

Design Element		Manual Section	Design Value (By Type of Area)				
			Suburban	Intermediate	Built-Up		
Design Controls	Design Forecast Period	40-2.02	20 Years	20 Years	20 Years		
	*Design Speed (km/h) (2)	40-3.0	Curbed: 50 – 80 Uncurbed: 50 – 80	Curbed: 50 – 70 Uncurbed: 50 – 70	Curbed: 50 – 60		
	Access Control	40-5.0	None	None	None		
	Level of Service	40-2.0	Desirable: C; Minimum: D	Desirable: C; Minimum: D	Desirable: C; Minimum: D		
	On-Street Parking	45-1.04	Optional (3)	Optional (3)	Optional (3)		
Alignment Elements	Travel Lane	*Width (4)	45-1.01	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)	45-1.02	0.6 m	0.6 m	0.6 m		
	Shoulder	*Paved Width (7)	45-1.02	Curbed Des: 2.4 m; Min: 0.6 m Uncurbed: 2.4 m	Curbed: Des: 1.8 m; Min: 0.6 m Uncurbed: 1.8 m	2.4 m	
		Typical Surface Type (5)	Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	Cross Slope	*Travel Lane (8)	45-1.01	2%	2%	2%	
		Shoulder (8A)	45-1.02	4%	4%	2%	
	Auxiliary Lane	Lane Width	45-1.03	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: 2.4 m; Min: 0.6 m	Des: 1.8 m; Min: 0.6 m	Des: 1.2 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: 3.6 m	Des: 4.2 m; Min: 3.6 m	Des: 4.2 m; Min: 3.6 m	
	Parking-Lane Width (1)		45-1.04	Des: 3.3 m; Min: 2.4 m	Des: 3.3 m; Min: 2.4 m	Des: 3.3 m; Min: 2.4 m	
	Median Width	Raised Island	45-2.0	Des: 5.4 m; Min: 1.2 m (9)	Des: 5.4 m; Min: 1.2 m (9)	Des: 5.4 m; Min: 1.2 m (9)	
		Flush / Corrugated		Des: 4.8 m; Min: 1.2 m (9)	Des: 4.8 m; Min: 1.2 m (9)	Des: 4.8 m; Min: 1.2 m (9)	
	Sidewalk Width (10)		45-1.06	1.5 m with 1.5-m Buffer (Des)	1.5 m with 1.5-m Buffer (Des)	Varies, 1.8 m Min	
	Bicycle-Lane Width (11)		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	
	Clear Zone		49-2.0	(12)	(12)	(12)	
	Typical Curbing Type (where used) (13)		45-1.05	Sloping / Vertical	Sloping / Vertical	Sloping / Vertical	
	Side Slopes (Uncurbed) (14)	Cut	Foreslope	45-3.0	Des: 6:1; Max: 4:1 (15)	Des: 6:1; Max: 4:1 (15)	N/A
			Ditch Width		1.2 m (16)	1.2 m (16)	N/A
			Backslope		4:1 for 1.2 m; 3:1 Max. to Top (17)	4:1 for 1.2 m; 3:1 Max. to Top (17)	N/A
		Fill	Des: 6:1 to Clr Zone; 3:1 Max to Toe Max: 4:1 to Clr Zone; 3:1 Max to Toe		Des: 6:1 to Clr Zone; 3:1 Max to Toe Max: 4:1 to Clr Zone; 3:1 Max to Toe	N/A	
Side Slopes (Curbed)	Cut(Backslope)	45-3.0	(18)	(18)	(18)		
	Fill (19)		12:1 for 3.6 m; 3:1 Max to Toe	12:1 for 3.6 m; 3:1 Max to Toe	12:1 for 3.6 m; 3:1 Max to Toe		

* Controlling design criterion.

Des: Desirable; Min: Minimum.

GEOMETRIC DESIGN CRITERIA FOR URBAN COLLECTOR (New Construction or Reconstruction)

Figure 53-8

Design Element		Manual Section	Design Value (By Type of Area)				
			Suburban	Intermediate	Built-Up		
Bridges	New or Reconstructed Bridge	*Structural Capacity (20)	Ch. 60	HL-93	HL-93	HL-93	
		*Clear-Roadway Width(21)	45-4.01	Uncurbed: Full Paved Approach Width Curbed: Full Approach Curb-to-Curb Width			
	Existing Bridge to Remain in Place	*Structural Capacity	Ch. 72	HS-20	HS-20	HS-20	
		*Clear-Roadway Width	45-4.01	Uncurbed: Travelway Plus 0.6 m on Each Side Curbed: Full Approach Curb-to-Curb Width			
	*Vertical Clearance (Collector) (22)	New or Replaced Overpassing Bridge (22)	44-4.0	4.45 m	4.45 m	4.45 m	
		Existing Overpassing Bridge		4.30 m	4.30 m	4.30 m	
Vertical Clearance (Collector over Railroad) (23)		Ch. 69	7.00 m				
Alignment Element	Design Speed			50 km/h	60 km/h	70 km/h	80 km/h
	*Stopping Sight Distance		42-1.0	65 m	85 m	105 m	130 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
		Stop Maneuver		155 m	195 m	235 m	280 m
	Intersection Sight Distance, -3% to +3% (28)		46-10.0	P: 105 m SU: 135 m	P: 125 m SU: 160 m	P: 150 m SU: 185 m	P: 190 m SU: 235 m
	*Minimum Radius for $e_{max} = 4\% / 6\%$		43-2.0	80 m / 75 m (24a)	130 m / 120 m (24a)	185 m / 170 m (24a)	230 m (24b)
	*Superelevation Rate (25)		43-3.0	Up to $e_{max} = 6\%$			$e_{max} = 8\%$
	*Horizontal Sight Distance		43-4.0	(26)			
	*Vertical Curvature (K-value)	Crest	44-3.0	7	11	17	26
		Sag		13	18	23	30
	*Maximum Grade (27)	Level	44-1.02	9%	9%	8%	7%
Rolling		11%		10%	9%	8%	
Minimum Grade		44-1.03	Desirable: 0.5% Minimum: 0.3% (Curbed); 0.0% (Uncurbed)				

U: Urban; SU: Suburban.

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

These criteria apply regardless of funding source.

**GEOMETRIC DESIGN CRITERIA FOR URBAN COLLECTOR
(New Construction or Reconstruction)**

Figure 53-8 (Continued)

GEOMETRIC DESIGN CRITERIA FOR URBAN COLLECTOR
(New Construction or Reconstruction)

Footnotes to Figure 53-8

- (1) Parking Lane. In a residential area, a parallel parking lane of 2.1 to 2.4 m width should be provided on one or both sides of the street. In a commercial or industrial area, parking-lane width should range from 2.4 to 3.3 m, and lanes should be provided on both sides of the street. The minimum value may only be used if the lane is not intended for use as a travel lane in a restricted condition. Where a curb-and-gutter section is used, the gutter-pan width may be considered as part of the parking-lane width. Where practical, the parking-lane width should be in addition to the gutter-pan width.
- (2) Design Speed. The minimum design speed should equal the minimum value, the anticipated posted speed limit after construction, or the legal speed limit on a non-posted highway. The legal speed limit in an urban district is 30 mph (48 km/h). Based upon an engineering study, the design speed may be raised to an absolute maximum of 55 mph (88 km/h).
- (3) On-Street Parking. In general, on-street parking is discouraged.
- (4) Travel-Lane Width. In an industrial area, a 3.6-m width should be used. Where right-of-way is restricted, a 3.3-m width may be used in an industrial area, or a 3.0-m width may be used in a residential area. On a multi-lane facility in a built-up area, the minimum width is 3.0 m.
- (5) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.
- (6) Curb Offset. The curb offset should be 0.6 m. Vertical curbs introduced intermittently should be offset 0.6 m. A continuous curb used along a median or channelizing island 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 front 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. 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.
- (8A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.
- (9) Minimum Median Width. The criteria assume the presence of mountable curbs with a 0-m curb offset.
- (10) Sidewalk Width. A buffer of less than 0.6 m wide is not permitted. If no buffer is provided, the sidewalk width should be 1.8 m.
- (11) Bicycle-Lane Width. The width is in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.
- (12) Clear Zone. The following will apply.
 - a. Facility with Vertical Curbs. The clear zone will be measured from the edge of travel lane or will be to the right-of-way line, whichever is less. No clear zone is required where there is 24-h parking.
 - b. Facility with Sloping Curbs or without Curbs. The clear zone will vary according to design speed, traffic volume, side slopes, and horizontal curvature.
 - c. Curbed Facility. There should be an appurtenance-free area as measured from the gutter line of a curb.
 - d. Value. See Section 49-2.0 for specific clear-zone value.

Footnotes to Figure 53-8 (continued)

- (13) Curbing Type. Vertical curbs may only be used with a design speed 70 km/h or lower.
- (14) Side Slopes (Uncurbed). Value is for new construction. See Sections 45-3.0 and 45-8.0 for more information. For a reconstruction project, see Section 49-3.0.
- (15) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.
- (16) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.
- (17) Backslope. The backslope for a rock cut will vary according to the height of the cut and the geotechnical requirements. See Section 45-8.0 for typical rock-cut sections.
- (18) 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 will 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.
- (19) Side Slope (Curbed) Fill. If no sidewalks are present or planned, the lateral extent of the 12:1 slope may be reduced to 1.2 m.
- (20) 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 Sept. 1, 2004, through Dec. 31, 2005.
 - b. A State-highway bridge within 25 km of a Toll-Road gate must be designed for Toll-Road loading.
 - c. A 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 configurations.
- (21) Width (New or Reconstructed Bridge). See Section 59-1.0 for more information on bridge width.
- (22) Vertical Clearance (Collector Under Railroad). Value includes an additional 150-mm allowance for future pavement overlays. Vertical clearance applies from usable edge to usable edge of shoulder.
- (23) Vertical Clearance (Collector Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.
- (24) Minimum Radius. The following will apply.
 - a. Based on $e_{\max} = 4\%$ or 6% and low-speed urban street conditions.
 - b. Based on $e_{\max} = 8\%$ and open-road conditions.
- (25) Superelevation Rate. See Section 43-3.0 for value of superelevation rate based on design speed and radius. See Section 43-3.0 and the INDOT *Standard Drawings* for information on superelevation requirements.
- (26) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance which applies at the site. See the discussion in Section 43-4.0.
- (27) Maximum Grade. For a grade along a longitudinal distance of less than 150 m (PVT to PVC), a one-way downgrade, or a road with AADT < 400, the maximum grade may be up to 2% steeper than the table value. Where adjacent sidewalks are present, the maximum desirable grade is 5%.
- (28) Intersection Sight Distance. For a left turn onto a 2-lane roadway: P = Passenger car; SU = single unit truck. See Figure 46-10G for value for a combination truck.