TC-5.11

ADJUSTMENT FACTORS

NUMBER OF LANES ROTATED n_1	ADJUSTMENT FACTOR (b_w)
1	1.00
1.5	0.8333
2	0.75
2.5	0.70
3	0.6667
3.5	0.6425

RELATIVE GRADIENTS

DESIGN SPEED V_D MPH	MAXIMUM RELATIVE GRADIENT (rg) 12' LANE	MIN. TRANSITION LENGTH IN FEET RURAL CONDITIONS WITH PAVEMENT WIDENING AND REVERSE CURVES FOR ALL CONDITIONS (2 SECOND RULE)	MAXIMUM RELATIVE GRADIENT (rg) RAMPS AND LOOPS 16' LANE	18' LANE	24' LANE
20	0.74	59	0.84	0.89	0.99
25	0.70	74	0.80	0.84	0.93
30	0.66	88	0.75	0.80	0.88
35	0.62	103	0.71	0.75	0.83
40	0.58	117	0.66	0.70	0.77
45	0.54	132	0.61	0.65	0.72
50	0.50	147	0.57	0.60	0.67
55	0.47	161	0.54	0.57	0.63
60	0.45	176	0.51	0.54	0.60
65	0.43	191	0.49	0.52	0.57
70	0.40	205	0.45	0.48	0.53
75	0.38	220	0.43	0.46	0.51
80	0.35	235	0.39	0.42	0.47

DEFINITIONS

A - FRONT OVERHANG OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

bw - ADJUSTMENT FACTOR FROM TABLE.

C - LATERAL CLEARANCE OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

E - SUPERELEVATION RATE FROM APPROPRIATE TABLE.

e_d - DESIGN SUPERELEVATION RATE, PERCENT

e_{NC} - NORMAL CROSS SLOPE RATE, PERCENT

F_A - CALCULATED WIDTH OF OVERHANG FOR DESIGN VEHICLE.

L - WHEELBASE OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

Lr - LENGTH OF SUPERELEVATION RUNOFF SECTION.

Lt - LENGTH OF TANGENT RUNOUT SECTION

M - MULTIPLE LANE FACTOR.

N - NUMBER OF LANES.

n_1 - NUMBER OF LANES ROTATED (FROM TABLES).

Pw - PAVEMENT WIDTH.

R - RADIUS OF CURVE.

rg - RELATIVE GRADIENT FROM APPROPRIATE TABLE.

U - CALCULATED TRACK WIDTH OF DESIGN VEHICLE.

u - TRACK WIDTH OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

V_D - DESIGN VELOCITY.

w - CALCULATED WIDENING.

W - PAVEMENT WIDTH

W_C - CALCULATED TOTAL CURVE WIDTH.

W_n - WIDTH OF LANE.

Z - CALCULATED EXTRA WIDTH ALLOWANCE.

FORMULAS USED TO CALCULATE SUPERELEVATION RUNOFF (Lr) AND CROWN RUNOUT (Lt)

NO WIDENING REQUIRED

$Lr = b_w(W_n\ n_1\ E/rg)$

$Lr = M(WE/rg)$ (ALT. MULTI-LANE)

WIDENING REQUIRED

$Lr = b_w[E\ n_1\ (W_n + w/N)/rg]$

$Lr = m[E(W + w/N)/rg]$ (ALT. MULTI-LANE)

$$L_t = \left(\frac{e_{NC}}{e_d}\right) Lr$$

FOR SOLVED PROBLEMS USING THIS METHODOLOGY FOR Lr, SEE THE EXAMPLES ON PAGE 803.22

NOTE: AN ALTERNATE METHOD FOR MULTI-LANE UNDIVIDED PAVEMENTS (48'). THE Lr IS 1.5 TIMES (M=1.5) THE CORRESPONDING LENGTH FOR TWO LANE HIGHWAYS; AND FOR SIX LANE UNDIVIDED PAVEMENTS (72'), THE Lr IS TWO TIMES (M=2) THE CORRESPONDING LENGTH FOR TWO LANE HIGHWAYS.

VDOT
ROAD AND BRIDGE STANDARDS

METHODOLOGIES FOR CALCULATING TC-5.11 VALUES

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE