

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

	DESIGN SPEED (MPH)	MINIMUM RADIUS		(13) STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	(1) MINIMUM WIDTH TOTAL SHOULDERS		(2) PAVED SHOULDER WIDTH		(3) WIDTH OF DITCH (FRONT SLOPE)	(4) SLOPE	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES
		U	ULS	MIN.		FILL W/GR	CUT & FILL	RT.	LT.			
FREEWAYS	70	1821'	-	730'	12'	15'	12'	10'	4'	12'	CS-4 OR CS-4B	2 THRU LANES SAME DIRECTION - 6' + PAVE. WIDTH + 12' 3 OR MORE THRU LANES SAME DIRECTION - 14' + PAVE. WIDTH + 14'
	60	1204'	-	570'								
	50	760'	-	425'								
OTHER PRINCIPAL ARTERIAL WITH SHOULDER DESIGN	60	1204'	-	570'	(12) 12'	(5) (6) 13'	10'	8'	4'	10'	CS-4 OR CS-4E	UNDIVIDED & DIVIDED 3 OR MORE THRU LANES SAME DIRECTION - 10' + PAVE. WIDTH + 10'
	50	929'	-	425'								
	40	563'	593'	305'	(12) 11'					6'	CS-3 OR CS-3B	2 THRU LANES (DIVIDED) SAME DIRECTION - 6' + PAVE. WIDTH + 10'
	30	300'	273'	200'								
	DESIGN SPEED (MPH)	MINIMUM RADIUS		STOPPING SIGHT DISTANCE	MIN. WIDTH OF LANE	(8) STANDARD CURB & GUTTER (14)	BUFFER STRIP WIDTH	(9) MINIMUM SIDEWALK WIDTH	(10) SLOPE	(7) NEW AND RECONSTRUCTED MINIMUM BRIDGE WIDTHS AND VERTICAL CLEARANCES		
OTHER PRINCIPAL ARTERIAL WITH CURB & GUTTER	60	1204'	-	570'	(12) 12'	CG-7	(11)	5'	2:1	SAME AS CURB TO CURB OF APPROACHES		
	50	929'	-	425'								
	45	732'	795'	360'	(5) (6) 11'	CG-6						
	40	563'	593'	305'								
	30	300'	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-5.01R (2001 AASHTO Green Book) super-elevation 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.

Standard TC-5.01U (Urban) (2001 AASHTO Green Book) super-elevation based on 4% maximum is to be used on Other Principal Arterials with a design speed less than 60 mph.

RELATIONSHIP OF MAXIMUM GRADES TO DESIGN SPEEDS									
TYPE OF TERRAIN	FREEWAYS*				ARTERIALS				
	DESIGN SPEED (MPH)								
	50	60	70	30	40	45	50	60	
	GRADES (PERCENT)								
LEVEL	4	3	3	8	7	6	6	5	
ROLLING	5	4	4	9	8	7	7	6	
MOUNTAINOUS	6	6	5	11	10	9	9	8	

\* Grades 1 percent steeper than the value shown may be used on Urban Freeways for extreme cases in urban areas where development precludes the use of flatter grades and for one-way downgrades, except in mountainous terrain.

Standard TC-5.04ULS (Urban Low Speed) (2004 AASHTO Green Book) super-elevation 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.

A minimum 30' width of surfacing or a minimum 30' face to face of curb is to be used within incorporated cities or towns to qualify for maintenance payments.

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

### 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 (both directions). For 6 or more lanes, the median shoulder provided will be the same as that shown for independent grading. On Freeways, if truck traffic exceeds 250 DDHV, the minimum width of graded shoulder should be 17' for fills and 14' 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 exceeds 250 DDHV, the right paved shoulder width should be 12', and on 6 or more lane Freeways, the left paved shoulder width should also be 12' if truck traffic exceeds 250 DDHV.
- (3) Ditch slopes to be 6:1 - 10' and 12' widths and 4:1 - 6' width.
- (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) Vertical clearance at roadway underpasses for new & reconstructed bridges to be 16'-6" (1' additional clearance required for non-vehicular overpasses). 14' Shoulders may be reduced to 10' minimum when truck traffic is less than 250 DDHV.
- (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 may 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) If a buffer strip is used between the back of curb and sidewalk, it should be 2' minimum.
- (12) Situations having restrictions on trucks may allow the use of lanes 1 foot less in width.
- (13) For intersection sight distance requirements see [Append. C, Table C-1-5](#).
- (14) Because Urban Principal Arterials are typically free-flowing, with higher operating speeds, Standard CG-7 is recommended for design speeds  $\geq$  45 mph. See current AASHTO "Green Book", Chapter 2.

**FIGURE A - 1 - 5**