

Design Element			Manual Section	Design Values (By Type of Area)			
				Suburban	Intermediate	Built-Up	
Design Controls	Design Forecast Year		40-2.02	20 Years	20 Years	20 Years	
	Design Speed (mph) (1)		40-3.0	Curbed: 45-55 Uncurbed: 50-60	Curbed: 40-50 Uncurbed: 50-60	Curbed: 30-35	
	Access Control		40-5.0	Partial Control / None	None	None	
	Level of Service		40-2.0	Des: B; Min: C	Des: C; Min: D	Des: C; Min: D	
	On-Street Parking		45-1.04	None	Optional (2)	Optional (2)	
Cross Section Elements	Travel Lane	*Width (3)	45-1.01	Curbed: 12 ft Uncurbed: 12 ft	Curbed: Des.: 12 ft; Min.: 11 ft Uncurbed: Des.: 12 ft; Min.: 11 ft	Curbed: Des.: 12 ft; Min.: 10 ft	
		Typical Surface Type (4)	Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	*Curb Offset (5)		45-1.02	2 ft	2 ft	2 ft	
	Shoulder	*Paved Width (6)	45-1.02	Curbed, Rt. Des: 10 ft; Min 2 ft Curbed, Lt. Des: 4 ft; Min 2 ft Uncurbed, Rt.: 10 ft; Lt.: 4 ft	Curbed, Rt. Des: 8 ft; Min 2 ft Curbed, Lt. Des: 4 ft; Min 2 ft Uncurbed, Rt.: 8 ft; Lt.: 4 ft	Right: 6 ft; Left: 4 ft	
		Typical Surface Type (4)	Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	Cross Slope	*Travel Lane (7)	45-1.01	2%	2%	2%	
		Shoulder (7A)	45-1.02	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2%; Paved Width > 4 ft: 4%	
	Auxiliary Lanes	Lane Width		45-1.03	Des: 12 ft; Min: 11 ft	Des: 12 ft; Min: 11 ft	Des: 12 ft; Min: 10 ft
		Curb Offset (8)		45-1.03	1 ft	1 ft	1 ft
		Shoulder Width		45-1.03	Des: 10 ft; Min: 2 ft	Des: 8 ft; Min: 2 ft	Des: 6 ft; Min: 2 ft
		Typical Surface Type (4)		Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete
	TWLTL Lane Width			46-5.0	Des: 16 ft; Min: 14 ft	Des: 16 ft; Min: 14 ft	Des: 14 ft; Min: 12 ft
	Parking Lane Width			45-1.04	N/A	Des: 12 ft; Min: 10 ft (9)	Des: 12 ft; Min: 10 ft (9)
	Median Width	Depressed		45-2.0	26.5 ft – 50 ft	N/A	N/A
		Raised Island		45-2.0	Des: 18 ft; Min: 13 ft (10)	Des: 18 ft; Min: 4 ft (10)	Des: 18 ft; Min: 4 ft (10)
		Flush / Corrugated		45-2.0	Des: 16 ft; Min: 13 ft (10)	Des: 16 ft; Min: 4 ft (10)	Des: 16 ft; Min: 4 ft (10)
	Sidewalk Width (11)			45-1.06	5 ft with 5 ft Buffer (Des)	5 ft with 5 ft Buffer (Des)	Varies; 6 ft Min
	Bicycle Lane Width (12)			51-7.0	Curbed: 5 ft Uncurbed: Shld Width +4 ft	Curbed: 5 ft Uncurbed: Shld Width +4 ft	Curbed: 5 ft
	Clear Zones			49-2.0	(13)	(13)	(13)
	Typical Curbing Type (where used) (14)			45-1.05	Sloping / Vertical	Sloping / Vertical	Sloping / Vertical
	Side Slopes (Uncurbed) (15)	Cut	Foreslope	45-3.0	6:1 (16)	6:1 (16)	N/A
			Ditch Width		4 ft (17)	4 ft (17)	N/A
			Backslope		4:1 for 20 ft; 3:1 Max. to Top (18)	4:1 for 20 ft; 3:1 Max. to Top (18)	N/A
Fill		6:1 to Clear Zone; 3:1 Max. to Toe	6:1 to Clear Zone; 3:1 Max. to Toe		N/A		
Side Slopes (Curbed)	Cut (Backslope)		45-3.0	(19)	(19)	(19)	
	Fill		45-3.0	12:1 for 12 ft; 3:1 Max. to Toe	12:1 for 12 ft; 3:1 Max. to Toe	12:1 for 12 ft; 3:1 Max. to Toe	
Median Slopes (Depressed)			45-2.0	Des: 8:1; Max: 5:1	N/A	N/A	

*Controlling design criteria (see Section 40-8.0). Des: Desirable. Min: Minimum.

**GEOMETRIC DESIGN CRITERIA FOR MULTI-LANE URBAN ARTERIAL
(New Construction or Reconstruction)**

Table 53-6

Design Element		Manual Section	Design Values (By Type of Area)					
			Suburban	Intermediate	Built-Up			
Bridges	New or Reconstructed Bridge	*Structural Capacity (20)	Ch. 60	HS-25	HS-25	HS-25		
		*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 2 ft on Each Side; Curbed: Full Approach Curb-to-Curb Width				
	*Vertical Clearance (Arterial Under) (22)	New or Replaced Overpassing Bridge (22a)	44-4.0	16.5 ft	16.5 ft (22b)	16.5 ft (22b)		
		Existing Overpassing Bridge		14 ft	14 ft	14 ft		
Sign Truss / Pedestrian Bridge (22a)		New: 17.5 ft; Existing: 17 ft		New: 17.5ft; Existing: 17 ft	New: 17.5 ft; Existing: 17 ft			
Vertical Clearance (Arterial over Railroad) (23)		Ch. 69	7.00 m					
Alignment Elements	Design Speed			30 mph	35 mph	45 mph	50 mph	55 mph
	*Stopping Sight Distance		42-1.0	210 ft	270 ft	340 ft	420 ft	520 ft
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	U: 630 ft SU: 550 ft	U: 770 ft SU: 670 ft	U: 900 ft SU: 770 ft	U: 1030 ft SU: 880 ft	U: 1180 ft SU: 1030 ft
		Stop Maneuver		500 ft	630 ft	770 ft	910 ft	1060 ft
	Intersection Sight Distance, -3% to +3% (28)		46-10.0	P: 350 ft SU: 450 ft	P: 410 ft SU: 530 ft	P: 500 ft SU: 610 ft	P: 630 ft SU: 770 ft	P: 760 ft SU: 920 ft
	*Minimum Radii for $e_{max} = 4\% / 6\%$		43-2.0	260 ft/240 ft (24a)	420ft/390 ft (24a)	600 ft/ 550 ft (24a)	750 ft (24b)	1000 ft (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-values)	Crest	44-3.0	19	29	61	84	114
		Sag		37	49	79	96	115
*Maximum Grade (27)	Level	44-1.02	8%	7%	6.5%	6%	5.5%	
	Rolling		9%	8%	7.5%	7%	6.5%	
Minimum Grade		44-1.03	Desirable: 0.5% Minimum: 0.3% (Curbed); 0.0% (Uncurbed)					

* Controlling design criteria (see Section 40-8.0). U: Urban; SU: Suburban
Refer to note at bottom of Table 53-2 for approval authority for Level One design exceptions.

**GEOMETRIC DESIGN CRITERIA FOR MULTI-LANE URBAN ARTERIAL
(New Construction or Reconstruction)
Table 53-6 (Continued)**

GEOMETRIC DESIGN CRITERIA FOR MULTI-LANE URBAN ARTERIAL
(New Construction or Reconstruction)
Footnotes to Table 53-6

- (1) Design Speed. The minimum design speed should equal a) the minimum value from the table, b) the anticipated posted speed limit after construction, or c) the state legal limit on a non-posted highway. The legal limit in an urban district is 30 mph. Based on an engineering study, these speeds may be raised to an absolute max. of 55 mph.
- (2) On-Street Parking. In general, on-street parking is discouraged.
- (3) Travel Lane Width. For an arterial on the National Truck Network, the right lane must be 12 ft in width.
- (4) Surface Type. The pavement type selection will be determined by the INDOT Pavement Design Engineer.
- (5) Curb Offset. The curb offset (for both left and right) should be 2 ft. Vertical curbs introduced intermittently should be offset 2 ft. A continuous curb used along a median or channelizing island may be offset 1 ft.
- (6) Shoulder Width. The table values apply to paved shoulder widths. The following will also apply:
 - a. For an uncurbed section, the shoulder is paved to the face of guardrail. The desirable guardrail offset is 2 ft from the effective usable shoulder width. See Section 49-5.0 for more information.
 - b. For an uncurbed section, a desirable additional 1 ft of compacted aggregate will be provided.
 - c. For a curbed section, the curb offset is included in the paved shoulder width.
- (7) Cross Slope (Travel Lane). Cross slopes of 1.5% are acceptable for an existing bridge to remain in place.
- (7A) Cross Slope (Shoulder). See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.
- (8) Curb Offset for Auxiliary Lane. In a curbed section, the offset may be zero.
- (9) Parking Lane. 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 a 1-ft offset to the curb (if present). The cross slope for a parking lane is typically 1% steeper than the adjacent travel lane.
- (10) Minimum Median Width. The criteria in the table assume the presence of a mountable curb with a 0-ft curb offset.
- (11) Sidewalk Width. A buffer of less than 2 ft wide is not permitted. If no buffer is provided, the sidewalk width should be 6 ft.
- (12) Bicycle Lane Width. The widths in the table are in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.
- (13) Clear Zones. 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-hour parking.
 - b. Facility with Sloping Curbs or without Curbs. The clear zone will vary according to design speed, traffic volumes, side slopes and horizontal curvature.
 - c. Curbed Facility. There should be an appurtenance-free area as measured from the gutter line of any curb.

- d. Values. See Section 49-2.0 for specific clear zone values.
- (14) Curbing Type. Vertical curbs may only be used with design speed lower than 50 mph.
- (15) Side Slopes (Uncurbed). Values in the table are for new construction. See Section 45-3.0 and Section 45-8.0 for more information. For a reconstruction project, see Section 49-3.0.
- (16) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.
- (17) Ditch Widths. In rock cuts, a V ditch should be used. See Section 45-8.0.
- (18) Backslopes. Backslopes for a rock cut will vary according to the height of the cut and geotechnical factors. See Section 45-8.0 for typical rock cut sections.
- (19) Side Slopes (Curbed) Cut. Typically, 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 6 ft. Where a sidewalk is present, the toe of the backslope will typically be 1 ft beyond the edge of sidewalk. See Section 45-3.0 for more information.
- (20) Structural Capacity (New or Reconstructed Bridge). The following will apply:
- Each bridge on a facility with greater than 600 trucks per day should be checked using the Alternate Military loading.
 - Each State highway bridge within 15 mi 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 configurations.
- (21) Width (New or Reconstructed Bridge). See Section 59-1.0 for more information on bridge widths.
- (22) Vertical Clearance (Arterial Under Railroad). The following will apply:
- Table values include an additional 6-in. allowance for future pavement overlays.
 - In a highly urbanized area, a minimum clearance of 14 ft may be provided if there is at least one route with a 16-ft clearance.
 - Vertical clearances apply from usable edge to usable edge of shoulder.
- (23) Vertical Clearance (Arterial Over Railroad). See Chapter Sixty-nine for additional information on railroad clearance under a highway.
- (24) Minimum Radii. The following will apply:
- Based on $e_{\max} = 4\%$ or 6% and low-speed urban street conditions.
 - Based on $e_{\max} = 8\%$ and open-road conditions.
- (25) Superelevation Rate. See Section 43-3.0 for values of superelevation based on design speed and radii. 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. Sometimes the SSD values for trucks will apply. See the discussion in Section 43-4.0.
- (27) Where adjacent sidewalks are present, the maximum desirable grade is 5%.
- (28) Intersection Sight Distance. For left turn onto a 2-lane road. P = Passenger car; SU = single unit truck. See Figure 46-10G for values for combination trucks.