Design Element				Manual Section	Design Values (By Type of Area)		
					Suburban	Intermediate	Built-Up
Design Controls	Design Forecast Period			55-4.01	20 Years (1)	20 Years (1)	20 Years (1)
	*Design Speed (km/h) (2)			55-4.01	Posted Speed Limit	Posted Speed Limit	Posted Speed Limit
	Access Control			40-5.0	Partial Control / None	None	None
	Level of Service			40-2.0	Des: B; Min: D	Des: C; Min: D	Des: C; Min: D
	On-Street Parking			45-1.0	None	Optional (3)	Optional (3)
Cross Section Elements	Travel Lane	*Width (4)		55-4.05	Curbed: Des: 3.6 m; Min: 3.3 m Uncurbed: Des: 3.6 m; Min: 3.3 m	Curbed: Des: 3.6 m; Min: 3.3 m Uncurbed: Des: 3.6 m; Min: 3.3 m	Curbed: Des: 3.6 m; Min: 3.0 m
		Typical Surface Type (5)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	*Curb Offset (6)			55-4.05	Des: 0.6 m; Min: 0.3 m	Des: 0.6 m; Min: 0.3 m	Des: 0.6 m; Min: 0.3 m
	Shoulder	*Paved Width (7)		55-4.05	Curbed, Rt. Des: 3.0 m; Min 0.3 m Curbed, Lt. Des: 1.2 m; Min 0.3 m Uncurbed, Rt.: 3.0 m; Lt.: 1.2 m	Curbed, Rt. Des: 2.4 m; Min 0.3 m Curbed, Lt. Des: 0.9 m; Min 0.6 m Uncurbed, Rt.: 2.4 m; Lt.: 0.9 m	Right: 1.8 m; Left: 0.9 m
		Typical Surface Type (5)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	Cross Slope	*Travel Lane (8)		55-4.05	2% - 3%	2% - 3%	2% - 3%
		Shoulder (9)		55-4.05	Rt.: 4% - 6%; Lt.: 2% - 3%	Paved Width ≤ 1.2 m: 2%-3%; Paved Width > 1.2m: 4%-6%	Paved Width ≤ 1.2 m: 2%-3%; Paved Width > 1.2m: 4%-6%
	Auxiliary Lanes	Lane Width		55-4.05	Des: 3.6 m; Min: 3.3 m	Des: 3.6 m; Min: 3.0 m	Des: 3.6 m; Min: 3.0 m
		Curb Offset			Des: 0.3 m; Min: 0.0 m	Des: 0.3 m; Min: 0.0 m	Des: 0.3 m; Min: 0.0 m
		Shoulder Width			Des: 3.0 m; Min: 0.6 m	Des: 2.4 m; Min: 0.6 m	Des: 1.8 m; Min: 0.6 m
		Typical Surface Type (5)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	TWLTL-Lane Width			46-5.0	Des: 4.8 m; Min. 4.2 m	Des: 4.8 m; Min: 3.6 m	Des: 4.2 m; Min: 3.3 m
	Parking-Lane Width			45-1.04	N/A	Des: 3.0 m; Min: 2.4 (10)	Des: 3.0 m; Min: 2.4 m (10)
	Median Width	Depressed		55-4.05	Existing	Existing	N/A
		Raised Island			Des: 4.8 m; Min: 0.6 m	Des: 4.8 m; Min: 0.6 m	Des: 4.8 m; Min: 0.6 m
		Flush / Corrugated			Des: 4.8 m; Min: 0.6 m	Des: 4.8 m; Min: 0.6 m	Des: 4.8 m; Min: 0.6 m
	Sidewalk Width (11)			55-4.05	1.2 m with 1.5-m Buffer (Des)	Des: 1.8 m; Min: 1.2 m	Des: 1.8 m; Min: 1.2 m
	Bicycle-Lane Width (12)			51-7.0	Curbed: 1.5 m Uncurbed: Shld. Width +1.2 m	Curbed: 1.5 m Uncurbed: Shld. Width +1.2 m	Curbed: 1.5 m
	Obstruction-Free Zone			55-5.02	See Section 55-5.02	See Section 55-5.02	See Section 55-5.02
	Typical Curbing Type (where used) (13)			55-4.05	Sloping / Vertical	Sloping / Vertical	Sloping / Vertical
	Side Slopes (Uncurbed)	Cut	Foreslope	55-4.05	2:1 or Flatter	2:1 or Flatter (14)	N/A
			Ditch Width		(14)	(14)	N/A
			Backslope		2:1 or Flatter (14)	2:1 or Flatter (14)	N/A
		Fill			2:1 or Flatter (14)	2:1 or Flatter (14)	N/A
	Side Slopes (Curbed)	Cut (Backslope)		55-4.05	(15)	(15)	(15)
		Fill			2:1 or Flatter (14)	2:1 or Flatter (14)	2:1 or Flatter (14)
	Median Slopes (Depressed)			55-4.05	Desirable: 8:1; Maximum: 4:1	Desirable: 8:1; Maximum: 4:1	Desirable: 8:1; Maximum: 4:1

Des: Desirable; Min: Minimum
* Controlling design criterion.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

Figure 55-3E

Design Element			Manual Section	Design Values (By Type of Area)				
				Suburban	Intermediate	Built-Up		
Bridges	New or Reconstructed Bridge	*Structural Capacity (16)	Ch. 60	HL-93	HL-93	HL-93		
		*Clear-Roadway Width(17)	55-6.03	Curbed: Full Approach Curb-to-Curb Width Uncurbed: Full Approach Width				
	Existing Bridge to Re-main in Place	*Structural Capacity	Ch. 72	HS-20	HS-20	HS-20		
		*Clear-Roadway Width	55-6.02	Curbed: Full Approach Curb-to-Curb Width; Uncurbed: Travelway Plus 0.6 m on Each Side				
	*Vertical Clearance (Arterial Under)	New or Replaced Overpassing Bridge (18a & 18c)	55-6.0	5.05 m	5.05 m (18b)	5.05 m (18b)		
		Existing Overpassing Bridge (19)		4.30 m	4.30 m	4.30 m		
		Sign Truss / Pedestrian Bridge (18a & 18c)		New: 5.35 m; Existing: 5.20 m	New: 5.35 m; Existing: 5.20 m	New: 5.35 m; Existing: 5.20 m		
	Vertical Clearance (Arterial over Railroad) (20)		Ch. 69	7.00 m				
Alignment Elements	Design Speed		---	50 km/h	60 km/h	70 km/h	80 km/h	90 km/h
	*Stopping Sight Distance		55-4.02	65 m	85 m	105 m	130 m	160 m
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	U: 195 m SU: 170 m	U: 235 m SU: 205 m	U: 275 m SU: 235 m	U: 315 m SU: 270 m	U: 360 m SU: 315 m
		Stop Maneuver		155 m	195 m	235 m	280 m	325 m
	Intersection Sight Distance, -3% to +3% (21)		55-4.06	P: 105 m SU: 135 m	P: 125 m SU: 160 m	P: 150 m SU: 185 m	P: 190 m SU: 235 m	P: 230 m SU: 280 m
	*Minimum Radius		55-4.03	See Section 55-4.03				
	*Superelevation Rate		55-4.03	See Section 55-4.03				
	*Horizontal Sight Distance		55-4.03	See Section 55-4.03				
	*Vertical Curvature (K-values)	Crest	55-4.04	See Section 55-4.04				
		Sag		See Section 55-4.04				
	*Maximum Grade	Level	55-4.04	10%	9%	8.5%	8%	7%
		Rolling		11%	10%	9.5%	9%	8%
	Minimum Grade		44-1.03	Curbed Des: 0.5%; Curbed Min: 0.3% Uncurbed: 0.0%				

SU: Suburban. U: Urban.

* Controlling design criterion. A deviation from such is a design exception, and is subject to approval. See Section 40-8.0.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

Figure 55-3E (Continued)

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

Footnotes to Figure 55-3E

(1) Design Forecast Period. For a partial 3R project, the pavement should be designed for at least a 10-year design life.

(2) Design Speed. The minimum design speed should equal the anticipated posted speed limit after construction or the legal speed limit on a non-posted highway. This is 48 km/h (30 mph), but with an engineering study it may be raised to a maximum of 88 km/h (55 mph).

(3) On-Street Parking. In general, on-street parking is discouraged.

(4) Travel Lane (Width). For an arterial on the National Truck Network, the right lane must be 3.6m in width. For a non-National-Truck-Network route, a minimum 3.3-m travel lane should be used where truck volume exceeds 200 trucks per day. See Section 55-4.05.

(5) Surface Type. The pavement type selection will be determined by the Office of Pavement Engineering or by the local jurisdiction.

(6) Curb Offset. Vertical curbs which are either continuous or introduced intermittently may be offset 0.3 m.

(7) Shoulder Width. The value applies to paved-shoulder width. The following will also apply:

a. For an uncurbed section, the shoulder is paved to the face of guardrail. The desirable guardrail offset is 0.6 m from the effective usable-shoulder width. See Section 49-5.0 for more information.
b. For an uncurbed section, a desirable additional 0.3 m of compacted aggregate will be provided.
c. If guardrail is present, the minimum offset from E.T.L. to face of guardrail should desirably be equal to the shy-line offset distance, but not less than 1.2 m (see Section 49-5.0 for shy-line offsets). In a restrictive situation, the guardrail offset may be 0.3 m from the effective usable-shoulder width.
d. For a curbed section, the curb offset is included in the paved-shoulder width.

(8) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.

(9) Cross Slope (Shoulder). Value is for a tangent section. See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information. See Figure 43-3M or Figure 43-3N for shoulder cross slope on a horizontal curve.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

Footnotes to Figure 55-3E (Continued)

(10) Parking Lane Width. The following will apply:

a. Where the parking lane will be used as a travel lane during peak hours or may be converted to a travel lane in the future, the width should be equal to the travel lane width plus the curb offset width (if present).
b. A parking lane for residential usage may be 2.1 m narrower.
c. The cross slope for a parking lane is typically 1% steeper than that of the adjacent travel lane.

(11) Sidewalk Width. Value is for the installation of a new sidewalk. An existing sidewalk width of 0.9 m or greater (with or without a buffer) may be retained. A buffer strip of 1.2 m or more is desirable.

(12) Bicycle-Lane Width. The value is in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.

(13) Curbing Type. Vertical curbs may only be used with design speed lower than 80 km/h.

(14) Side Slopes. Section 55-4.05 provides additional information for side-slope criteria.

(15) Side Slope (Curbed) Cut. A shelf or sidewalk will be present immediately behind the curb before the toe of the backslope. The minimum width of a shelf desirably should be 1.8 m. Where a sidewalk is present, the toe of the backslope will be 0.3 m beyond the edge of sidewalk. See Section 45-3.0 for more information.

(16) Structural Capacity (New or Reconstructed Bridge). The following will apply:

a. HS-25 loading with Alternate Military Loading should be applied for each project with notice to proceed with design beginning September 1, 2004, through December 31, 2005.
b. Each State highway bridge within 25 km of a Toll-Road gate must be designed for Toll-Road loading.
c. Each bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck loading configuration.
d. See Chapter Sixty for additional information on the loading criteria.

(17) Width (New or Reconstructed Bridge). Width is minimum for a 3R project. See Section 59-1.0 for additional information on bridge width.

GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT

Footnotes to Figure 55-3E (Continued)

(18) Vertical Clearance (Arterial Under Railroad). The following will apply:

a. Value includes an additional 150-mm allowance for a future pavement overlay.
b. In a highly-urbanized area, a minimum clearance of 4.30 m may be provided if there is at least one route with a 4.90-m clearance.
c. Vertical clearance applies from usable edge to usable edge of shoulder.

(19) Vertical Clearance (Existing Bridge). See Section 55-6.02 for additional information on minimum allowable vertical clearance.

(20) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.

(21) Intersection Sight Distance. For left turn onto a 2-lane road, P = Passenger car; SU = single unit truck. See Figure 46-10G for value for a combination truck.