

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 Remain 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:
- 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).
 - A parking lane for residential usage may be 2.1 m narrower.
 - 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:
- 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.
 - Each State highway bridge within 25 km of a Toll-Road gate must be designed for Toll-Road loading.
 - Each bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck loading configuration.
 - 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.