

Design Element			Manual Section	Rural	Urban	
Design Controls	Design Forecast Period		40-2.02	20 Years	20 Years	
	*Design Speed, mph		40-3.0	70	50-70 (1)	
	Access Control		40-5.0	Full Control	Full Control	
	Level of Service		40-2.0	Desirable: B Minimum: C	Desirable: B Minimum: C (2)	
Cross-Section Elements	Travel Lane	*Width	45-1.01	12 ft	12 ft	
		Surface Type(3)	Chp. 52	Asphalt / Concrete	Asphalt / Concrete	
	Shoulder	*Right Width(4)	45-1.02	Chp. 52	Usable: 11 ft Paved: 10 ft	Usable: 11 ft Paved: 10 ft
		*Left Width(5)			2 Ln: D 8 ft, M 4 ft Paved; 3 Ln: 10 ft Paved	2 Lanes: 4 ft Paved 3 Lanes: 10 ft Paved
		Surface Type(3)		Asphalt / Concrete	Asphalt / Concrete	
	Cross Slope	*Travel Lane (6)	45-1.01		2%	2%
		Shoulder (6A)	45-1.02		Paved Width ≤ 4 ft: 2% Paved Width > 4 ft: 4%	Paved Width ≤ 4 ft: 2% Paved Width > 4 ft: 4%
	Auxiliary Lane	*Lane Width	45-1.03		12 ft	12 ft
		*Shoulder Width			Right: 10 ft (7) Left: 4 ft	Right: 10 ft (7) Left: 4 ft
	Median Width	Depressed	45-2.0		Desirable: 100 ft Minimum: 54.5 ft	Desirable: 60 ft Minimum: 10 ft for 4 lanes, 54.5 ft for 6 lanes
		Flush, with CMB			Desirable: 30.5 ft Minimum: 26.5 ft	Minimum: 26.5 ft
	Clear-Zone Width		49-2.0		(8)	(8)
	Side Slopes (9)	Cut	Foreslope	45-3.0	6:1 (10)	6:1 (10)
			Ditch Width		4 ft (11)	4 ft (11)
Backslope			4:1 (12)		4:1 (12)	
Fill		45-3.0		6:1 to Clear Zone; 3:1 max. to Toe	6:1 to Clear Zone; 3:1 max. to Toe	
Median Slopes		45-2.02		Desirable: 8:1 Maximum: 5:1	Desirable: 8:1 Maximum: 5:1	
Bridges	New or Reconstructed Bridge	*Structural Capacity	Chp. 60	HL-93 (13)	HL-93 (13)	
		*Clear-Roadway Width (14)	45-4.01	Full Paved Approach Width	Full Paved Approach Width	
	Existing Bridge to Remain in Place	*Structural Capacity	Chp. 72		HS-20	HS-20
		*Clear-Roadway Width	45-4.01		Travelway Plus 10 ft Rt. & 4 ft Lt. Shoulders	Travelway Plus 10 ft Rt. & 4 ft Lt. Shoulders
	*Vertical Clearance, Freeway Under (15c)	New or Replaced Overpassing Bridge (15a)	44-4.0		16.5 ft	16.5 ft(15b)
		Existing Overpassing Bridge			16 ft	16 ft (15b)
		Sign Truss / Pedestrian Bridge (15a)			New: 17.5 ft Existing: 17 ft	New: 17.5 ft Existing: 17 ft
Vertical Clearance, Freeway over Railroad (16)		Chp. 69		23 ft	23 ft	

\* Controlling design criterion.

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY  
(New Construction or Complete Reconstruction)**

**Figure 53-1**

Design Element		Manual Section	Rural	Urban				
Alignment Elements	Design Speed	---	70 mph	50 mph	55 mph	60 mph	70 mph	
	*Stopping Sight Distance	42-1.0	730 ft	425	495 ft	570 ft	730 ft	
	Decision Sight Distance (17)	42-2.0	780 ft	910	1030 ft	1150 ft	1410 ft	
	*Minimum Radius, e=8%	43-2.0	1640 ft	750	1000 ft	1290 ft	1650 ft	
	*Superelevation Rate	43-3.0	$e_{max}=8\%$ (18)	$e_{max}=8\%$ (18)				
	*Horizontal Sight Distance	43-4.0	(19)	(19)				
	*Vertical Curvature, K-value	Crest	44-3.0	247	84	114	151	247
		Sag		181	96	115	136	181
	*Maximum Grade (20)	Level	44-1.02	3%	4%	3.5%	3%	3%
Rolling		4%		5%	4.5%	4%	4%	
Minimum Grade	44-1.03	Desirable: 0.5% Minimum: 0.0%	Desirable: 0.5% Minimum: 0.0%					

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

These criteria apply to a route either on or off the National Highway System, regardless of funding source.

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY  
(New Construction or Complete Reconstruction)**

**Figure 53-1 (continued)**

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY  
(New Construction or Complete Reconstruction)**

**Footnotes to Figure 53-1**

- (1) Design Speed. A 50 mph design speed may be considered in a restricted urban area.
- (2) Level of Service. A minimum Level of Service of D may be used on an urban reconstruction project.
- (3) Surface Type. The pavement-type selection will be determined by the INDOT Office of Pavement Engineering.
- (4) Shoulder Width, Right. The following will apply.
  - a. The shoulder is paved to the front 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. Where the number of trucks exceeds 250 DDHV, a 12-ft width should be used. If the 12-ft width is used, the usable-shoulder width will be 13 ft.
  - c. Usable-shoulder width is defined as the distance from the edge of the travel lane to the shoulder break point.
- (5) Shoulder Width, Left. The following will apply.
  - a. The usable-shoulder width is equal to the paved-shoulder width. The desirable guardrail offset is 2 ft from the usable-shoulder width. See Section 49-5.0 for more information.
  - b. Where there are 3 or more lanes in one direction and the volume of trucks exceed 250 DDHV, a 12-ft width should be used.
  - c. For a left shoulder of 4 ft or wider, the usable-shoulder width will be 1 ft more than the paved-shoulder width.
- (6) Cross Slope, Travel Lane. Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.
- (6A) Cross Slope, Shoulder. See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information.
- (7) Auxiliary-Lane Shoulder Width, Right. On a reconstruction project, a 6-ft width may be used.
- (8) Clear-Zone Width. This will vary according to design speed, traffic volume, side slopes, and horizontal curvature. See Section 49-2.0.
- (9) Side Slopes. 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.
- (10) Foreslope. See Sections 49-2.0 and 49-3.0 for the lateral extent of the foreslope in a ditch section.

**GEOMETRIC DESIGN CRITERIA FOR FREEWAY  
(New Construction or Complete Reconstruction)**

**Footnotes to Figure 53-1 (continued)**

- (11) Ditch Width. A V-ditch should be used in a rock cut. See Section 45-8.0.
- (12) Backslope. For an earth cut of 10 ft or deeper, the first horizontal 20 ft of the backslope will be sloped at a rate of 4:1. Then, a slope rate of 3:1 is normally used to the natural ground line. See Section 45-3.0 and the INDOT *Standard Drawings*. The backslope for a rock cut will vary according to the height of cut and the geotechnical requirements. See the INDOT *Standard Drawings* for typical rock-cut sections.
- (13) Structural Capacity, New or Reconstructed Bridge.
- a. HL-93 loading should be applied.
  - b. A State-highway bridge within 15 mi 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.
- (14) Width, New or Reconstructed Bridge. See Section 59-1.01(01) for more information. The bridge clear-roadway width is the algebraic sum of the following:
- a. the approach traveled-way width;
  - b. the approach effective usable-shoulder width without guardrail; and
  - c. a bridge-railing offset (see Figure 59-1G).
- (15) Vertical Clearance, Freeway Under. The following will apply.
- a. Table value includes an additional 6 in. allowance for future overlays.
  - b. A 14-ft clearance may be used in an urban area where an alternate freeway facility with a 16-ft clearance is available.
  - c. Vertical clearance applies from usable edge to usable edge of shoulders.
- (16) Vertical Clearance, Freeway Over Railroad. See Chapter 69 for additional information on railroad clearance under a highway.
- (17) Decision Sight Distance. Value is for the avoidance maneuver (speed/path/direction change). See Section 42-2.0.
- (18) Superelevation Rate. See Section 43-3.0 for value of superelevation rate based on design speed and radius.
- (19) Horizontal Sight Distance. For a given design speed, the necessary middle ordinate will be determined by the radius and the sight distance. Sometimes, the stopping-sight-distance value for a truck should be considered. See the discussion in Section 43-4.0.
- (20) Maximum Grade. A grade of 1% steeper may be used in a restricted urban area where development precludes the use of a flatter grade. A grade of 1% steeper may also be used for a one-way-roadway downgrade.
- (21) For a bridge of 200 ft or longer that is to remain in place, the minimum width of each shoulder is 4 ft. This requirement does not apply to a bridge-deck replacement.