

DRAWN BY: BLT CHECKED BY: VZ APPROVED BY: KCK	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT					ISSUED: 12/26/23	
	TENSION DEVELOPMENT AND LAP SPLICE LENGTHS FOR SUBSTRUCTURE					SUPERSEDES: 11/27/01	
EPOXY COATED REINFORCEMENT F _c = 3.0 ksi F _y = 60.0 ksi							
BAR SIZE	SPACING THRESHOLD *		BASIC DEVELOPMENT LENGTH (in) **	TENSION DEVELOPMENT LENGTH			
				≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	3d _b (in)	6d _b (in)		CLEAR COVER ≥ 3d _b & CLEAR SPACING ≥ 6b _d (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ 3d _b & CLEAR SPACING ≥ 6b _d (in)	ALL OTHER CASES (in)
3	1⅞	2¼	32	16	20	20	22
4	1½	3	42	21	26	27	29
5	1⅞	3¾	52	25	32	33	36
6	2¼	4½	63	31	38	40	43
7	2⅝	5¼	73	36	44	46	50
8	3	6	84	41	51	53	58
9	3⅜	6¾	94	46	57	59	64
10	3¾	7½	104	50	63	65	71
11	4⅞	8¼	115	56	69	72	79

BAR SIZE	SPACING THRESHOLD *		TENSION LAP LENGTH			
			≤ 12" OF CONCRETE BELOW		> 12" OF CONCRETE BELOW	
	3d _b (in)	6d _b (in)	CLEAR COVER ≥ 3d _b & CLEAR SPACING ≥ 6b _d (in)	ALL OTHER CASES (in)	CLEAR COVER ≥ 3d _b & CLEAR SPACING ≥ 6b _d (in)	ALL OTHER CASES (in)
3	1⅞	2¼	20	26	26	29
4	1½	3	27	33	35	38
5	1⅞	3¾	33	41	43	46
6	2¼	4½	40	50	52	56
7	2⅝	5¼	46	57	60	65
8	3	6	53	66	69	75
9	3⅜	6¾	59	74	77	84
10	3¾	7½	65	82	85	92
11	4⅞	8¼	72	90	94	102

* USE SPACING THRESHOLD VALUES IN DETERMINING THE APPROPRIATE COLUMN FROM WHICH TO SELECT THE DEVELOPMENT AND LAP LENGTH.

** IF THE PROJECT SPECIFIC CONDITIONS DO NOT FALL INTO ONE OF THE COLUMNS INCLUDED IN THE TABLE ABOVE OR ARE NOT IN ALIGNMENT WITH THE NOTES ON THIS BRIDGE DESIGN GUIDE CALCULATE THE TENSION DEVELOPMENT AND LAP LENGTHS USING THE BASIC DEVELOPMENT LENGTH FROM THE TABLE ABOVE AND THE APPROPRIATE MODIFICATION FACTORS OUTLINED IN AASHTO LRFD 5.10.8.

NOTES:

THE VALUES IN THE TABLE ABOVE ARE BASED ON THE REQUIREMENTS OUTLINED IN AASHTO LRFD 5.10.8.

THE VALUES IN THE TABLE ABOVE ASSUME THE AREA OF REINFORCEMENT PROVIDED IS EQUAL TO THE AREA OF REINFORCEMENT REQUIRED BY THE DESIGN (λ_{er} = 1.0).

THE VALUES IN THE TABLE ABOVE ACCOUNT FOR THE TYPICAL CONFINEMENT REINFORCEMENT DETAILED IN THE MDOT BRIDGE DESIGN GUIDES (λ_{rc} = 0.4).

LAP LENGTHS ARE BASED ON CLASS B LAP SPLICES IN ACCORDANCE WITH AASHTO LRFD 5.10.8.4.3a.

DEVELOPMENT AND LAP LENGTHS IN THE TABLES ABOVE WILL BE CONSERVATIVE FOR UNCOATED REINFORCEMENT.

PREPARED BY DESIGN DIVISION	7.14.02A
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