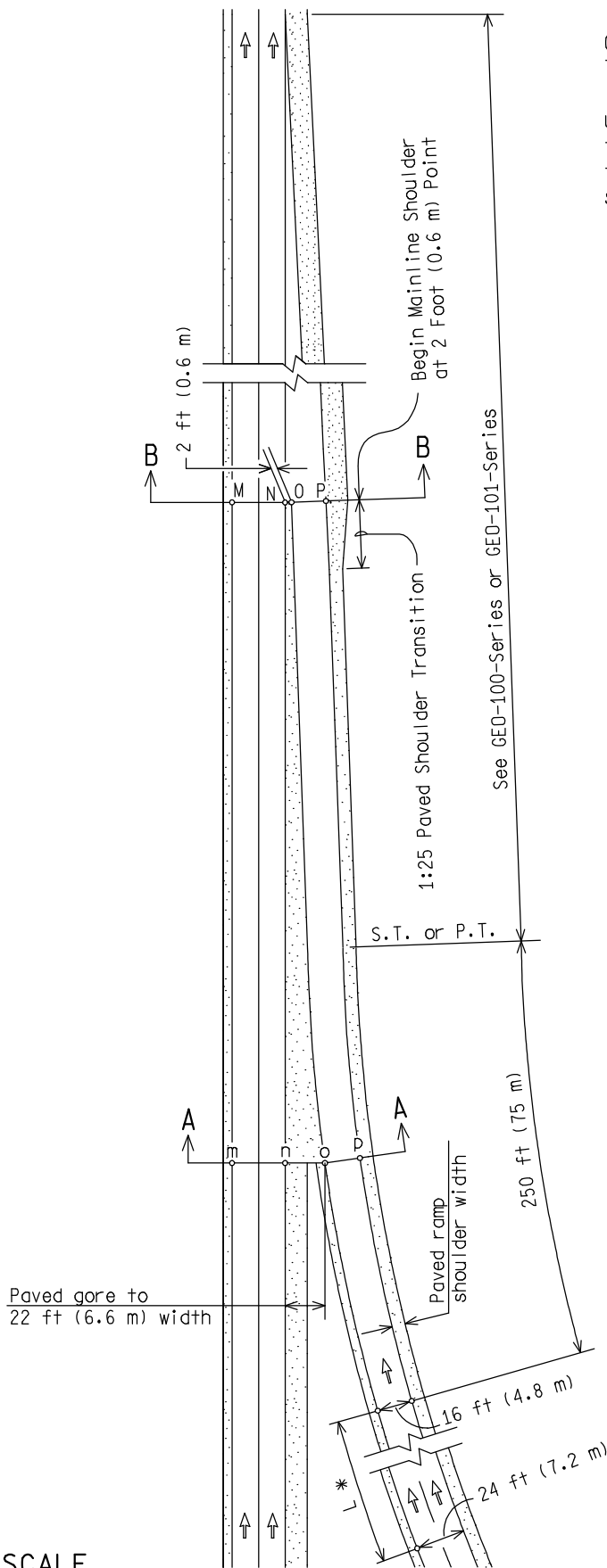


CASE I

CASE I:  
Two ramp lanes merge to one lane on ramp proper. Consider use on two lane ramps when a two lane merge is not required to obtain a desired level of service.



Calculation for Transition Length "L"  
(V = Design Speed)

English (L in Ft and V in MPH):

$$L \text{ ft} = (12)(V \text{ MPH}) \text{ for } V \geq 45 \text{ MPH}$$

$$L = \frac{V^2}{5} \text{ for } V \leq 40 \text{ MPH}$$

Metric (L in m and V in km/hr):

$$L = (2.25)(V) \text{ for } V \geq 70 \text{ km/hr}$$

$$L = \frac{V^2}{43} \text{ for } V \leq 65 \text{ km/hr}$$

\* Note: Transition to one lane should be consistently on the left or the right within the interchange, if feasible.

NOT TO SCALE



BY: *John C. Friend*  
ENGINEER OF DELIVERY

BY: *John P. Pothol*  
ENGINEER OF DEVELOPMENT

GEOMETRIC DESIGN GUIDE FOR  
TWO LANE  
ENTRANCE RAMP

DRAWN BY: LPS/ECH  
CHECKED BY: JAT/IRG

FILE:PW/RD/TS/Geom D/mdot GEO110C EOC.dgn

REV. 09/06/2007

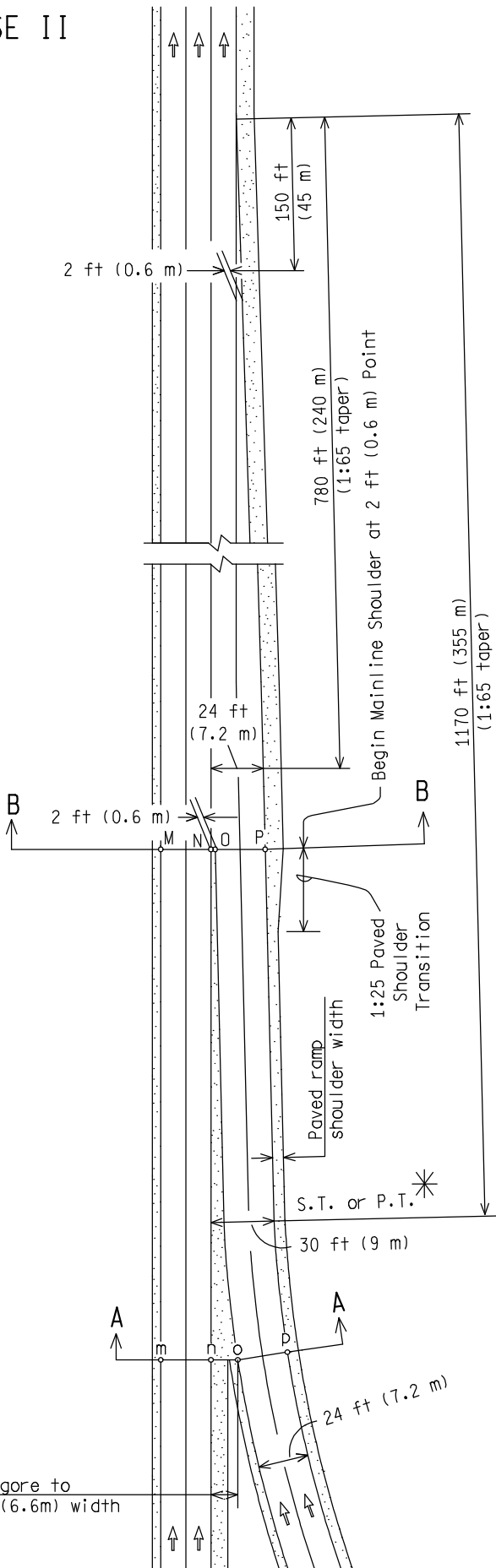
09/06/2007  
PLAN DATE:

GEO-110-C

SHEET  
1 OF 6

CASE II

CASE II:  
 Outside ramp lane is tapered away. Inside ramp lane is added, consider use on 2 lane ramps to achieve a desired level of service. If an additional lane drop is required, the added lane may be dropped after 0.5 mile (800 meters).

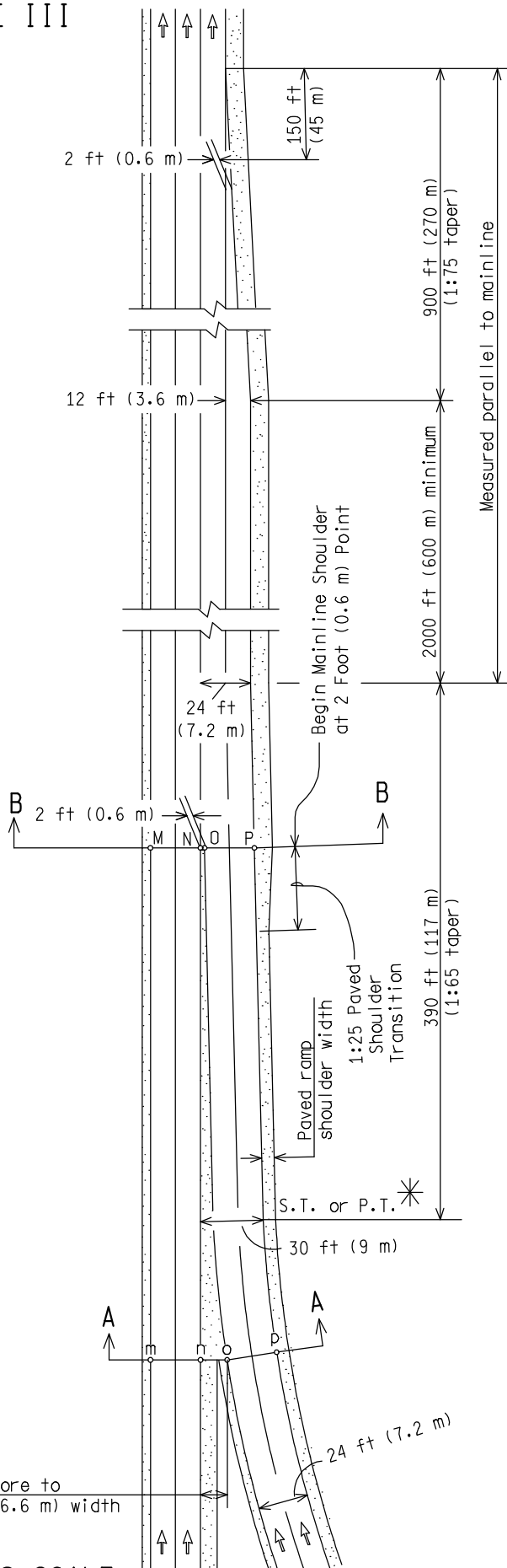


Mainline Design Speed = 75 MPH (120 Km/hr)

\* When transition spiral is used, reduce the 1170 feet (355 meters) by half of the transition spiral length. The 30 foot (9 meter) lateral offset distance should be recalculated.

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# CASE III



## CASE III:

Outside ramp lane is dropped after a parallel section. Inside ramp lane is added. Consider use on two lane ramps when the desired level of service is not met by Case II. If an additional lane drop is required, the added lane may be dropped after 0.5 miles (800 meters).

Mainline Design Speed = 75 MPH (120 Km/hr)

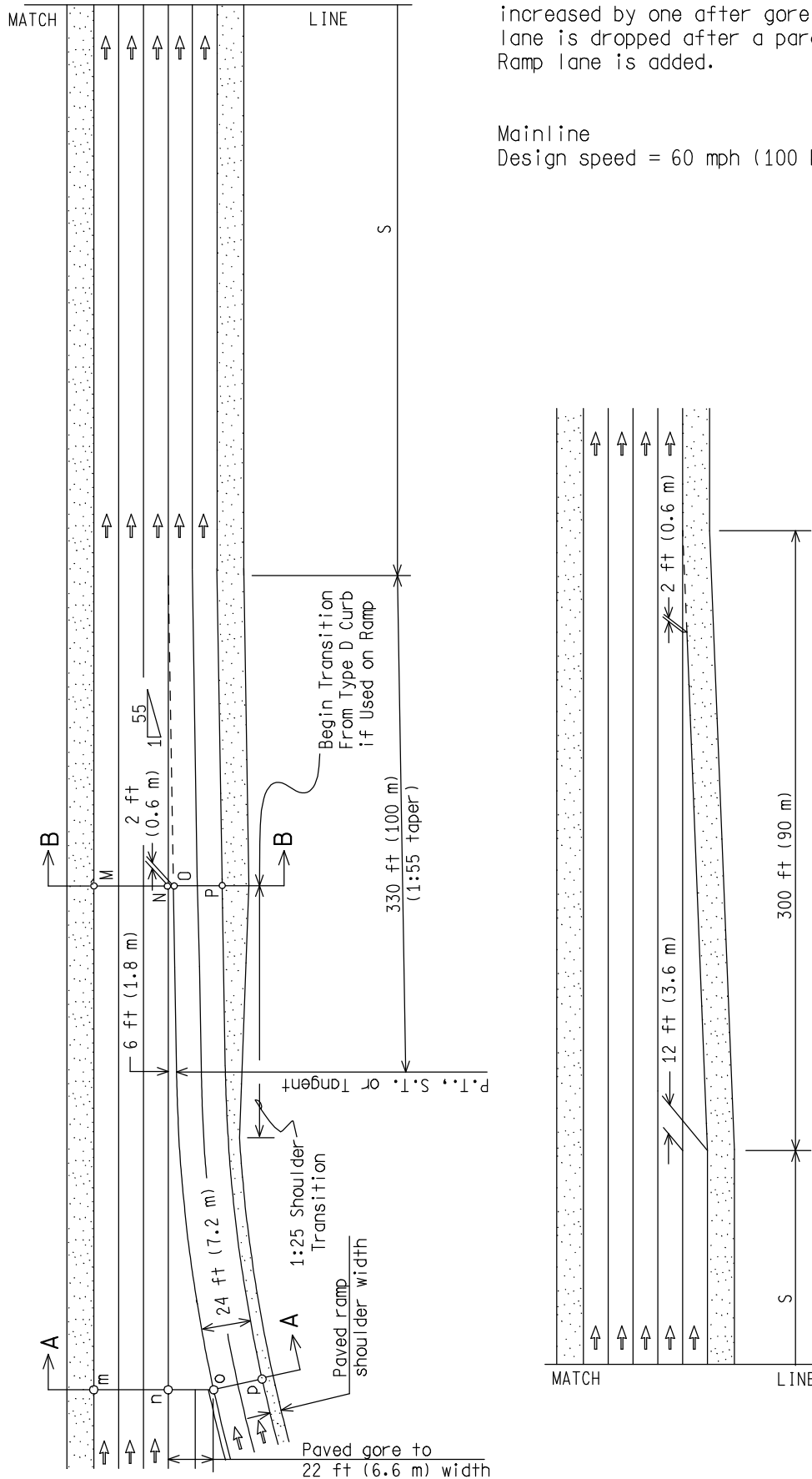
\* When transition spiral is used, reduce the 390 feet (117 meters) by half of the transition spiral length. The 30 foot (9 meter) lateral offset distance should be recalculated.

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# CASE IV

CASE IV:  
 Two lane entrance with freeway lanes increased by one after gore. Outside ramp lane is dropped after a parallel section. Ramp lane is added.

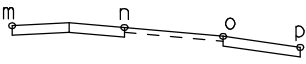
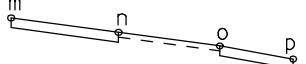
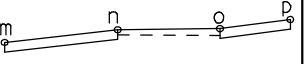
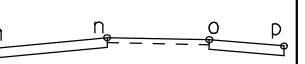
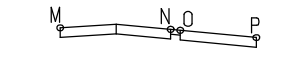
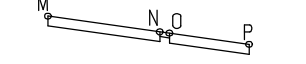
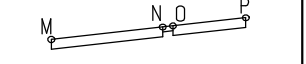
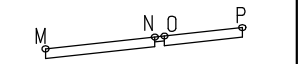
Mainline  
 Design speed = 60 mph (100 km/hr).



Mainline	
60 MPH (100 km/hr) Freeway Design Speed	S in Feet (Meters)
Percent Grade of Through Roadway	
-3 to less than -5	380 (115)
Between -3 and +3	680 (185)
+3 to less than +5	1080 (340)

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# EDGE OF PAVEMENT ELEVATION RELATIONSHIPS

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

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

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NOTES:

1. Select design speed based on combination of the superelevation rate and the radius of the curve. See chapter 3 of the MDOT Road Design Manual.
2. If the through pavement is curved, plot offsets for the taper and connect with the appropriate curve.
3. Prepare detail grades and profiles from Section A-A to Section B-B to assure proper drainage.
4. 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 maximum radius in which a spiral should be used.
5. The maximum algebraic difference in pavement cross slope between the mainline and the ramp auxiliary lane should not exceed 5%.
6. 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.
7. The design speed of the ramp vertical alignment should meet or exceed the design speed of the ramp horizontal alignment.
8. 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.
9. Each ramp should be carefully studied to provide maximum vision at its merge points. See Geometric Design Guide GEO-300-Series.
10. Two lane ramps should be 24 ft (7.2 m) minimum edge to edge. Radii less than 500 ft (150 m) may require widening, consult the Geometric Design Unit of Lansing Traffic and Safety.
11. The longitudinal joint on a 24 foot (7.2m) ramp pavement shall be located 12 feet (3.6m) from the right edge of the pavement and ended where the ramp width becomes 16 feet (4.8m).
12. These design concepts are for new construction. Where modification may be needed for retrofitting to existing road features, consult the Geometric Design Unit of Lansing Traffic and Safety.

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