

NOT TO SCALE

EDGE OF PAVEMENT ELEVATION RELATIONSHIPS

When the through lanes are not super-elevated	When the through lanes are super-elevated and "N" is lower than "M"	When the through lanes are super-elevated and "N" is higher than "M"
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.
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 N, O & P should be progressively lower.	Points m, n, o & p should be progressively lower.	Point o should be higher than point n.
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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.

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



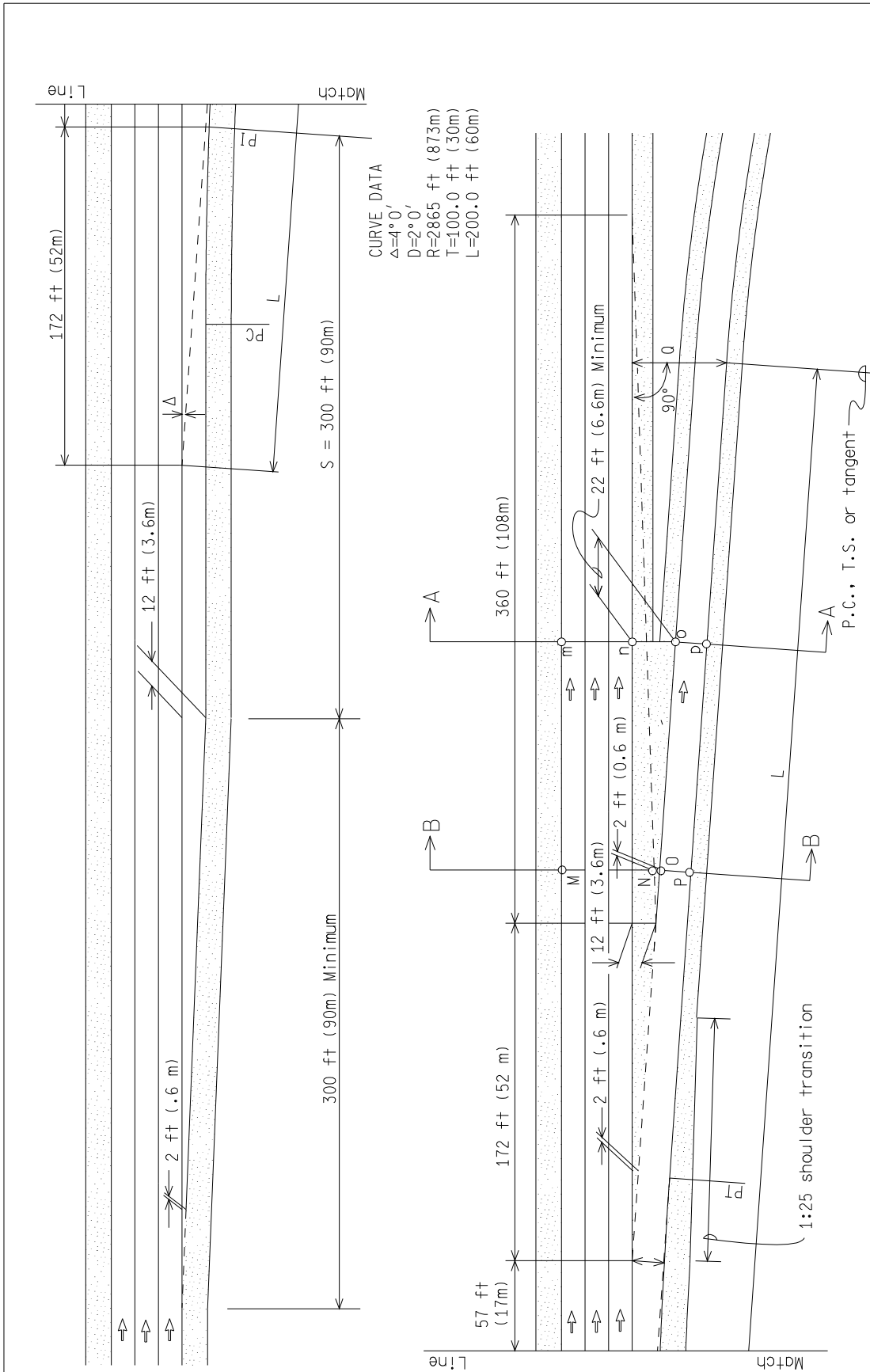
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GEOMETRIC DESIGN GUIDE FOR
ONE-LANE PARALLEL
EXIT RAMP

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NOTE:
 SEE TABLES ON FOLLOWING SHEETS
 FOR FREEWAY SPEEDS OF 70 AND
 75 MPH.

RAMP DIVERG. ANGLE	URBAN FREEWAY EXIT RAMP 60 MPH TO 30 MPH DECELERATION	
	RAMP % GRADE	L
$\Delta=4^{\circ}$	-3 TO LESS THAN -5	687.6 ft (209.6 m)
	BETWEEN -3 AND +3	601.6 ft (183.4 m)
	+3 TO LESS THAN +5	558.6 ft (170.3 m)
		0
		48.0 ft (14.6 m)
		42.0 ft (12.8 m)
		39.0 ft (11.9 m)

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MINIMUM ENGLISH LENGTHS FOR PARALLEL EXIT RAMP

RAMP DESIGN SPEED (MPH)	PERCENT GRADE OF THROUGH ROADWAY	TAPER=30:1 $\Delta=1^{\circ}54'33''$ ROADWAY DESIGN SPEED = 75 MPH $Q = 23'$ $L_d \text{ min} = 350'$	TAPER=30:1 $\Delta=1^{\circ}54'33''$ ROADWAY DESIGN SPEED = 70 MPH $Q = 23'$ $L_d \text{ min} = 350'$	TAPER=25:1 $\Delta=2^{\circ}17'26''$ ROADWAY DESIGN SPEED = 60 MPH $Q = 24'$ $L_d \text{ min} = 300'$	TAPER=25:1 $\Delta=2^{\circ}17'26''$ ROADWAY DESIGN SPEED = 55 MPH TO 50 MPH $Q = 24'$ $L_d \text{ min} = 300'$	TAPER=25:1 $\Delta=2^{\circ}17'26''$ ROADWAY DESIGN SPEED = 45 MPH OR LESS $Q = 24'$ $L_d \text{ min} = 300'$
		L_d (FT)	L_d (FT)	L_d (FT)	L_d (FT)	L_d (FT)
20	-3 TO LESS THAN -5	744	684	576	528	390
	BETWEEN -3 AND +3	620	570	480	440	325
	+3 TO LESS THAN +5	558	513	432	396	300
25	-3 TO LESS THAN -5	720	660	552	492	354
	BETWEEN -3 AND +3	600	550	460	410	300
	+3 TO LESS THAN +5	540	495	414	369	300
30	-3 TO LESS THAN -5	690	624	516	456	300
	BETWEEN -3 AND +3	575	520	430	380	300
	+3 TO LESS THAN +5	518	468	387	342	300
35	-3 TO LESS THAN -5	642	588	486	420	300
	BETWEEN -3 AND +3	535	490	405	350	300
	+3 TO LESS THAN +5	482	441	365	315	300
40	-3 TO LESS THAN -5	588	528	420	342	300
	BETWEEN -3 AND +3	490	440	350	300	300
	+3 TO LESS THAN +5	441	396	315	300	300
45	-3 TO LESS THAN -5	528	468	360	300	300
	BETWEEN -3 AND +3	440	390	300	300	300
	+3 TO LESS THAN +5	396	351	300	300	300
50	-3 TO LESS THAN -5	468	432	300	300	
	BETWEEN -3 AND +3	390	360	300	300	
	+3 TO LESS THAN +5	351	350	300	300	
55	-3 TO LESS THAN -5	468	432	300	300	
	BETWEEN -3 AND +3	390	360	300	300	
	+3 TO LESS THAN +5	351	350	300	300	
60	-3 TO LESS THAN -5	468	432	300		
	BETWEEN -3 AND +3	390	360	300		
	+3 TO LESS THAN +5	351	350	300		
65	-3 TO LESS THAN -5	468	432			
	BETWEEN -3 AND +3	390	360			
	+3 TO LESS THAN +5	351	350			
70	-3 TO LESS THAN -5	468	432			
	BETWEEN -3 AND +3	390	360			
	+3 TO LESS THAN +5	351	350			
75	-3 TO LESS THAN -5	468				
	BETWEEN -3 AND +3	390				
	+3 TO LESS THAN +5	351				

Note: When an L_d value of 300' is used for mainline design speeds of 60 mph and less, the parallel portion of the ramp is omitted, and the ramp taper connects directly with the mainline taper to form a uniform deflection (Δ).

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MINIMUM METRIC LENGTHS FOR PARALLEL EXIT RAMP

RAMP DESIGN SPEED (km/hr)	PERCENT GRADE OF THROUGH ROADWAY	TAPER=30:1 $\Delta=1^{\circ}54'33''$	TAPER=30:1 $\Delta=1^{\circ}54'33''$	TAPER=25:1 $\Delta=2^{\circ}17'26''$	TAPER=25:1 $\Delta=2^{\circ}17'26''$	TAPER=25:1 $\Delta=2^{\circ}17'26''$
		ROADWAY DESIGN SPEED = 120 Km/Hr Q = 6.9m L_d min = 107	ROADWAY DESIGN SPEED = 110 Km/Hr Q = 6.9m L_d min = 107	ROADWAY DESIGN SPEED = 100 Km/Hr Q = 7.2m L_d min = 90	ROADWAY DESIGN SPEED = 90 Km/Hr to 80 Km/Hr Q = 7.2m L_d min = 90	ROADWAY DESIGN SPEED = 70 Km/Hr OR LESS Q = 7.2m L_d min = 90m
		L_d (m)	L_d (m)	L_d (m)	L_d (m)	L_d (m)
30	-3 TO LESS THAN -5	222	204	186	162	114
	BETWEEN -3 AND +3	185	170	155	135	95
	+3 TO LESS THAN +5	167	153	140	122	90
40	-3 TO LESS THAN -5	210	192	174	144	102
	BETWEEN -3 AND +3	175	160	145	120	90
	+3 TO LESS THAN +5	158	144	131	108	90
50	-3 TO LESS THAN -5	204	180	162	132	90
	BETWEEN -3 AND +3	170	150	135	110	90
	+3 TO LESS THAN +5	153	135	122	99	90
60	-3 TO LESS THAN -5	186	168	144	120	90
	BETWEEN -3 AND +3	155	140	120	100	90
	+3 TO LESS THAN +5	140	126	108	90	90
70	-3 TO LESS THAN -5	168	144	120	90	90
	BETWEEN -3 AND +3	140	120	100	90	90
	+3 TO LESS THAN +5	126	108	90	90	90
80	-3 TO LESS THAN -5	144	126	102	90	
	BETWEEN -3 AND +3	120	107	90	90	
	+3 TO LESS THAN +5	108	107	90	90	
90	-3 TO LESS THAN -5	144	126	102	90	
	BETWEEN -3 AND +3	120	107	90	90	
	+3 TO LESS THAN +5	108	107	90	90	
100	-3 TO LESS THAN -5	144	126	102		
	BETWEEN -3 AND +3	120	107	90		
	+3 TO LESS THAN +5	108	107	90		
110	-3 TO LESS THAN -5	144	126			
	BETWEEN -3 AND +3	120	107			
	+3 TO LESS THAN +5	108	107			
120	-3 TO LESS THAN -5	144				
	BETWEEN -3 AND +3	120				
	+3 TO LESS THAN +5	108				

Note: When an L_d value of 90m is used for mainline design speeds of 100 km/hr and less, the parallel portion of the ramp is omitted, and the ramp taper connects directly with the mainline taper to form a uniform deflection (Δ).

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NOTES:

1. The designer has the flexibility to choose 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 ramp.
2. Select the design speed based on a combination of the superelevation rate and the radius of the curve. See also chapter 3 of MDOT Road Design Manual.
3. If an additional through lane is provided or the exit ramp leaves the mainline on the high side (outside) of the curve, use GEO-131-Series.
4. If the through pavement is curved, plot offsets for taper and connect with appropriate curve.
5. Prepare detail grades and profiles from Section B-B through A-A.
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 (0.6m) 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 paved lane. This algebraic difference also applies within crowned gores.
9. The design speed of the ramp vertical alignment shall match 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 shall be carefully studied to provide maximum vision at its merge points. See Geometric Design Guide Geo-300-Series.
12. The sight distance in advance of the exit ramp gore should be at least 25% longer than the minimum stopping sight distance for the design speed of the mainline.
13. 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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