

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

	DESIGN SPEED (MPH)	MINIMUM RADIUS		(13) MINIMUM STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	MINIMUM WIDTH OF TOTAL SHOULDERS			(2) PAVED SHOULDER WIDTH		(3) MINIMUM WIDTH OF DITCH FRONT SLOPE	(4) SLOPE	NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS			FILL W/GR	FILL	CUT	LT.	RT.			
FREEWAYS	70	#	-	730'	12'	(1) 17'	14'	(1) 14'	4'	12'	12'	CS-4 OR 4B	See Footnote (7)
	60	#	-	570'									
	50	#	-	425'									
OTHER PRINCIPAL ARTERIAL WITH SHOULDER DESIGN	60	#	-	570'	(12)	13'	10'	10'	4'	8'	10'	CS-4 OR 4E	
	50	929'	-	425'									
	45	713'	795'	360'	(5) (6) (12) 11'						6'	CS-3 OR 3B	
	40	536'	593'	305'									
	35	373'	408'	250'									
	30	251'	273'	200'									
	DESIGN SPEED (MPH)	MINIMUM RADIUS		MINIMUM STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	(8) STANDARD CURB & GUTTER		BUFFER STRIP WIDTH	(9) MINIMUM SIDEWALK WIDTH	(10) SLOPE			
OTHER PRINCIPAL ARTERIAL WITH CURB & GUTTER	60	#	-	570'	(12) 12'	CG-7	(11)	5'	2:1				
	50	929'	-	425'									
	45	713'	795'	360'									
	40	536'	593'	305'	(5) (6) (12) 11'	CG-6							
	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 should never 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 high speed design. Under these conditions, a design speed of 70 mph is most desirable because the higher design speeds are closely related to the overall quality and safety of the facility.

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 and is to be used for all 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 less than 60 mph.

Standard TC-5.11ULS (Urban Low Speed) 1 superelevation based on 2% maximum is to 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 and right of way used within incorporated cities or towns to qualify for maintenance funds see Code of Virginia Section 33.2-319.

For guidelines on Interchange Ramps, see Standard GS-R.

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 8.2.1, page 8-4, Table 8-1.

FOOTNOTES

- (1) Shoulder widths shown are for right shoulders and independently graded median shoulders. An 8' graded median shoulder will be provided when the mainline is 4 lanes (2 lanes in each direction). For 6 or more lanes, the median shoulder provided will be the same as that shown for independent grading. On Freeways, if truck traffic is less than 250 DDHV, the minimum width of graded shoulder shall be 15' for fills and 12' for cuts.
- (2) When the mainline is 6 or more lanes, the left paved shoulder width should be the same as the right paved shoulder. On Freeways, if truck traffic is less than 250 DDHV, the minimum right paved shoulder width shall be 10'.
- (3) Ditch slopes to be 6:1 - 10' and 12' widths and 4:1 - 6' width. 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) If heavy truck traffic is anticipated, an additional 1 foot width is desirable.
- (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, Section A-5 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 3-3, Table 3-2.
- (14) Intersection sight distance requirements see [Append. F, Table 2-7](#).

FIGURE A - 1 - 5