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TENSION DEVELOPMENT LENGTHS AND TENSION LAP SPLICE LENGTHS
GRADE 60 (UNCOATED) REINFORCEMENT
(NORMAL WEIGHT CONCRETE)

BAR SIZE	F _c = 3000		F _c = 4000		F _c = 5000		F _c = 6000		F _c = 7000		F _c = 8000		BAR SIZE
	CLASS A	CLASS B	CLASS A	CLASS B	CLASS A	CLASS B	CLASS A	CLASS B	CLASS A	CLASS B	CLASS A	CLASS B	
#3	17	22	15	19	13	17	12	16	12	16	12	16	#3
#4	22	29	19	25	17	23	16	21	15	19	14	18	#4
#5	28	36	24	31	22	28	20	26	18	24	17	22	#5
#6	33	43	29	37	26	34	24	31	22	28	21	27	#6
#7	40	53	35	45	31	41	28	37	27	35	25	33	#7
#8	48	63	42	54	38	49	34	45	32	41	30	39	#8
#9	55	72	48	62	43	56	39	51	36	47	34	44	#9
#10	62	81	54	70	48	63	44	57	41	53	38	50	#10
#11	70	91	61	79	54	71	50	64	46	60	43	56	#11

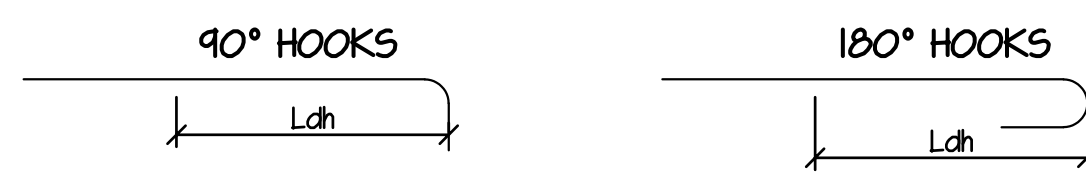
- NOTES:
- ALL LENGTHS SHOWN IN THE TABLE ARE IN INCHES.
 - L_d = TENSION DEVELOPMENT LENGTH.
 - THE ABOVE TABLE IS VALID FOR:
 - BEAMS AND COLUMNS WHERE CONCRETE COVER > = db, c/c BAR SPACING > = 2db AND WITH STIRRUPS OR TIES THROUGHOUT ld NOT LESS THAN THE CODE MINIMUM.
 - OTHER ELEMENTS SUCH AS SLABS, WALLS, ETC. WHERE CONCRETE COVER > = db, c/c BAR SPACING > = 3db.
 - FOR TOP BARS, MULTIPLY THE SPLICE LENGTHS BY 1.30. TOP BARS REQUIRE A MINIMUM OF 12" OF FRESH CONCRETE BELOW BAR.

TYPICAL DETAIL
TENSION DEVELOPMENT AND SPLICE LENGTHS
(NORMAL WEIGHT CONCRETE)

9 FOUNDATION DETAIL
SCALE: NO SCALE

DEVELOPMENT LENGTHS OF STANDARD HOOKS IN TENSION
GRADE 60 (UNCOATED) REINFORCEMENT
(NORMAL WEIGHT CONCRETE)

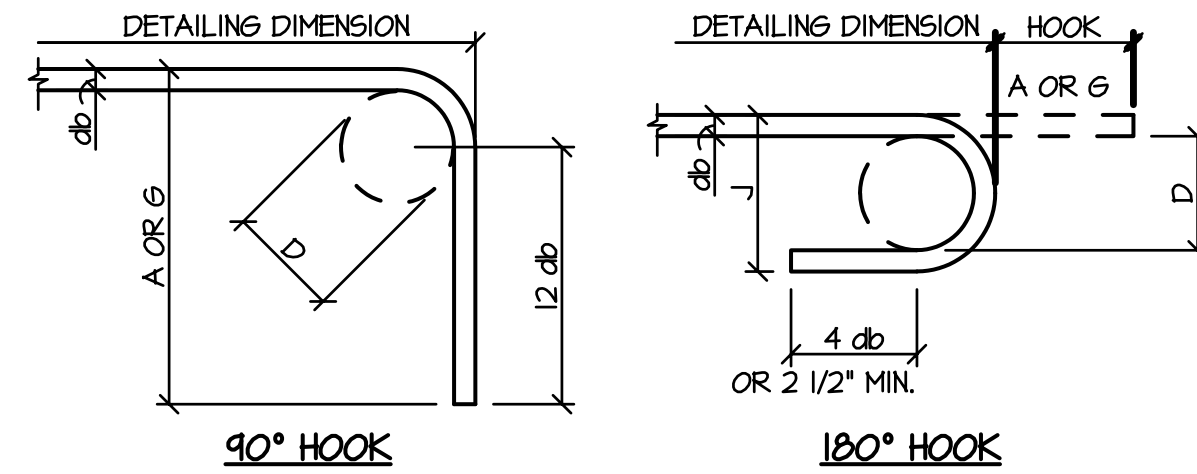
BAR SIZE	F _c = 3000		F _c = 4000		F _c = 5000		F _c = 6000		F _c = 7000		F _c = 8000		BAR SIZE
	L _{hb}	0.7L _{hb}	L _{hb}	0.7L _{hb}	L _{hb}	0.7L _{hb}	L _{hb}	0.7L _{hb}	L _{hb}	0.7L _{hb}	L _{hb}	0.7L _{hb}	
#3	9	6	8	6	7	6	6	6	6	6	6	6	#3
#4	11	8	10	7	9	8	8	8	8	7	6	6	#4
#5	14	10	12	9	11	8	10	7	9	7	6	6	#5
#6	17	12	15	10	13	9	12	9	11	8	11	8	#6
#7	20	14	17	12	15	11	14	10	13	9	12	9	#7
#8	22	16	19	14	17	12	16	11	15	11	14	10	#8
#9	25	18	22	15	20	14	18	12	17	12	16	11	#9
#10	28	20	25	17	22	16	20	14	19	13	18	12	#10
#11	31	22	27	19	24	17	22	16	21	15	19	14	#11



- NOTES:
- ALL LENGTHS SHOWN IN THE TABLE ARE IN INCHES.
 - L_{hb} = TENSION DEVELOPMENT LENGTH.
 - L_{dh} = L_{hb}, UNLESS CONDITIONS OF ITEM 4 ARE SATISFIED.
 - L_{dh} = 0.7 L_{hb}, WHEN SIDE COVER NORMAL TO PLANE OF HOOK IS NOT LESS THAN 2 1/2 INCHES AND FOR 90° HOOK, COVER ON BAR EXTENSION BEYOND HOOK SHALL NOT BE LESS THAN 2 INCHES.
 - HOOKS SHALL NOT BE CONSIDERED EFFECTIVE IN DEVELOPING BARS IN COMPRESSION.

TYPICAL DETAIL
DEVELOPMENT LENGTH OF STANDARD HOOKS IN TENSION
(NORMAL WEIGHT CONCRETE)

8 FOUNDATION DETAIL
SCALE: NO SCALE



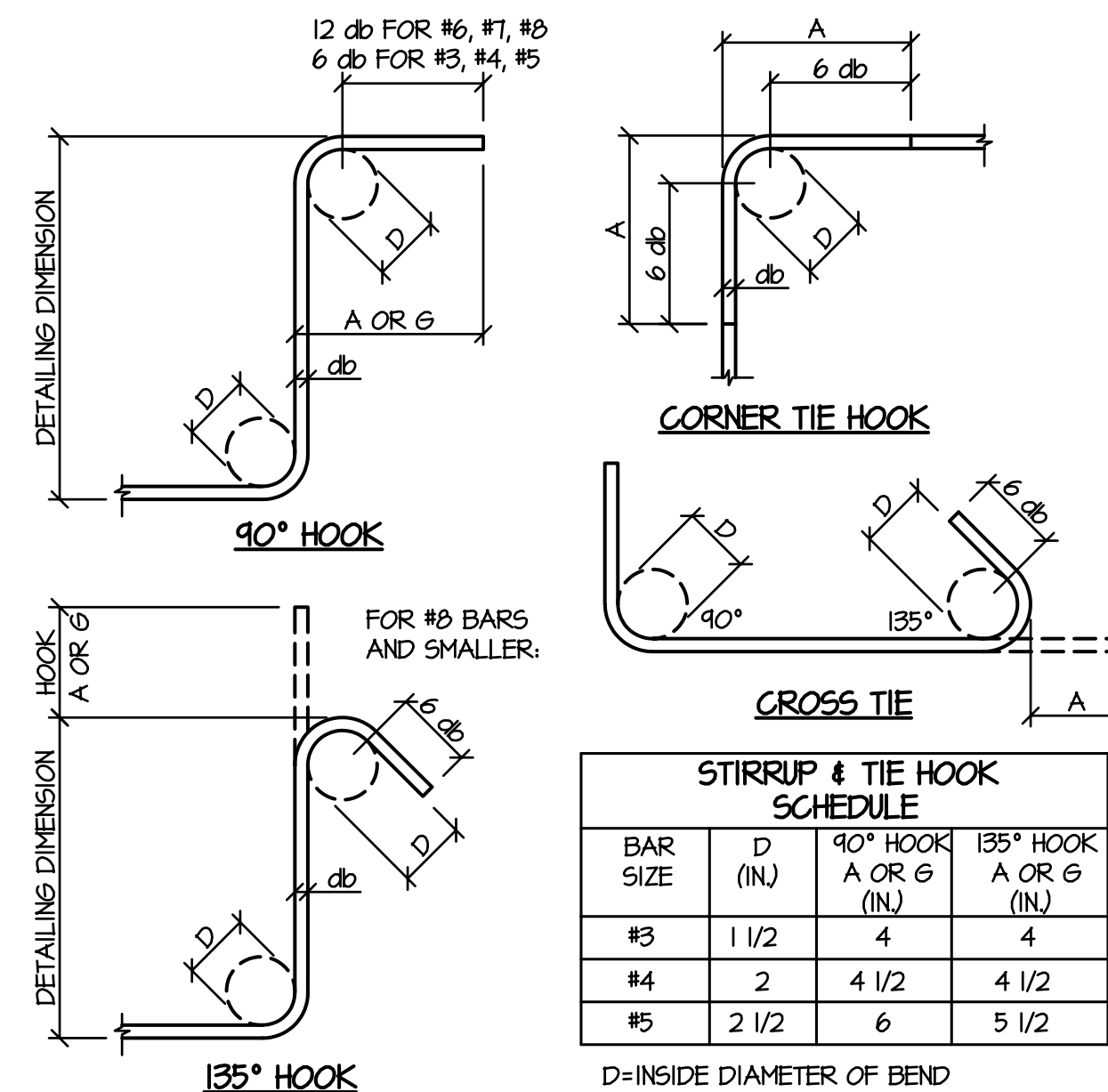
RECOMMENDED END HOOKS, ALL GRADES

BAR SIZE	FINISHED BEND DIAMETER D, (IN)	180° HOOKS		90° HOOKS
		A OR G, (IN)	J, (IN)	A OR G, (IN)
#3	2 1/4	5	3	6
#4	3	6	4	8
#5	3 3/4	7	5	10
#6	4 1/2	8	6	12
#7	5 1/4	10	7	14
#8	6	11	8	16
#9	9 1/2	15	11 3/4	19
#10	10 3/4	17	13 1/4	22
#11	12	19	14 3/4	24
#14	18 1/4	27	21 3/4	31
#18	24	36	28 1/2	41

D = INSIDE DIAMETER OF BEND

END HOOK TYPES

6 FOUNDATION DETAIL
SCALE: NO SCALE



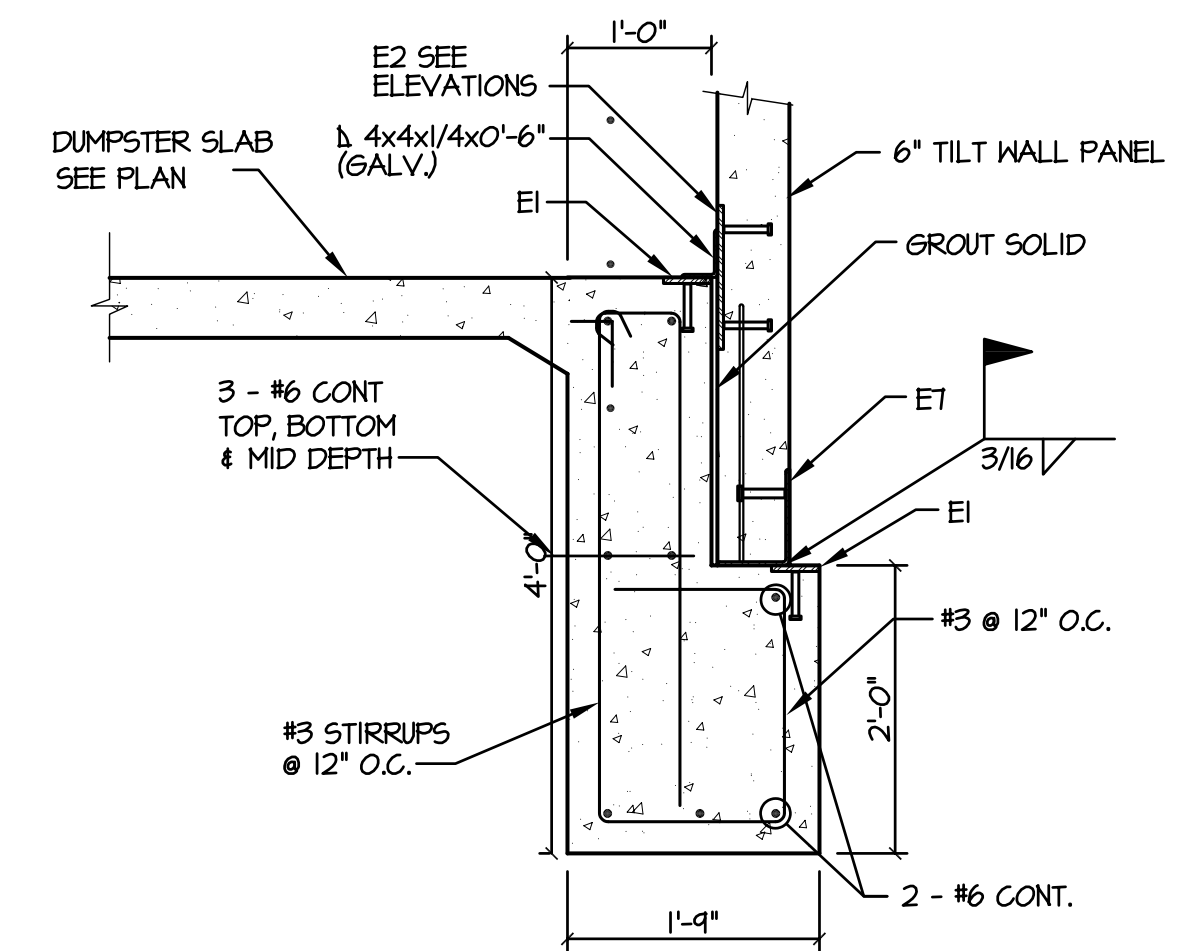
STIRRUP & TIE HOOK SCHEDULE

BAR SIZE	D (IN)	90° HOOK	135° HOOK
		A OR G (IN)	A OR G (IN)
#3	1 1/2	4	4
#4	2	4 1/2	4 1/2
#5	2 1/2	6	5 1/2

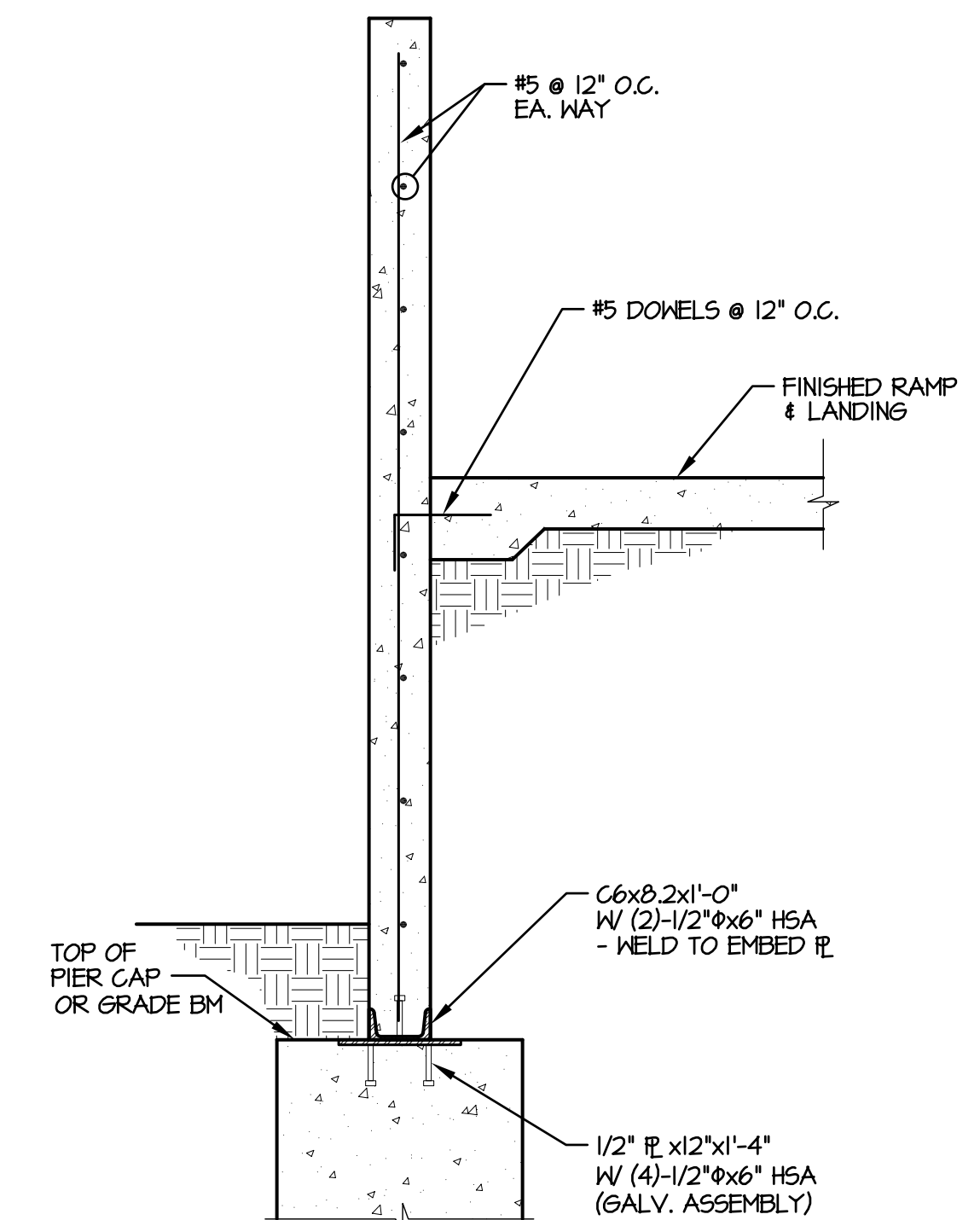
D = INSIDE DIAMETER OF BEND

STIRRUP AND TIE HOOK TYPES

5 FOUNDATION DETAIL
SCALE: NO SCALE



2 FOUNDATION DETAIL
SCALE: NO SCALE



1 FOUNDATION DETAIL
SCALE: NO SCALE

Sheet Title:

FOUNDATION DETAILS

Issue:

CD/PERMIT

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12 MARCH 2019

△ 11-08-2018 Permit Revisions

Revision Date:

Sheet: