

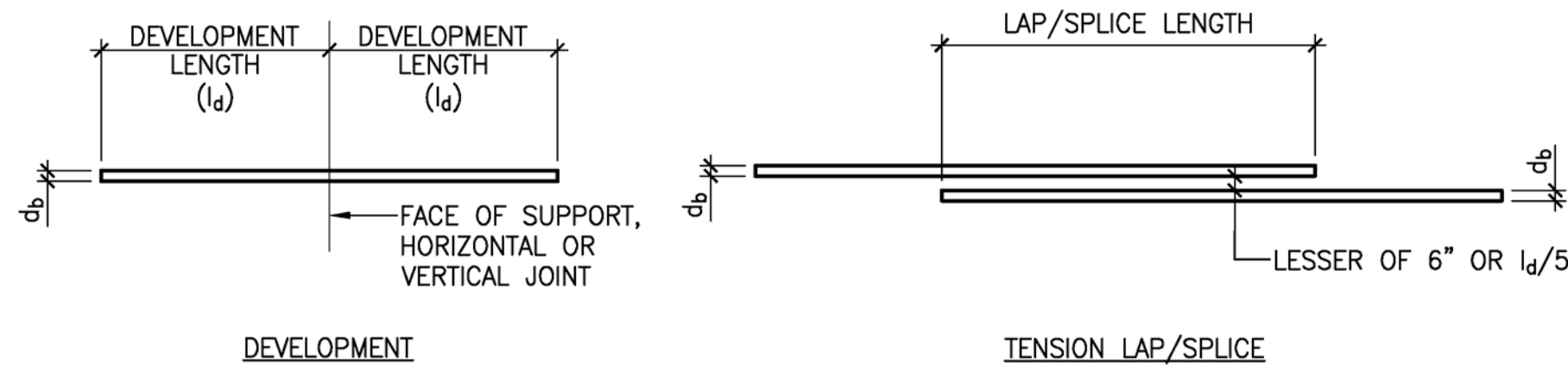
BAR SIZE	D (IN.)
#3	2 1/4
#4	3
#5	3 3/4
#6	4 1/2
#7	5 1/4
#8	6
#9	9
#10	10 1/4
#11	11 1/4

- NOTES:
 1. ALL BENDS SHALL BE MADE COLD.
 2. d_b = BAR DIAMETER.

BAR SIZE	D (IN.)
#3	1 1/2
#4	2
#5	2 1/2

- NOTES:
 1. ALL BENDS SHALL BE MADE COLD.
 2. d_b = BAR DIAMETER.

BAR SIZE	TENSION DEVELOPMENT LENGTH						TENSION LAP/SPLICE LENGTH					
	TOP BARS			OTHER BARS			TOP BARS			OTHER BARS		
	3000 PSI	4000 PSI	5000 PSI	3000 PSI	4000 PSI	5000 PSI	3000 PSI	4000 PSI	5000 PSI	3000 PSI	4000 PSI	5000 PSI
#3	22	19	17	17	15	13	29	20	23	23	20	17
#4	29	25	23	22	19	17	38	33	30	29	25	23
#5	36	31	28	28	24	22	47	41	37	37	32	29
#6	43	37	34	33	29	26	56	49	45	43	38	34
#7	63	54	49	48	42	38	82	71	64	63	55	50
#8	72	62	56	55	48	43	94	81	73	72	63	56
#9	81	70	63	62	54	48	106	91	82	81	71	63
#10	91	79	71	70	61	54	119	103	93	91	80	71
#11	101	87	78	78	67	60	132	114	102	102	88	78

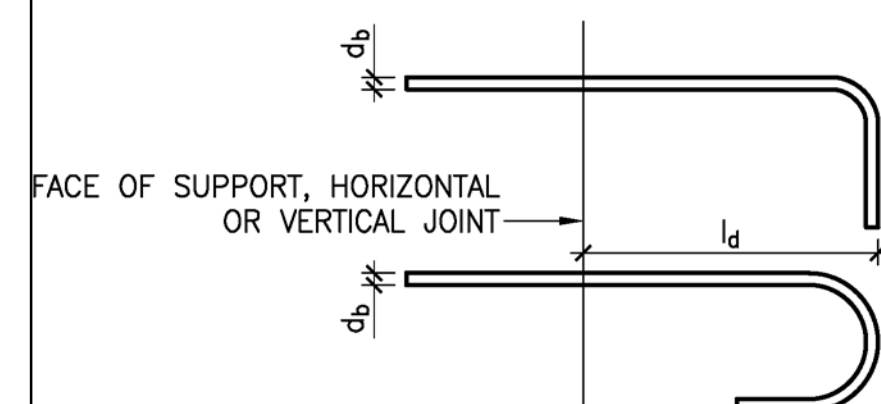


- NOTES:
 1. REFER TO "HOOKED REINFORCEMENT TENSION DEVELOPMENT LENGTH SCHEDULE" WHEN THE STRAIGHT DEVELOPMENT LENGTH IN TENSION CANNOT BE ACCOMMODATED IN THE CONCRETE SECTION.
 2. ALWAYS USE TENSION DEVELOPMENT LENGTH AND TENSION LAP/SPLICE LENGTH VALUES.
 3. TABULATED DEVELOPMENT AND LAP/SPLICE LENGTHS ARE BASED ON REINFORCING STEEL YIELD STRENGTH $F_y=60$ KSI, NORMAL WEIGHT CONCRETE, AND CLASS B LAPS.
 4. TOP BARS ARE DEFINED AS HORIZONTAL BARS WITH MORE THAN 12 INCHES OF FRESH CONCRETE CAST IN THE MEMBER BELOW THE BARS TO BE DEVELOPED OR SPLICED. TOP BAR FACTOR DOES NOT APPLY TO BARS IN WALLS.
 5. WHEN DIFFERENT BAR DIAMETERS ARE SPLICED, USE LARGER BAR LAP SPLICE LENGTH.
 6. ALL TABULATED VALUES ARE MINIMUM LENGTHS, IN CASE OF CONFLICT WITH PLANS, SECTIONS, OR DETAILS USE THE LONGER LENGTH.
 7. d_b = BAR DIAMETER.
 8. l_d = DEVELOPMENT, LAP OR SPLICE LENGTH.
 9. ADJUST TABULATED LENGTHS BY THE FOLLOWING FACTORS WHERE APPLICABLE. NOTE THAT FACTORS ARE CUMULATIVE: (E.G. $1.30 \times 1.50 = 1.95$)
 A. LIGHT WEIGHT CONCRETE: 1.30
 B. 3 OR LESS BUNDLED BARS: 1.20
 C. 4 OR MORE BUNDLED BARS: 1.33
 D. CLEAR SPACING LESS THAN $2d_b$ AND CLEAR COVER LESS THAN d_b : 1.50
 E. CLASS A LAP SPLICE: 0.77
 F. EPOXY COATED BARS: 1.50
 10. WELDED AND/OR MECHANICAL SPLICES MAY BE USED AT IF APPROVED BY THE STRUCTURAL ENGINEER OF RECORD PROVIDED THAT THE SPLICE IS CAPABLE OF DEVELOPING AT LEAST 125% OF THE YIELD STRENGTH OF THE LARGER BAR IN TENSION. WHERE WELDED AND/OR MECHANICAL SPLICES ARE TO BE USED, THE GENERAL CONTRACTOR SHALL SUBMIT FULL DATA ON THE PROPOSED MATERIAL, PROCEDURES, AND INSTALLATION INSTRUCTIONS TO THE ENGINEER FOR REVIEW AS A SHOP DRAWING SUBMISSION.
 11. USE MECHANICAL COUPLERS FOR #14 AND LARGER BARS.
 12. LAP SPLICES IN CONCRETE MASONRY SHALL BE AS SPECIFIED IN "STRAIGHT REINFORCEMENT DEVELOPMENT LENGTH IN GROUTED MASONRY" DETAIL.
 13. SPLICES OF HORIZONTAL REINFORCEMENT IN WALLS SHALL BE STAGGERED.
 14. SPLICES IN WALLS CONTAINING TWO CURTAINS OF REINFORCEMENT SHALL NOT OCCUR IN THE SAME LOCATION.

1 TYPICAL REINFORCEMENT BENDS

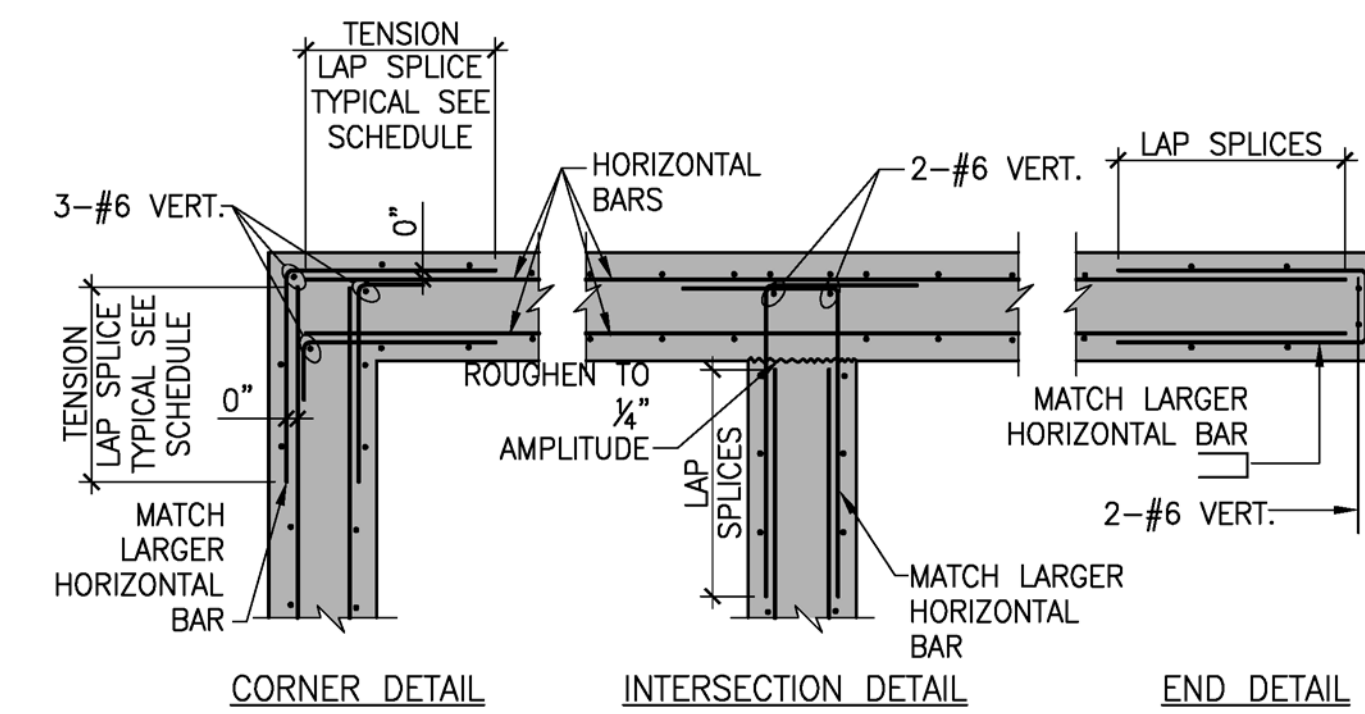
2 TYPICAL TIE AND STIRRUP HOOKS

3 STRAIGHT REINFORCEMENT DEVELOPMENT AND SPLICE LENGTH SCHEDULE



- NOTES:
 1. SEE TYPICAL TIE AND STIRRUP HOOKS DETAIL FOR ADDITIONAL INFORMATION.
 2. TABULATED DEVELOPMENT LENGTHS ARE BASED ON REINFORCING STEEL YIELD STRENGTH $F_y = 60$ KSI AND NORMAL WEIGHT CONCRETE.
 3. ALL TABULATED VALUES ARE MINIMUM LENGTHS. IN CASE OF CONFLICT WITH THE PLANS, SECTIONS, OR DETAILS, USE THE LONGER LENGTH.
 4. d_b = BAR DIAMETER
 5. l_d = DEVELOPMENT LENGTH
 6. ADJUST TABULATED LENGTHS BY THE FOLLOWING FACTORS WHERE APPLICABLE. NOTE THAT THE FACTORS ARE CUMULATIVE:
 A. REINFORCING BAR STRENGTH OTHER THAN 60 KSI: $(F_y/60,000)$
 B. LIGHT WEIGHT CONCRETE: 1.3
 C. EPOXY COATED BARS: 1.2

BAR SIZE	TENSION DEVELOPMENT LENGTH (l_d) INCHES		
	3000 PSI	4000 PSI	5000 PSI
#3	9	8	7
#4	11	10	9
#5	14	12	11
#6	17	15	13
#7	20	17	15
#8	22	19	17
#9	25	22	20
#10	28	24	22
#11	31	27	24



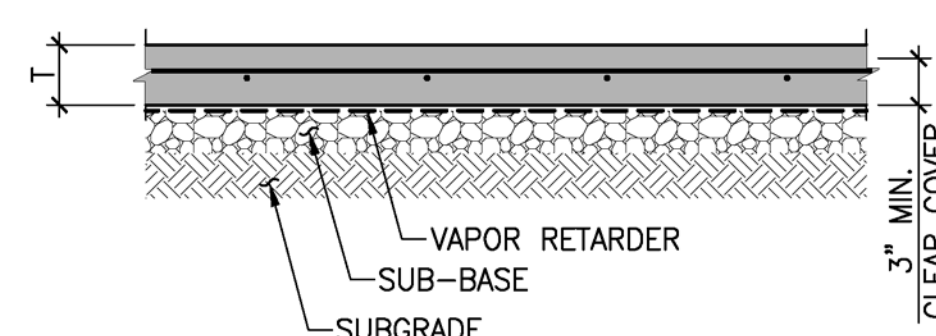
MINIMUM CONCRETE WALL REINFORCEMENT SCHEDULE		
WALL THICKNESS	VERT. REINF.	HORIZ. REINF.
LESS THAN 10"	#4 @ 12" MID.	#5 @ 12" MID.
10" TO 12" INCL.	#4 @ 12" E.F.	#4 @ 12" E.F.
12" TO 18" INCL.	#5 @ 12" E.F.	#5 @ 12" E.F.

- NOTE:
 PROVIDE THE ABOVE MINIMUM REINFORCEMENT IN ALL CONCRETE WALLS WHERE REINFORCEMENT IS NOT INDICATED ON THE DRAWINGS

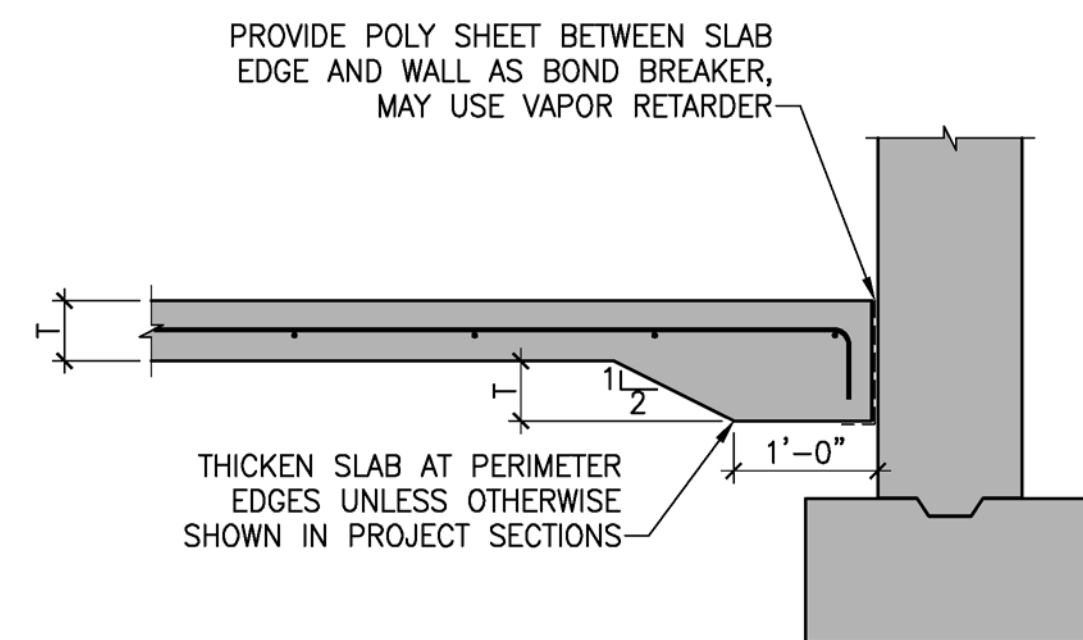
4 HOOKED REINFORCEMENT TENSION DEVELOPMENT LENGTH SCHEDULE

5 HORIZONTAL WALL REINFORCEMENT DETAILS

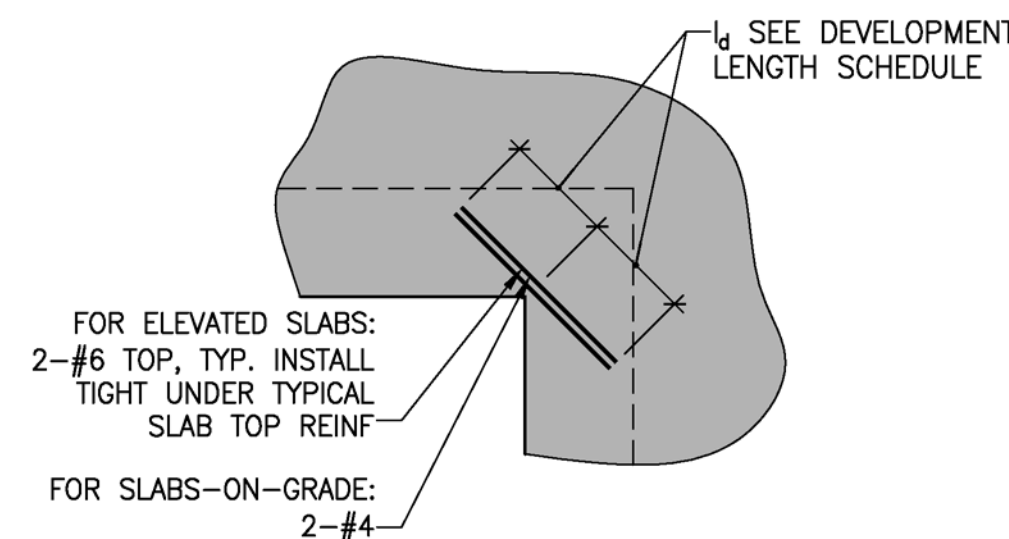
6 MINIMUM WALL REINFORCEMENT SCHEDULE



- NOTES:
 1. SEE PLANS FOR SLAB CONSTRUCTION.
 2. SEE PLANS, GENERAL NOTES AND/OR SPECIFICATIONS FOR VAPOR BARRIER.
 3. SEE PLANS, GENERAL NOTES AND/OR SPECIFICATIONS FOR SUB-BASE AND/OR SUBGRADE REQUIREMENTS.
 4. SEE GENERAL NOTES FOR ADDITIONAL REINFORCING BAR CONCRETE COVER REQUIREMENTS.



8 THICKENED SLAB-ON-GRADE AT WALLS



- NOTE:
 DETAIL APPLIES AT OPENINGS AND CORNERS OF SLAB DEPRESSIONS.

9 TYPICAL SLAB REINFORCEMENT AT RE-ENRANT CORNER

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 1 617 478 0321
 www.perkinswill.com

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 MaineHealth

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 AKF ENGINEERS

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 1 617 737 1111
 1 617 737 4311

STRUCTURAL ENGINEER
 SIMPSON GUMPERTZ &
 HEGER

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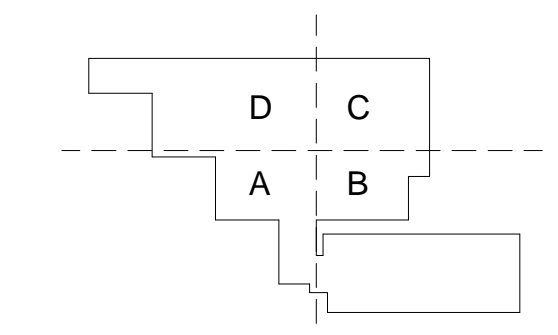
MEDICAL EQUIPMENT PLANNERS
 RTKL ASSOCIATES INC.

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 DALLAS, TX 75201
 1 214 468 7000
 1 214 468 7601

COST ESTIMATOR
 DG JONES & PARTNERS

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 Wilton, MA 01991
 1 781 932 3131
 1 781 932 3199

CONSTRUCTION DOCUMENTS
 06.14.2013



Revisions

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Approved	JHT

Title
 TYPICAL CONCRETE DETAILS

Sheet
 S00-10

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