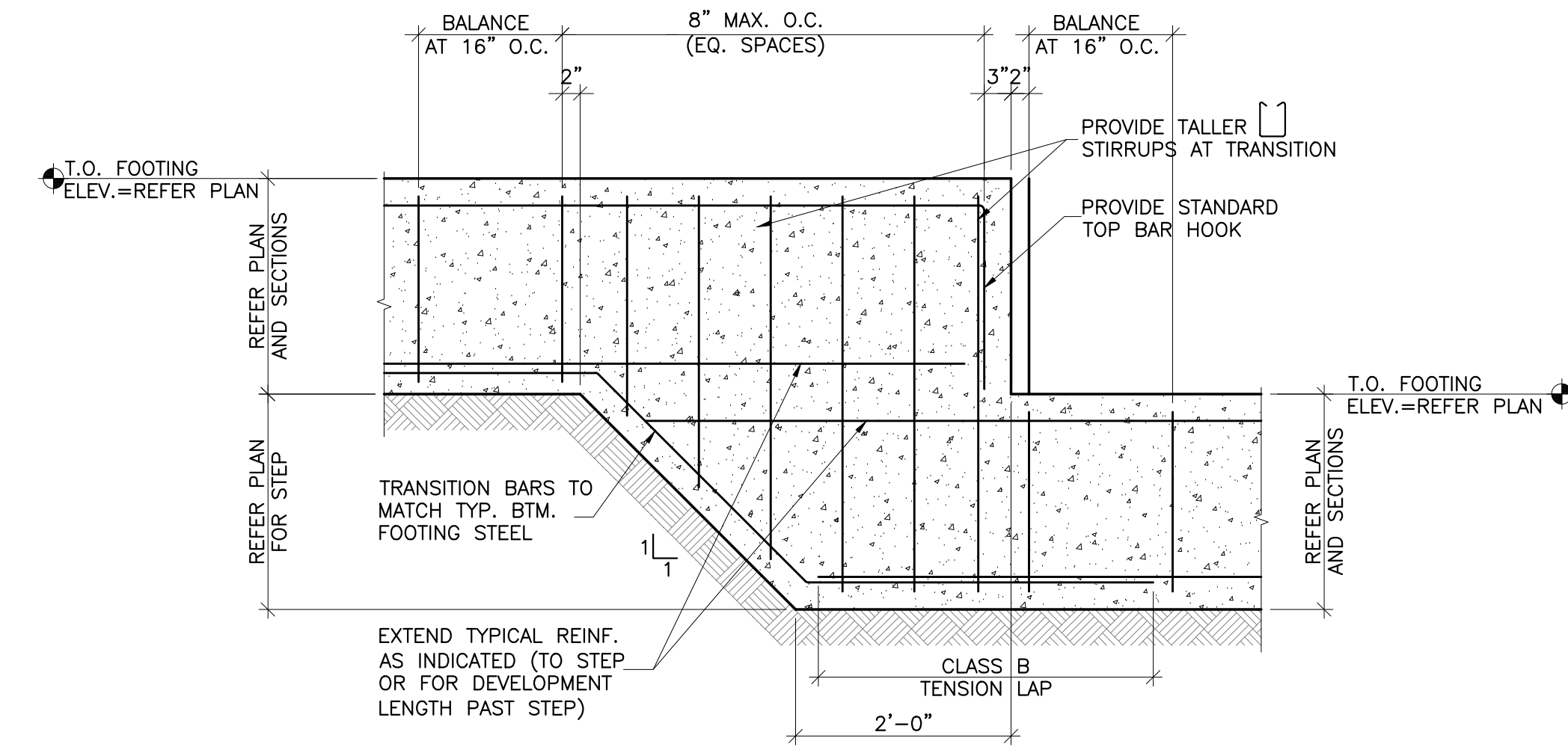
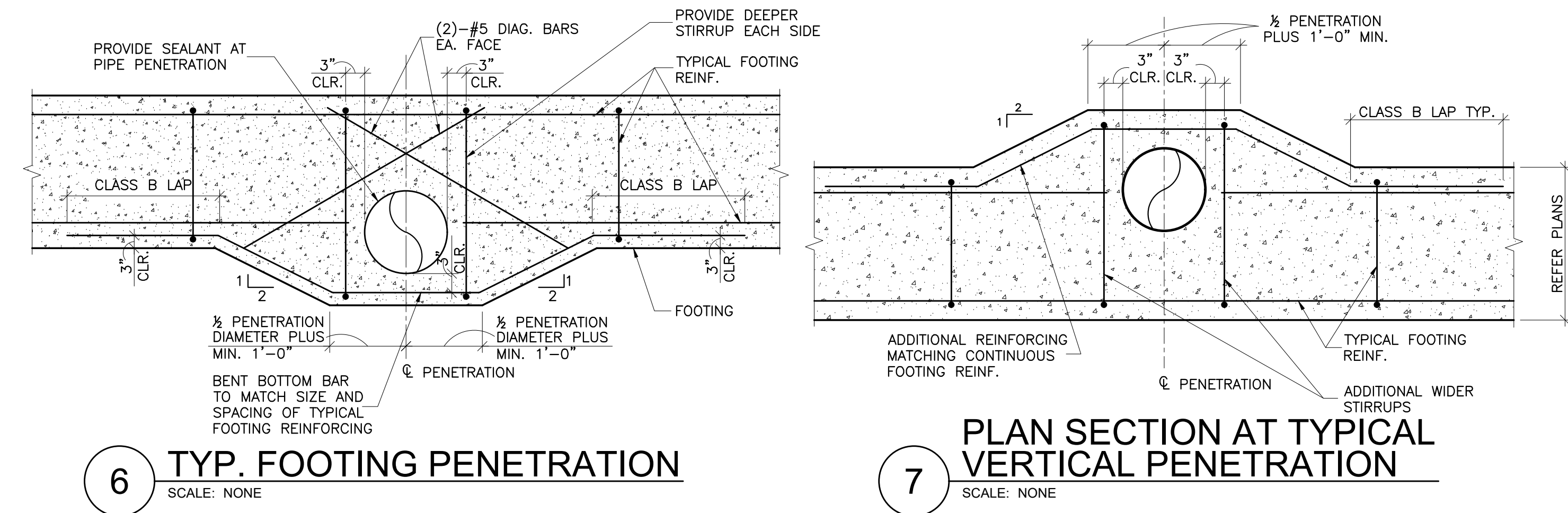
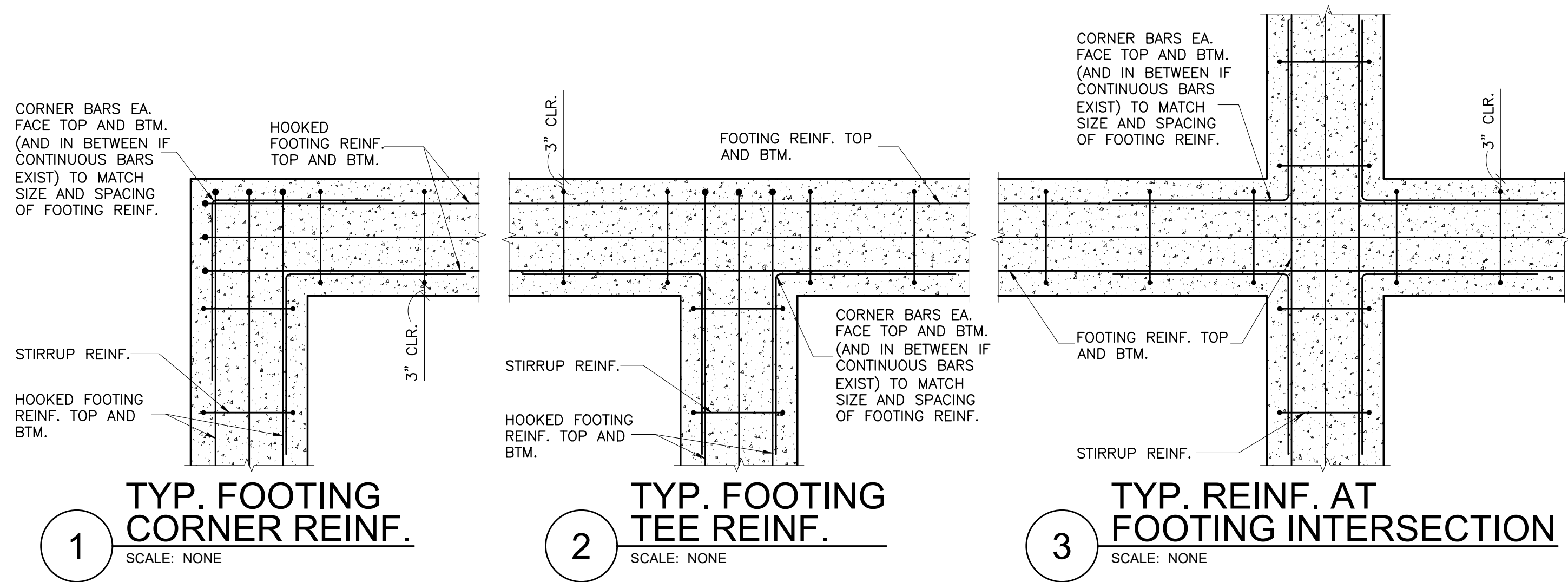
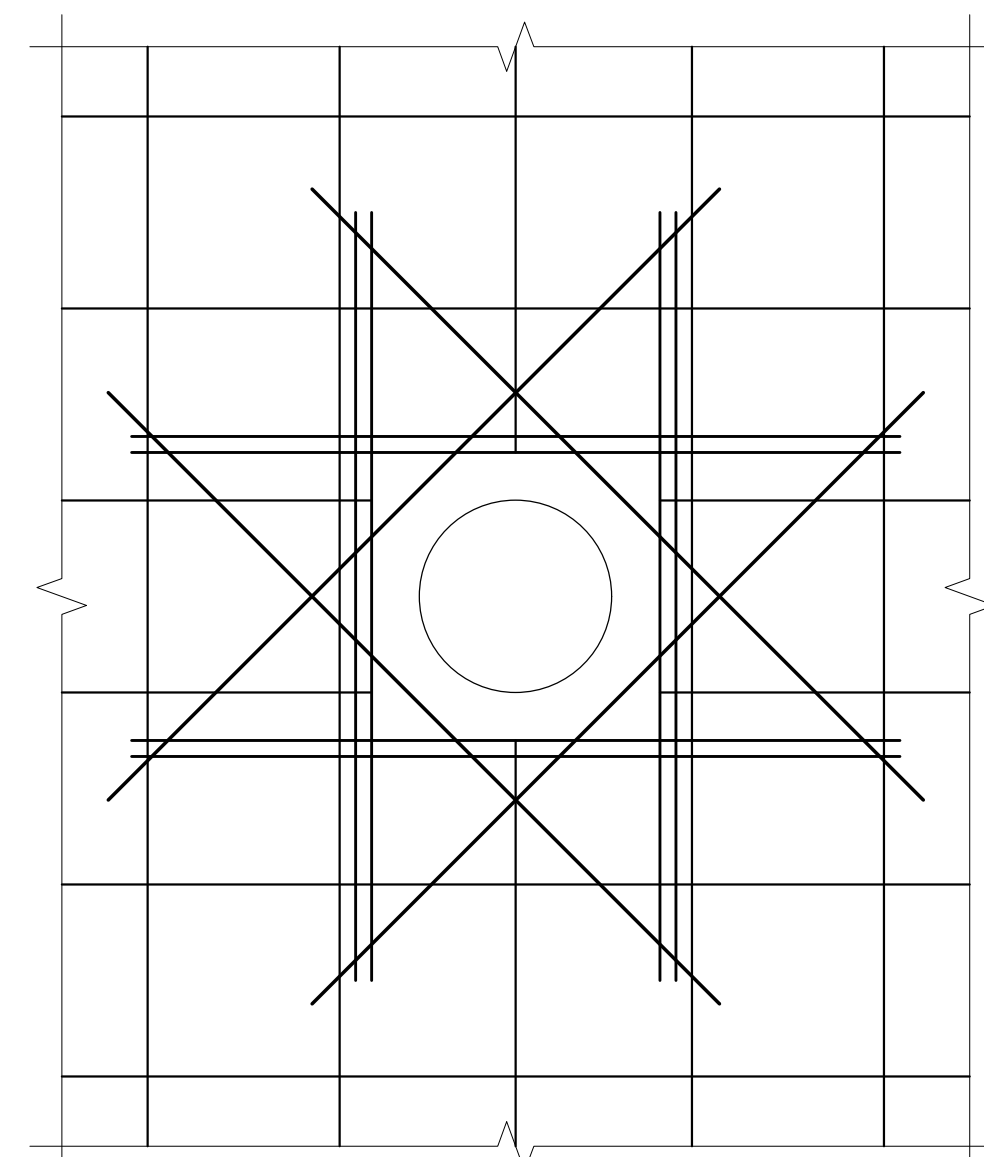




CONCRETE EXPOSURE	MEMBER	REINFORCEMENTS	SPECIFIED COVER, IN.
CAST AGAINST AND PERMANENTLY IN CONTACT WITH GROUND	ALL	ALL	3
EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	ALL	NO. 6 THROUGH NO. 18 BAR	2
		NO. 5 BAR, W31 OR D31 WIRE, AND SMALLER	1-1/2
		NO. 14 AND NO. 18 AND SMALLER	1-1/2
NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	SLAB, JOISTS, AND WALLS	NO. 11 BAR AND SMALLER	3/4
	BEAMS, COLUMNS, PEDESTALS, AND TENSION TIES	PRIMARY REINFORCEMENT, STIRRUPS, TIES, SPIRALS, AND HOOPS	1-1/2



REINF. BARS SPACED LESS THAN 12" O.C. TO BE SPREAD WITHOUT INTERRUPTION TO CLEAR PENETRATIONS LESS THAN 12" DIAM. SIZE OF DIAGONAL AND EXTRA PARALLEL BARS TO EQUAL SIZE OF TYPICAL SLAB OR WALL REINFORCING BARS. SEE DESIGN DRAWINGS FOR DIAMETER AND LOCATION OF PENETRATIONS. NUMBER OF EXTRA PARALLEL BARS PLACED EACH WAY AROUND PENETRATION TO BE EQUAL TO NUMBER OF BARS INTERRUPTED. (TYPICAL FOR EACH FACE OF SLAB OR WALL). MINIMUM OF ONE BAR EACH WAY, EACH FACE OF SLAB OR WALL. FOR PENETRATIONS LESS THAN 12", PROVIDE 4-#4x4'-0" DIAGONAL BARS EACH FACE.



BAR SIZE		TENSION DEVELOPMENT AND LAP-SPLICE LENGTHS FOR UNCOATED REINFORCING BARS			
		LAP LENGTH (IN.) PER SPACING AND COVER CASE			
		f'c=3500 psi (NORMAL WEIGHT)			
		TOP BARS		OTHER BARS	
LAP CLASS		CASE 1	CASE 2	CASE 1	CASE 2
#3	A	22	32	17	25
	B	28	42	22	32
#4	A	29	43	22	33
	B	37	56	29	43
#5	A	36	54	28	41
	B	47	70	36	54
#6	A	43	64	33	50
	B	56	84	43	64
#7	A	63	94	48	72
	B	81	122	63	94
#8	A	72	107	55	82
	B	93	139	72	107
#9	A	81	121	62	93
	B	105	157	81	121
#10	A	91	136	70	105
	B	118	177	91	136
#11	A	101	151	78	116
	B	131	196	101	151
#14	N/A	121	181	93	139
#18	N/A	161	241	124	186

BAR SIZE		TENSION DEVELOPMENT AND LAP-SPLICE LENGTHS FOR UNCOATED REINFORCING BARS			
		LENGTHS (IN.) PER CONCRETE STRENGTH			
		f'c=4000 psi (NORMAL WEIGHT)			
		TOP BARS		OTHER BARS	
LAP CLASS		CASE 1	CASE 2	CASE 1	CASE 2
#3	A	19	28	15	22
	B	24	36	19	28
#4	A	25	37	19	29
	B	32	48	25	37
#5	A	31	47	24	36
	B	40	60	31	47
#6	A	37	56	29	43
	B	48	72	37	56
#7	A	54	81	42	63
	B	70	106	54	81
#8	A	62	93	48	71
	B	80	121	62	93
#9	A	70	105	54	81
	B	91	136	70	105
#10	A	79	118	61	91
	B	102	153	79	118
#11	A	87	131	67	101
	B	113	170	87	131
#14	N/A	105	157	81	121
#18	N/A	139	209	107	161

NOTES: 1 in.=25.4 mm.
1. TABULATED VALUES ARE BASED ON GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE. LENGTHS ARE IN INCHES.
2. TENSION DEVELOPMENT LENGTHS AND TENSION LAP-SPLICE LENGTHS ARE CALCULATED PER ACI 318, SECTIONS 25.4 AND 25.5, RESPECTIVELY. TABULATED VALUES FOR BEAMS OR COLUMNS ARE BASED ON TRANSVERSE REINFORCEMENT AND CONCRETE COVER MEETING MINIMUM CODE REQUIREMENTS.
3. CASES 1 AND 2, WHICH DEPEND ON THE TYPE OF STRUCTURAL ELEMENT, CONCRETE COVER, AND CENTER-TO-CENTER SPACING OF THE BARS, ARE DEFINED AS: BEAMS OR COLUMNS: CASE 1-COVER AT LEAST 1.0d, AND CENTER-TO-CENTER SPACING AT LEAST 2.0d, AND CASE 2-COVER LESS THAN 1.0d, OR CENTER-TO-CENTER SPACING LESS THAN 2.0d, ALL OTHERS: CASE 1-COVER AT LEAST 1.0d, AND CENTER-TO-CENTER SPACING AT LEAST 3.0d, CASE 2-COVER LESS THAN 1.0d, OR CENTER-TO-CENTER SPACING LESS THAN 3.0d.
4. LAP SPLICE LENGTHS ARE MULTIPLES OF TENSION DEVELOPMENT LENGTHS; CLASS A=1.0d AND CLASS B=1.3d (ACI 318, SECTION 25.5.2).
5. ACI 318 DOES NOT ALLOW TENSION LAP SPLICES OF #14 OR #18 BARS. THE TABULATED VALUES FOR THOSE BAR SIZES ARE THE TENSION DEVELOPMENT LENGTHS.
6. TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 12 in. OF CONCRETE CAST BELOW THE BARS.
7. FOR LIGHTWEIGHT-AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.

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