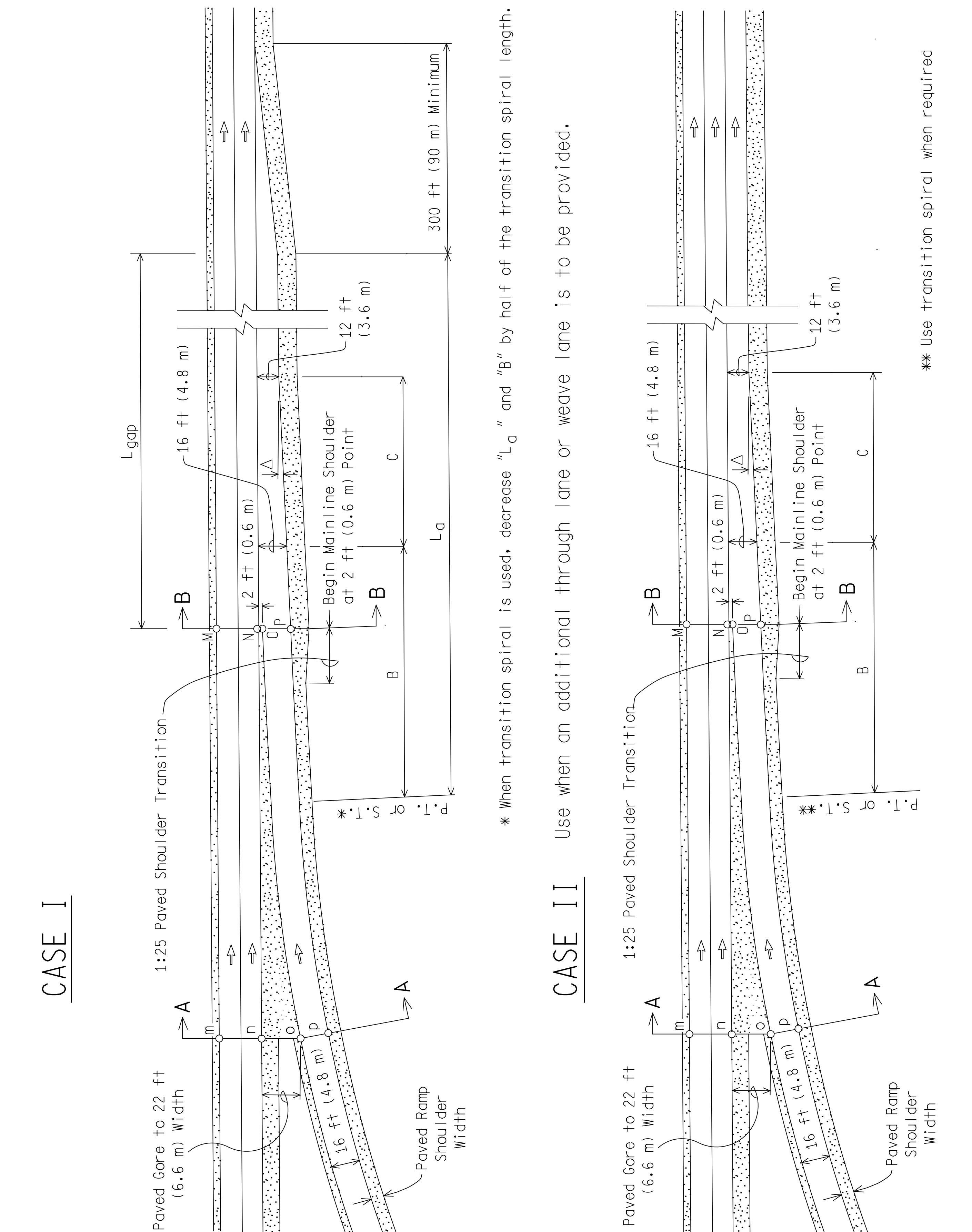

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REV. 07-19-11 AR

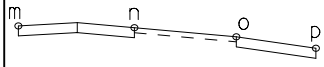
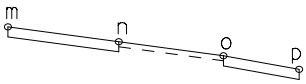
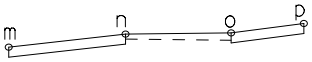
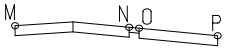
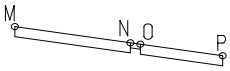
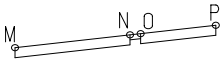
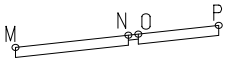
GEOMETRIC DESIGN GUIDE FOR
ONE-LANE PARALLEL
ENTRANCE RAMP

09/06/2007
PLAN DATE:

GEO-101-F

SHEET
1 OF 5

EDGE OF PAVEMENT ELEVATION RELATIONSHIPS

WHEN THE THROUGH LANES ARE NOT SUPERELEVATED	WHEN THE THROUGH LANES ARE SUPERELEVATED AND N IS LOWER THAN M	WHEN THE THROUGH LANES ARE SUPERELEVATED AND N IS HIGHER THAN M	
		RAMP AND THROUGH LANE SUPERELEVATED IN SAME DIRECTION	RAMP AND THROUGH LANE SUPERELEVATED IN OPPOSITE DIRECTION
SECTION A-A			
 POINTS n, o & p SHOULD BE PROGRESSIVELY LOWER.	 POINTS m, n, o & p SHOULD BE PROGRESSIVELY LOWER.	 POINT o SHOULD BE HIGHER THAN POINT n.	 POINT o SHOULD BE EQUAL TO OR LOWER THAN POINT n.
SECTION B-B			
 POINTS N, O & P SHOULD BE IN THE SAME PLANE.	 POINTS M, N, O & P SHOULD BE IN THE SAME PLANE.	 POINTS M, N, O & P SHOULD BE IN THE SAME PLANE.	 POINTS M, N, O & P SHOULD BE IN THE SAME PLANE.

Note: Maximum algebraic difference in pavement cross slope between mainline and ramp auxiliary lane should not exceed 5%.

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MINIMUM ENGLISH LENGTHS FOR PARALLEL ENTRANCE RAMPS

RAMP DESIGN SPEED (MPH)	PERCENT GRADE OF THROUGH ROADWAY	TAPER=65:1 Δ=0°52′53″ ROADWAY DESIGN SPEED = 75 MPH B = 390 FT C = 260 FT Lgap = 390 FT La (FT)	TAPER=60:1 Δ=0°57′17″ ROADWAY DESIGN SPEED = 70 MPH B = 360 FT C = 240 FT Lgap = 360 FT La (FT)	TAPER=55:1 Δ=1°02′30″ ROADWAY DESIGN SPEED = 60 MPH B = 330 FT C = 220 FT Lgap = 330 FT La (FT)	TAPER=50:1 Δ=1°08′45″ ROADWAY DESIGN SPEED = 55 to 50 MPH B = 300 FT C = 200 FT Lgap = 300 FT La (FT)	TAPER=45:1 Δ=1°16′23″ ROADWAY DESIGN SPEED = 45 or less MPH B = 270 FT C = 180 FT Lgap = 270 FT La (FT)
20	-3 TO LESS THAN -5	978	912	660	506	450
	BETWEEN -3 AND +3	1630	1520	1100	810	450
	+3 TO LESS THAN +5	2528	2280	1540	1094	608
25	-3 TO LESS THAN -5	948	852	612	500	450
	BETWEEN -3 AND +3	1580	1420	1020	780	450
	+3 TO LESS THAN +5	2528	2201	1479	1092	608
30	-3 TO LESS THAN -5	906	810	550	500	450
	BETWEEN -3 AND +3	1510	1350	910	670	450
	+3 TO LESS THAN +5	2492	2160	1365	972	608
35	-3 TO LESS THAN -5	852	738	550	500	450
	BETWEEN -3 AND +3	1420	1230	800	550	450
	+3 TO LESS THAN +5	2450	2030	1200	798	608
40	-3 TO LESS THAN -5	696	600	550	500	450
	BETWEEN -3 AND +3	1160	1000	550	500	450
	+3 TO LESS THAN +5	2088	1700	825	725	608
45	-3 TO LESS THAN -5	650	600	550	500	450
	BETWEEN -3 AND +3	1040	820	550	500	450
	+3 TO LESS THAN +5	1924	1435	825	725	608
50	-3 TO LESS THAN -5	650	600	550	500	
	BETWEEN -3 AND +3	780	600	550	500	
	+3 TO LESS THAN +5	1482	1080	825	725	
55	-3 TO LESS THAN -5	650	600	550	500	
	BETWEEN -3 AND +3	650	600	550	500	
	+3 TO LESS THAN +5	1268	1080	825	725	
60	-3 TO LESS THAN -5	650	600	550		
	BETWEEN -3 AND +3	650	600	550		
	+3 TO LESS THAN +5	1268	1080	825		
65	-3 TO LESS THAN -5	650	600			
	BETWEEN -3 AND +3	650	600			
	+3 TO LESS THAN +5	1268	1080			
70	-3 TO LESS THAN -5	650	600			
	BETWEEN -3 AND +3	650	600			
	+3 TO LESS THAN +5	1268	1080			
75	-3 TO LESS THAN -5	650				
	BETWEEN -3 AND +3	650				
	+3 TO LESS THAN +5	1268				

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MINIMUM METRIC LENGTHS FOR PARALLEL ENTRANCE RAMPS

RAMP DESIGN SPEED (km/hr)	PERCENT GRADE OF THROUGH ROADWAY	TAPER=65:1 Δ=0°52′53″ ROADWAY DESIGN SPEED = 120 Km/Hr B = 119 m C = 79 m Lgap = 119 m	TAPER=60:1 Δ=0°57′17″ ROADWAY DESIGN SPEED = 110 Km/Hr B = 110 m C = 73 m Lgap = 110 m	TAPER=55:1 Δ=1°02′30″ ROADWAY DESIGN SPEED = 100 Km/Hr B = 101 m C = 67 m Lgap = 101 m	TAPER=50:1 Δ=1°08′45″ ROADWAY DESIGN SPEED = 90 TO 80 Km/Hr B = 91 m C = 61 m Lgap = 91 m	TAPER=45:1 Δ=1°16′23″ ROADWAY DESIGN SPEED = 70 Km/Hr or Less B = 82 m C = 55 m Lgap = 82 m
		L_a (m)	L_a (m)	L_a (m)	L_a (m)	L_a (m)
30	-3 TO LESS THAN -5	309	234	183	152	137
	BETWEEN -3 AND +3	515	390	305	225	137
	+3 TO LESS THAN +5	736	555	428	315	178
40	-3 TO LESS THAN -5	294	222	171	152	137
	BETWEEN -3 AND +3	490	370	285	205	137
	+3 TO LESS THAN +5	736	555	428	287	178
50	-3 TO LESS THAN -5	276	204	168	152	137
	BETWEEN -3 AND +3	460	340	255	175	137
	+3 TO LESS THAN +5	736	544	408	263	178
60	-3 TO LESS THAN -5	246	183	168	152	137
	BETWEEN -3 AND +3	410	290	205	152	137
	+3 TO LESS THAN +5	697	493	349	243	178
70	-3 TO LESS THAN -5	198	183	168	152	137
	BETWEEN -3 AND +3	325	200	168	152	137
	+3 TO LESS THAN +5	553	340	268	243	178
80	-3 TO LESS THAN -5	198	183	168	152	137
	BETWEEN -3 AND +3	245	183	168	152	137
	+3 TO LESS THAN +5	441	329	302	243	178
90	-3 TO LESS THAN -5	198	183	168	152	
	BETWEEN -3 AND +3	198	183	168	152	
	+3 TO LESS THAN +5	356	329	302	243	
100	-3 TO LESS THAN -5	198	183	168		
	BETWEEN -3 AND +3	198	183	168		
	+3 TO LESS THAN +5	356	329	302		
110	-3 TO LESS THAN -5	198	183			
	BETWEEN -3 AND +3	198	183			
	+3 TO LESS THAN +5	356	329			
120	-3 TO LESS THAN -5	198				
	BETWEEN -3 AND +3	198				
	+3 TO LESS THAN +5	356				

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NOTES:

1. The designer has the flexibility to choose either the taper type ramp or the parallel type ramp. However, the same type of entrance and exit ramp should be used within an interchange and corridor. Uniformity in design is needed to aid driver expectancy. On sharp curves, it may be preferable to use parallel type ramps.

2. Select design speed based on a combination of the superelevation rate and the radius of the curve. See also chapter 3 of the MDOT Road Design Manual.

3. If the through pavement is curved, plot offsets for the taper and connect with the appropriate curve.

4. Prepare detail grades and profiles from Section A-A to Section B-B.

5. The value of La or Lgap, whichever produces the greater distance downstream from the 2 ft (0.6 m) point, is suggested for use in the design of the ramp entrance. La is the acceleration distance. Lgap is the minimum distance required to find a gap in traffic and merge onto the mainline.

6. Spiral transitions should be used on new ramp alignments, based on the design speed of the curve and the radius as shown in the table of the Road Standard Plan R-107-Series. The table gives the maximum radius in which a spiral should be used.

7. The maximum algebraic difference in pavement cross slope between the mainline and the ramp auxiliary lane should not exceed 5%.

8. The cross slope in the gore area between the 2 ft (0.6 m) point and the 22 ft (6.6 m) point should not exceed 8%, with a 6% maximum algebraic difference in cross slope between the gore and the adjacent lane. This algebraic difference also applies within crowned gores.

9. The design speed of the ramp vertical alignment should meet or exceed the design speed of the ramp horizontal alignment.

10. The mainline shoulder width should extend along the ramp to where the gore is 2 ft (0.6 m) wide. Use a 1:25 taper transition where it joins the ramp shoulder paving.

11. Each ramp should be carefully studied to provide maximum vision at its merge points. See Geometric Design Guide GEO-300-Series.

12. These design concepts are for new construction. Where modifications may be needed for retrofitting to existing road features, consult with the Geometric Design Unit of Lansing Traffic and Safety.

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