

**GEOMETRIC DESIGN STANDARDS FOR URBAN PRINCIPAL ARTERIAL SYSTEM (GS-5)**

	DESIGN SPEED (MPH)	MINIMUM RADIUS		(13) MINIMUM STOPPING SIGHT DISTANCE	MINIMUM WIDTH OF LANE	(1) MIN. WIDTH OF TOTAL SHOULDERS (GRADED + PAVED) CUT & FILL		(2) MINIMUM PAVED SHOULDER WIDTH		(3) MINIMUM WIDTH OF DITCH FRONT SLOPE	(4) SLOPE	NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS			With GR	Without GR	LT.	RT.			
FREEWAYS	70		-	730'	12'	16'	12'	4'	10'	12' @ 6:1	CS-4 OR 4B	See Footnote (5)
	60		-	570'								
	50		-	425'								
OTHER PRINCIPAL ARTERIAL WITH SHOULDER DESIGN	60		-	570'	(12)	14'	10'	4'	8'	10' @ 6:1	CS-4 OR 4E	
	50	929'	-	425'								
	45	713'	795'	360'	(5) (6) (12) 11'					6' @ 4:1	CS-3 OR 3B	
	40	536'	593'	305'								
	35	373'	408'	250'								
	30	251'	273'	200'								
	DESIGN SPEED (MPH)	MINIMUM RADIUS		(13) MINIMUM STOPPING SIGHT DISTANCE	MINIMUM WIDTH OF LANE	(8) STANDARD CURB & GUTTER		BUFFER STRIP WIDTH	(9) MINIMUM SIDEWALK WIDTH			
OTHER PRINCIPAL ARTERIAL WITH CURB & GUTTER	60	GS-1	-	570'	(12)	CG-3 / CG-7		(11)	5'			2:1
	50	929'	-	425'	12'							
	45	713'	795'	360'	(5) (6) (12) 11'	(14) CG-2 / CG-6						
	40	536'	593'	305'								
	35	373'	408'	250'								
	30	251'	273'	200'								

**GENERAL NOTES\***

Freeways - Urban Freeways should accommodate desired safe operating speeds during non-peak hours, but should not be so high as to exceed the limits of prudent construction, right of way and socioeconomic costs due to the large proportion of vehicles which are accommodated during periods of peak flow when lower speeds are necessary. The design speeds for Freeways shall not be less than 50 mph.

On many Urban Freeways, particularly in suburban areas, a design speed of 60 mph or higher can be provided with little additional cost above that required for 50 mph design speed. The corridor of the mainline may be relatively straight and the character and location of interchanges may permit a higher design speed. Under these conditions, a design speed of 70 mph should be considered.

Other Principal Arterials - Design speeds for Urban Arterials generally range from 40 to 60 mph, and occasionally may be as low as 30 mph. The lower (40 mph and below) speeds apply in the central business district and intermediate areas. The higher speeds are more applicable to the outlying business and developing areas.

Standard TC-5.11R (Rural) superelevation based on 8% maximum is to be used for ALL Freeways (50 – 70 mph) and for Other Principal Arterials with a design speed of 60 mph. For minimum radius, See GS-1.

Standard TC-5.11U (Urban) superelevation based on 4% maximum is to be used on Other Principal Arterials with a design speed of 50 mph and less.

Standard TC-5.11ULS (Urban Low Speed) superelevation based on 2% maximum is may be used on Other Principal Arterials with a design speed less than or equal to 45 mph.

Clear Zone and Recoverable Area information can be found in Appendix A, Section A-2 of the *Road Design Manual*.

If medians are included, see Section 2E-3 of Chapter 2E of the *Road Design Manual*. For minimum widths for roadway & right of way used within incorporated cities or towns to qualify for maintenance funds see Code of Va. Section 33.2-319.

For maximum grades relative to terrain and design speed, see AASHTO Green Book, Chapter 7, Section 7.3.3, page 7-29, Table 7-4, for Freeways, see Chapter 8, Section 8.2.7, page 8-4, Table 8-1.

**FOOTNOTES**

- (1) Total shoulder widths include the paved portion and are applicable to the left and right shoulder. On Freeways, if truck traffic exceeds 250 DDHV, a wider total shoulder should be considered (14' without guardrail and 18' with guardrail).
- (2) When the mainline is 6 or more lanes, the left paved shoulder width shall be the same as the right paved shoulder. On Freeways, if truck traffic exceeds 250 DDHV, a wider right paved shoulder should be considered (12').
- (3) A hydraulic analysis is necessary to determine actual depth requirement.
- (4) Additional or modified slope criteria apply where shown on typical sections.
- (5) Minimum lane widths to be 12' at all interchange locations.
- (6) Where heavy truck volume (equal to or greater than 10%) or bus traffic is anticipated, an additional 1 foot width should be considered.
- (7) See *Manual of the Structure and Bridge Division – Volume V – Part 2 Design Aids – Chapter 6 Geometrics*.
- (8) Or equivalent City or Town design.
- (9) Width of 8' or more may be needed in commercial areas.
- (10) 3:1 and flatter slopes shall be used when the right of way is behind the sidewalk (or sidewalk space) in residential or other areas where slopes will be maintained by the property owner.
- (11) For buffer strip widths see Appendix A(1), Section A(1)-1 Bicycle & Pedestrian Facility Guidelines.
- (12) Situations having restrictions on trucks may allow the use of lanes 1 foot less in width.
- (13) For additional information on sight distance requirements on grades of 3 percent or greater, see AASHTO Green Book, Section 3.2.2, page 3-2, Table 3-2. For Intersection sight distance requirements see *Append. F, Table 2-5*.
- (14) Where bicycle accommodation is next to curb or curb and gutter, mountable curb (CG-3) or mountable curb and gutter (CG-7) shall be used for design speeds of 45 mph and below.

**FIGURE A - 1 - 5**