STANDARD SYMBOLS

LOCATION ℄.....ALIGNMENT ON WHICH THE PROPOSED RIGHT-OF-WAY AND CONSTRUCTION IS BASED.
STANDARD PAVEMENT.....THE TYPICAL PAVEMENT SECTION TO BE SHOWN ON THE ROAD PLANS.
P.C. .....POINT OF BEGINNING OF BASELINE CIRCULAR CURVE.
P.T. .....POINT OF ENDING OF BASELINE CIRCULAR CURVE.
P.C.C. .....POINT OF BASELINE COMPOUND CURVATURE.
P.R.C.....POINT OF BASELINE REVERSE CURVE.
T.S. .....POINT OF CHANGE FROM TANGENT TO TRANSITION CURVE. (TANGENT TO SPIRAL)
S.C. .....POINT OF CHANGE FROM TRANSITION CURVE TO CIRCULAR CURVE. (SPIRAL TO CIRCULAR)
C.S. .....POINT OF CHANGE FROM CIRCULAR CURVE TO TRANSITION CURVE. (CIRCULAR TO SPIRAL)
S.T. .....POINT OF CHANGE FROM TRANSITION CURVE TO TANGENT. (SPIRAL TO TANGENT)
RADIUS .....RADIUS OF BASELINE CIRCULAR CURVE.
DV .....APPROXIMATE MAXIMUM SAFE SPEED IN KILOMETERS PER HOUR USING STANDARD RATE OF SUPERELEVATION.
NC .....APPROXIMATE MAXIMUM SAFE SPEED IN KILOMETERS PER HOUR WITH NO SUPERELEVATION FACTORS APPLY ONLY TO URBAN LOW SPEED CONDITIONS.
Lr .....LENGTH OF TRANSITION CURVE MEASURED ALONG BASELINE. WHERE NO TRANSITION CURVE IS APPLIED Lr IS LENGTH OF SUPERELEVATION RUNOFF SECTION.
W OR PW .....WIDTH OF STANDARD PAVEMENT.
ZT .....DISTANCE FROM TRANSITIONED BASELINE TO EDGES OF TRANSITIONED PAVEMENT
w .....MAXIMUM TOTAL PAVEMENT WIDENING.
E .....RATE OF SUPERELEVATION.
F .....SAFE SIDE FRICTION FACTOR.
S .....AMOUNT OF SUPERELEVATION TO BE APPLIED TO THE BASELINE GRADE TO OBTAIN THE ELEVATIONS OF THE EDGES OF TRANSITIONED PAVEMENT.
C .....DIFFERENCE IN ELEVATION BETWEEN BASELINE (CENTER) AND EDGE OF PAVEMENT FOR STANDARD PAVEMENT CROWN.
Lt .....STANDARD PAVEMENT CROWN TRANSITION OR TANGENT RUNOUT SECTION.
CP .....CHORD POINT (1/10 INCREMENTS OF TRANSITION CURVE).
NPC.....NORMAL PAVEMENT CROWN.

ALL DISTANCES (HORIZONTAL AND VERTICAL) ARE MEASURED IN METERS.

SPECIFICATION REFERENCE

TRANSITION CURVES FOR RURAL AND URBAN HIGHWAYS AND STREET CONDITIONS

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/07

802.01

TC-5.01

URBAN CONDITION

URBAN CONDITIONS APPLY TO URBAN STREET SYSTEMS AND ANY OTHER ROAD WITH PRESENT OR FUTURE URBAN STREET OPERATING CONDITIONS.

THESE TABLES CONTAIN THE MINIMUM SUPERELEVATION RATES AND TRANSITION LENGTHS FOR STANDARD URBAN PAVEMENT WIDTHS THROUGH A RANGE OF DESIGN VELOCITIES CONSIDERED MOST LIKELY TO BE USED IN URBAN ROAD DESIGN.

A TABLE FOR "LOW SPEED URBAN" DESIGNS IS ON SHEET 802.24 WITH A RANGE OF STANDARD PAVEMENT WIDTHS (W), SUPERELEVATION RUNOFF LENGTHS (Lr), AND RADII OF CURVE WHEN SUPERELEVATED BY AN AMOUNT EQUAL TO THE NORMAL CROWN AND THE APPROXIMATE MAXIMUM SAFE SPEEDS (DV) AFFORDED THEREBY. VALUES IN THIS TABLE CAN BE USED ON STREETS WITH OPERATING SPEEDS LESS THAN OR EQUAL TO 70km/h. ALSO SHOWN ARE THE APPROXIMATE MAXIMUM SAFE SPEEDS (NC) WITH NO SUPERELEVATION. VALUES FOR (NC) CAN BE USED ON URBAN ARTERIAL, COLLECTOR, AND LOCAL STREETS.

WHEN URBAN CONDITIONS APPLY THERE WILL BE NO BASELINE TRANSITION OR PAVEMENT WIDENING. THE LENGTH OF SUPERELEVATION RUNOFF (Lr) DETERMINES THE LENGTH OF SUPERELEVATION TRANSITION THROUGH WHICH THE OUTER EDGE OF PAVEMENT IS RAISED ABOVE THE BASELINE GRADE TO A MAXIMUM OF E ($\frac{W}{2}$). SEE SHEET 802.07 FOR A GRAPHICAL ILLUSTRATION OF THE APPLICATION OF THIS CORRECTION.

FOR CURVE RADII NOT LISTED IN TABLES REFER TO SHEET 802.22 TO CALCULATE SUPERELEVATION RUNOFF (Lr).

Lr SHOULD BE SHOWN ON THE PLANS FOR ALL CURVES.

E SHOULD BE SHOWN ON THE PLANS FOR ALL CURVES WITH URBAN STREET CONDITIONS.

FOR GRAPHICAL ILLUSTRATION OF DESIGN SUPERELEVATION RATES FOR URBAN CONDITIONS SEE SHEET 802.19.

FOR ADDITIONAL GENERAL INSTRUCTIONS (BOTH URBAN AND RURAL) SEE SHEET 802.04.

RURAL CONDITION

RURAL CONDITIONS APPLY TO INTERSTATE, ARTERIAL, PRIMARY AND SECONDARY SYSTEMS OR TO ANY OTHER ROAD WITH RURAL TYPE DESIGN AND OPERATING CONDITIONS.

THESE TABLES CONTAIN THE MINIMUM ALLOWABLE SUPERELEVATION, TRANSITION LENGTHS, AND WIDENING CORRECTIONS FOR STANDARD RURAL PAVEMENT WIDTHS THROUGH A RANGE OF DESIGN VELOCITIES CONSIDERED MOST LIKELY TO BE USED IN RURAL HIGHWAY DESIGN.

DEFINITIONS FOR THE STANDARD SYMBOLS USED THROUGHOUT THESE TABLES ARE FOUND ON SHEET 802.01.

FOR MINIMUM DESIGN FACTORS FOR VARIOUS DESIGN SPEEDS FOR RURAL CONDITIONS SEE SHEETS 802.32 THRU 802.40.

ON CURVES WITH GREATER THAN 850 m RADIUS, THERE WILL BE NO SPIRAL TRANSITION OR PAVEMENT WIDENING. PAVEMENT WILL BE SUPERELEVATED BY AN AMOUNT EQUAL TO THE RATE SHOWN IN THE TABLES. SEE SHEET 802.06 FOR A GRAPHICAL ILLUSTRATION OF THE APPLICATION OF THIS CORRECTION.

ON CURVES WITH PAVEMENT WIDTHS OF 7.2 m OR WIDER AND A RADIUS OF 230 m OR GREATER, THERE WILL BE NO SPIRAL TRANSITION OR PAVEMENT WIDENING. PAVEMENT WILL BE SUPERELEVATED BY AN AMOUNT EQUAL TO THE RATE SHOWN IN THE TABLES.

FOR CURVE RADII NOT LISTED IN TABLES, REFER TO SHEET 802.22 TO CALCULATE SUPERELEVATION RUNOFF LENGTH (Lr) AND PAVEMENT WIDENING (w).

Lr AND E SHOULD BE SHOWN ON THE PLANS FOR ALL CURVES.

FOR GRAPHICAL ILLUSTRATION OF DESIGN SUPERELEVATION RATES FOR RURAL CONDITIONS SEE SHEET 802.20.

FOR ADDITIONAL GENERAL INSTRUCTIONS (BOTH URBAN AND RURAL) SEE SHEET 802.04.

SEE SHEET 802.05 FOR A GRAPHICAL ILLUSTRATION OF SPIRAL TRANSITIONS.

TC-5.01

GENERAL CONDITION

ALL ORIGINAL CROSS SECTIONS SHALL BE TAKEN FROM THE BASELINE AT STATIONS, 20 METERS INTERVAL FOR RURAL PROJECTS, 10 METERS INTERVAL FOR URBAN PROJECTS, AND UNUSUAL BREAKS IN THE GROUND AS ON TANGENT ALIGNMENT.

WHERE A PART OR ALL OF A SUPERELEVATION TRANSITION CURVE FALLS ON A VERTICAL CURVE, ELEVATIONS ON THE VERTICAL CURVE SHOULD BE COMPUTED FOR THE POSITIONS GIVEN ON SHEET 802.16 FOR CROWN TRANSITIONS, SHEET 802.17 FOR URBAN PROJECTS AND SHEET 802.18 FOR RURAL PROJECTS. THESE ELEVATIONS AND PLUSES SHOULD BE SHOWN ON THE PLANS FOR THE CONVENIENCE OF THE SURVEY PARTY IN STAKING OUT THE PROJECT. THROUGHOUT THESE SECTIONS OF THE GRADE, ELEVATIONS AT EVEN STATIONS AND 10 OR 20 m INTERVALS SHOULD BE OMITTED.

SLOPE STAKES SHOULD BE SET AT THE POSITIONS ON THE TRANSITION GIVEN ON SHEETS 802.16, 802.17 AND 802.18 AND GROUND CROSS SECTIONS TAKEN AT THESE POSITIONS OMITTING THE STATIONS AND 10 OR 20 m INTERVALS THROUGHOUT THE TRANSITION. IF UNUSUAL BREAKS IN THE GROUND OCCUR, ADDITIONAL SECTIONS SHOULD, OF COURSE, BE TAKEN. ADDITIONAL SECTIONS SHOULD ALSO BE TAKEN WHERE LOCATION IS THROUGH ROCK CUT IN ANTICIPATION OF UNUSUAL BREAKAGE WHICH MAY OCCUR DURING CONSTRUCTION.

AFTER ROUGH GRADING HAS BEEN DONE, FINE GRADING (BLUE TOP) AND FORM STAKES SHOULD BE SET AT THE POSITIONS GIVEN ON SHEET 802.16 FOR TANGENT RUNOUT, SHEET 802.17 FOR URBAN PROJECTS OR AS GIVEN ON SHEET 802.18 FOR RURAL PROJECTS.

FINAL CROSS SECTIONS SHOULD, OF COURSE, BE TAKEN AT THOSE POSITIONS AT WHICH THE SLOPE STAKE SECTIONS WERE TAKEN. WHERE UNUSUAL BREAKAGE IN ROCK OCCURS, AND THIS WAS NOT ANTICIPATED, ADDITIONAL FINAL SECTIONS SHOULD BE TAKEN AND ORIGINAL GROUND SECTIONS INTERPOLATED.

BASELINE STAKES SHOULD BE SET AT ALL P.C.'S, P.T.'S, T.S.'S, S.T.'S, S.C.'S, AND C.S.'S IN STAKING OUT ALIGNMENT BUT SLOPE STAKES NEED NOT BE SET NOR CROSS SECTIONS TAKEN AT P.C.'S OR P.T.'S EXCEPT WHERE CALLED FOR IN THE ACCOMPANYING TABLES. THE TRANSITION WILL TAKE ITS FORM FROM THE POSITIONS GIVEN ON SHEETS 802.17 AND 802.18.

THE RIGHT OF WAY SHALL, IN ALL CASES, BE REFERENCED FROM THE BASELINE.

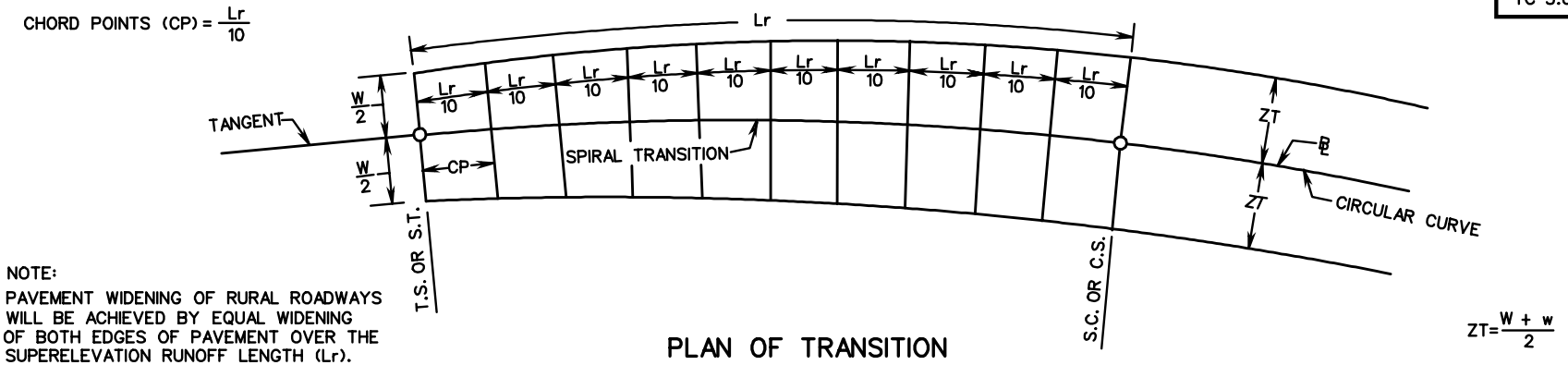
THE DESIGNER SHOULD EXERCISE CAUTION IN THE USE OF COMPOUND AND REVERSE CURVES UNLESS TOPOGRAPHICAL OR RIGHT OF WAY RESTRICTIONS MAKE THEIR USE APPROPIATE. THE USE OF BROKEN-BACK CURVES SHOULD BE AVOIDED EXCEPT WHERE VERY UNUSUAL TOPOGRAPHICAL OR RIGHT OF WAY CONDITIONS MAKE OTHER ALTERNATIVES IMPRACTICAL. THE USE OF BROKEN-BACK CURVES MAY REQUIRE A DESIGN EXCEPTION FROM THE STATE LOCATION AND DESIGN ENGINEER. SEE SHEETS 802.11 THRU 802.14 FOR GENERAL INFORMATION ON COMPOUND, REVERSE AND BROKEN-BACK CURVE INFORMATION. REFER TO CHAPTER 3 OF AASHTO'S A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS FOR SPECIFIC COMPOUND, AND REVERSE CURVE DESIGN INFORMATION.

A DESIGN EXCEPTION IS NOT REQUIRED WHEN USING VALUES FROM SHEETS 802.24 THRU 802.44 SINCE THESE TABLES WERE DERIVED WITHIN AASHTO GUIDELINES.

ALL TANGENT RUNOUT SECTION (Lt) VALUES AND SUPERELEVATION RUNOFF LENGTHS (Lr) LISTED IN THE TABLES HAVE BEEN ROUNDED UP TO THE NEAREST METER ALL Lt VALUES ARE BASED ON A 2% CROWN.

REFER TO APPENDIX A, SECTIONS A-1 AND A-4, OF THE ROAD DESIGN MANUAL FOR INFORMATION ON THE USE OF 5.4 m PAVEMENT WIDTHS (2.7 m LANE WIDTH).

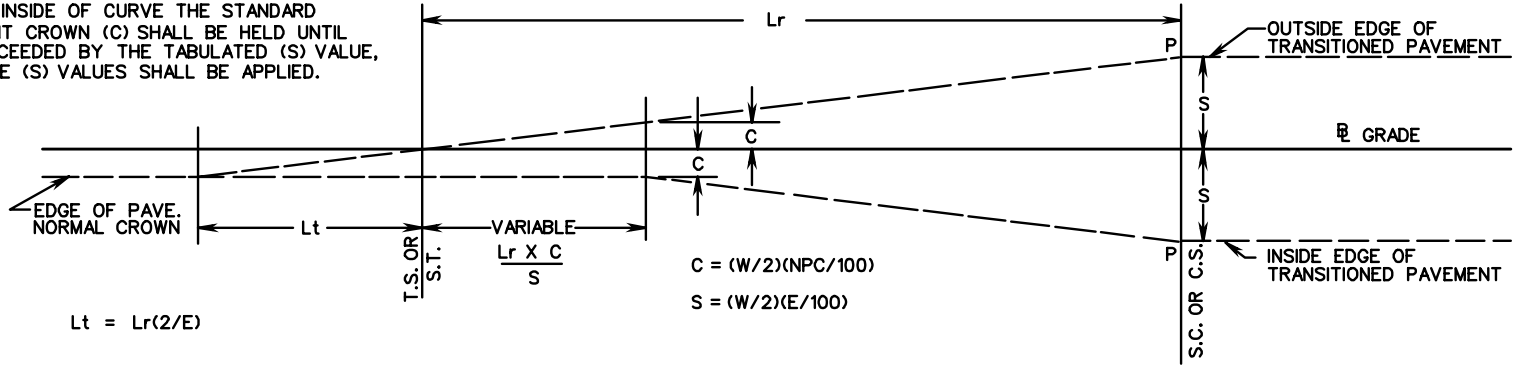
TC-5.01



NOTE:
PAVEMENT WIDENING OF RURAL ROADWAYS WILL BE ACHIEVED BY EQUAL WIDENING OF BOTH EDGES OF PAVEMENT OVER THE SUPERELEVATION RUNOFF LENGTH (Lr).

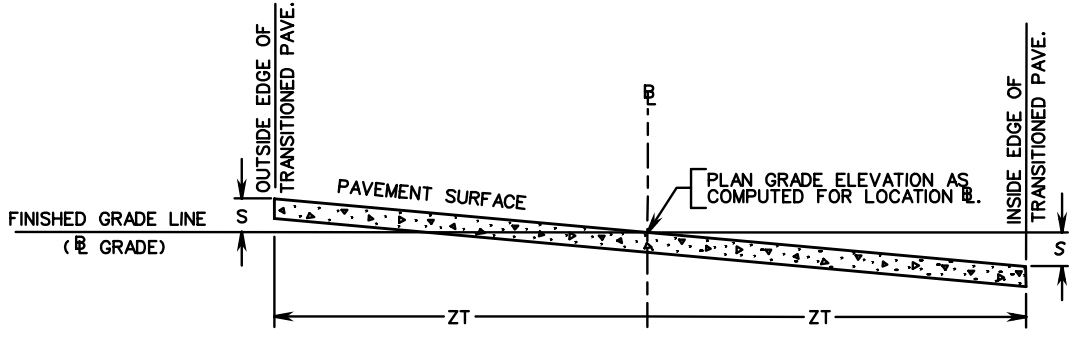
PLAN OF TRANSITION

NOTE:
ON THE INSIDE OF CURVE THE STANDARD PAVEMENT CROWN (C) SHALL BE HELD UNTIL IT IS EXCEEDED BY THE TABULATED (S) VALUE, THEN THE (S) VALUES SHALL BE APPLIED.



PROFILE OF TRANSITION

NOTE: SHORT VERTICAL CURVES SHOULD BE INSERTED BY EYE AT POINTS (P) IF CONSIDERED NECESSARY.



CROSS SECTION THRU TRANSITION

SPECIFICATION REFERENCE

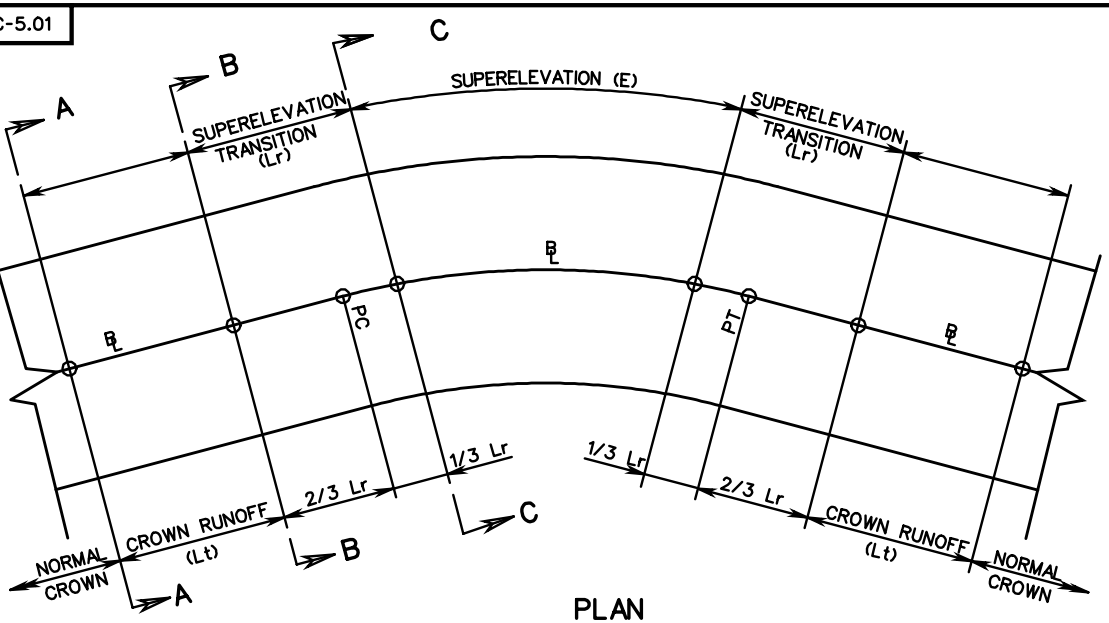
DETAILS FOR TRANSITIONED ℄ RURAL CONDITION WITH PAVEMENT WIDENING

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/07

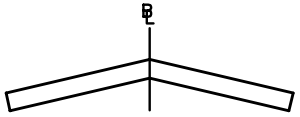
802.05

TC-5.01



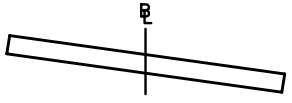
PLAN

Lt = Lr(2/E)



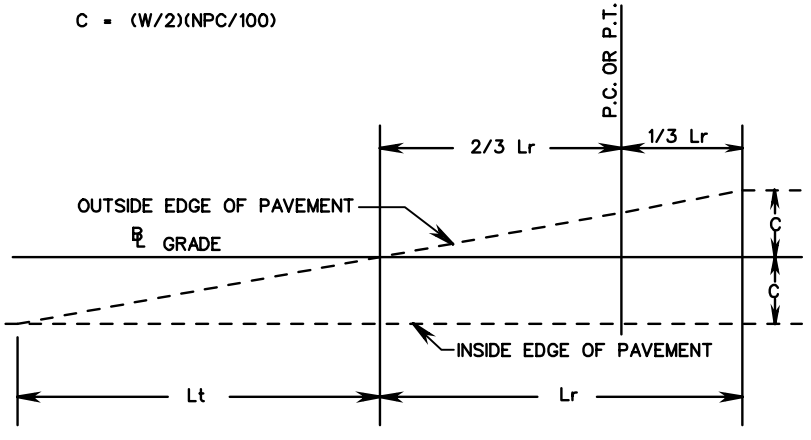
SECTION A-A
NORMAL CROWN

SECTION B-B
NORMAL CROWN
REMOVED (FLAT)



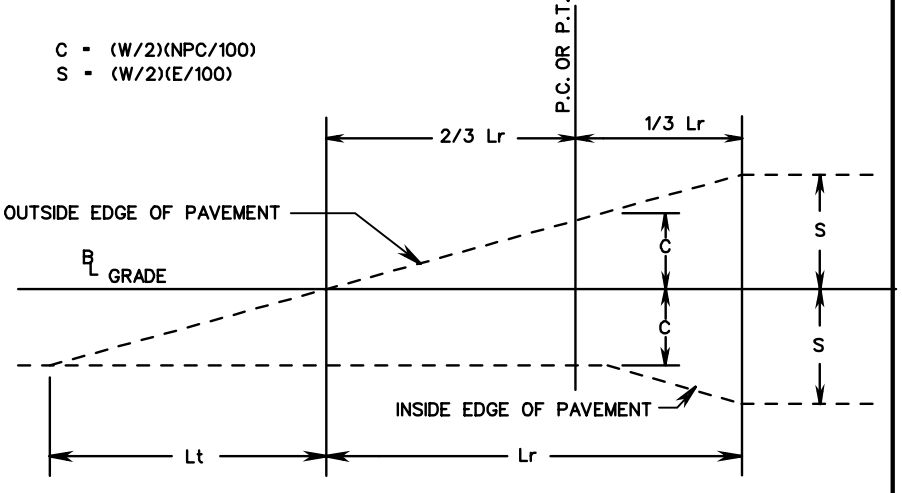
SECTION C-C
FULL SUPERELEVATION

C = (W/2)(NPC/100)



SUPERELEVATED BY AN AMOUNT EQUAL TO THE STANDARD PAVEMENT CROWN

C = (W/2)(NPC/100)
S = (W/2)(E/100)



NOTE : ON THE INSIDE OF CURVE THE STANDARD PAVEMENT CROWN (C) SHALL BE HELD UNTIL IT IS EXCEEDED BY THE TABULATED RATE OF SUPERELEVATION (E).

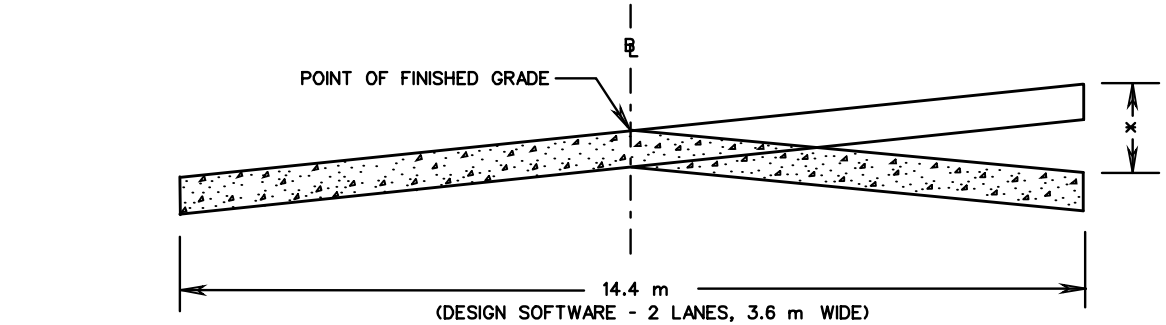
SUPERELEVATED BY AN AMOUNT EXCEEDING THE STANDARD PAVEMENT CROWN

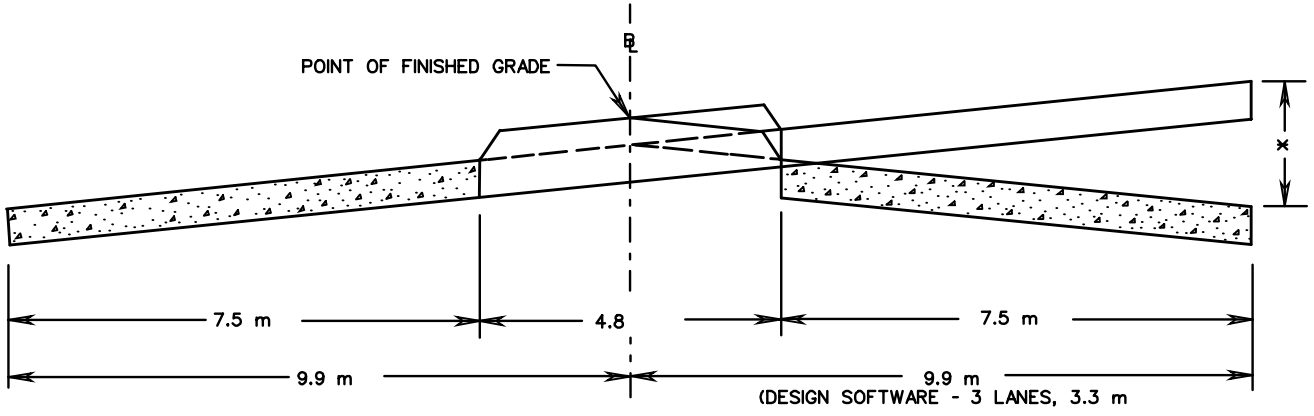
DETAILS FOR NON-TRANSITION ℄
URBAN CONDITIONS AND RURAL CONDITIONS WITHOUT PAVEMENT WIDENING

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

802.06 REV. 1/07





* THE ELEVATION DIFFERENTIAL BETWEEN NORMAL CROWN AND MAXIMUM SUPERELEVATION, RELATIVE TO THE BASELINE PROFILE.

ADDITIONAL INFORMATION MAY BE OBTAINED FROM A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (AASHTO) BOOK, CHAPTER III - ELEMENTS OF DESIGN (SUPERELEVATION RUNOFF).

ON STANDARD TC-5.01ULS, TC-5.01U , AND TC-5.01R (WITHOUT PAVEMENT WIDENING) SUPERELEVATED CURVES, POSITION THE Lr TWO THIRDS (2/3) ON THE TANGENT AND ONE THIRD (1/3) INTO THE CURVE. STATIONS AND ELEVATIONS FOR THESE TRANSITIONS WILL NEED TO BE COMPUTED FOR ALL CHORD POINTS AND SHOWN ON THE PROFILES.

SPECIFICATION REFERENCE

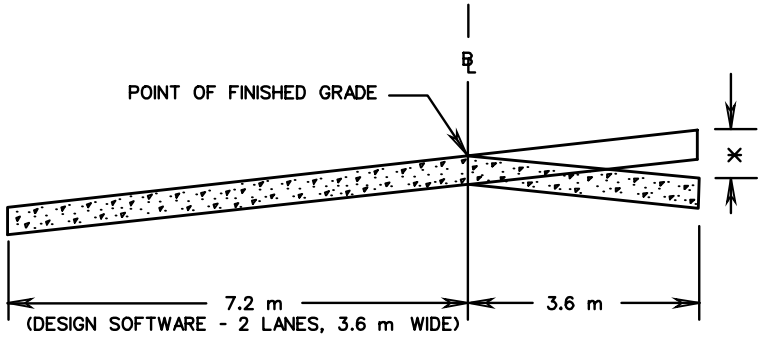
DETAILS OF SUPERELEVATION ABOUT BASELINE

VIRGINIA DEPARTMENT OF TRANSPORTATION

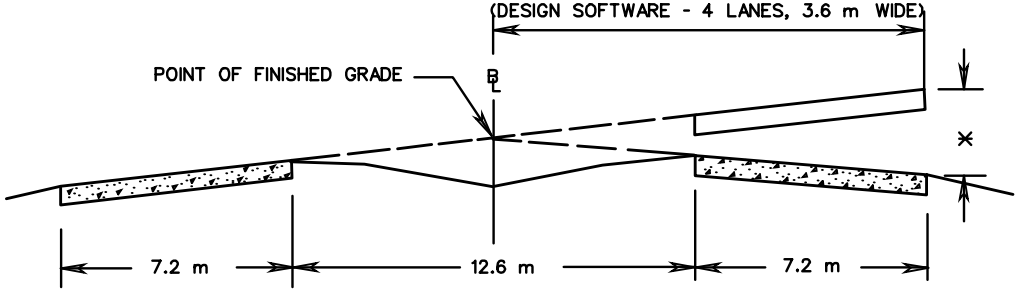
REV. 1/07

802.07

TC-5.01



THE PAVEMENT WIDTHS SHOWN IN THE STANDARD TC-5 TABLES ON SHEET 802.24A THROUGH 802.44 REPRESENT TWICE THE DISTANCE FROM THE CROWNLINE TO THE EDGE OF PAVEMENT ON THE HIGH SIDE.



* THE ELEVATION DIFFERENTIAL BETWEEN NORMAL CROWN AND MAXIMUM SUPERELEVATION, RELATIVE TO THE BASELINE PROFILE.

ADDITIONAL INFORMATION MAY BE OBTAINED FROM A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS (AASHTO) BOOK, CHAPTER III - ELEMENTS OF DESIGN (SUPERELEVATION RUNOFF).

PROJECTS IN WHICH LANES MAY BE ADDED IN THE FUTURE IN THE MEDIAN AREA SHOULD BE DESIGNED WITH THE CONSTRUCTION BASELINE AND POINT OF FINISHED GRADE LOCATED IN THE MIDDLE OF THE MEDIAN. SUPERELEVATION IS TO BE ROTATED FROM THIS BASELINE POINT. THIS WILL PREVENT UNEVEN PAVEMENT PROBLEMS (WHEN ADDITIONAL LANES ARE ADDED IN THE MEDIAN AREA) SUCH AS CROSSOVER GRADES AS WELL AS THE NEED FOR RETAINING WALLS, MEDIAN BARRIERS AND SPECIAL DESIGN DRAINAGE STRUCTURES. ADDITIONAL RIGHT OF WAY OR EASEMENTS, IN MOST SITUATIONS, WILL NOT BE REQUIRED.

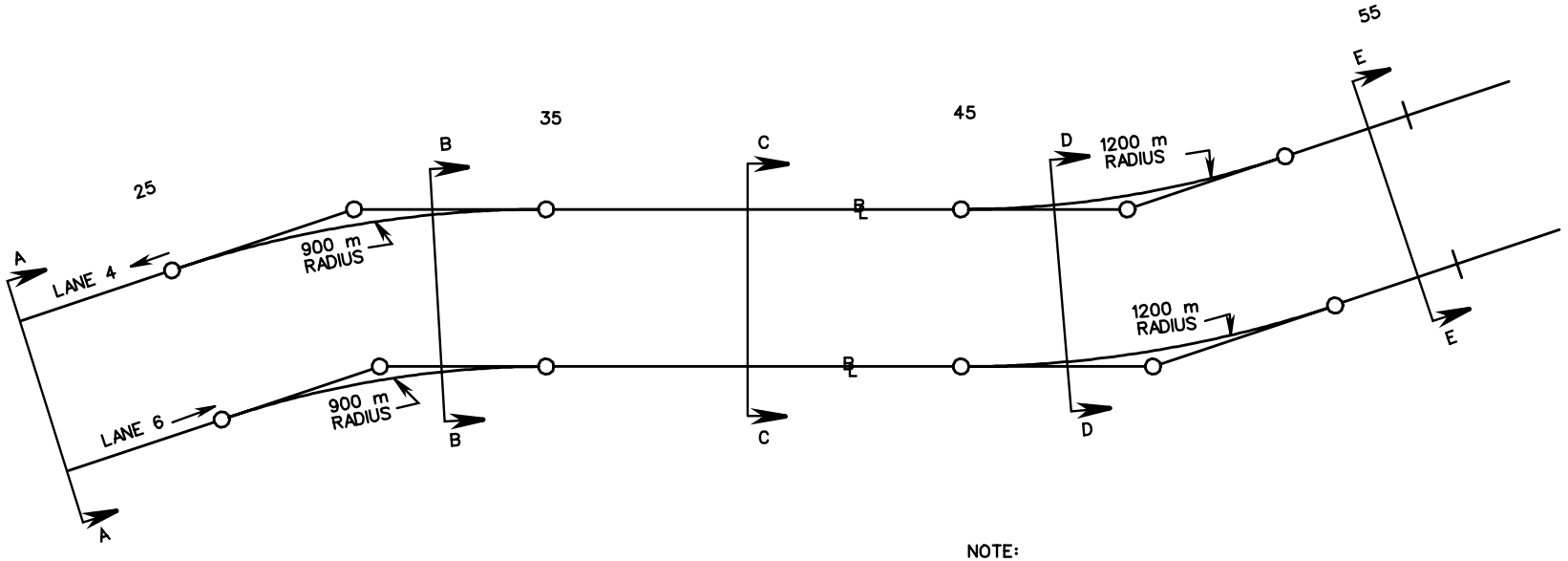
DETAILS OF SUPERELEVATION ABOUT BASELINE

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.08



NOTE:

WHEN ℄ (CROWNLINE) IS ON THE INSIDE EDGE OF PAVEMENT, TANGENT SECTIONS ARE TO BE CODED AS STRAIGHT.

SPECIFICATION REFERENCE

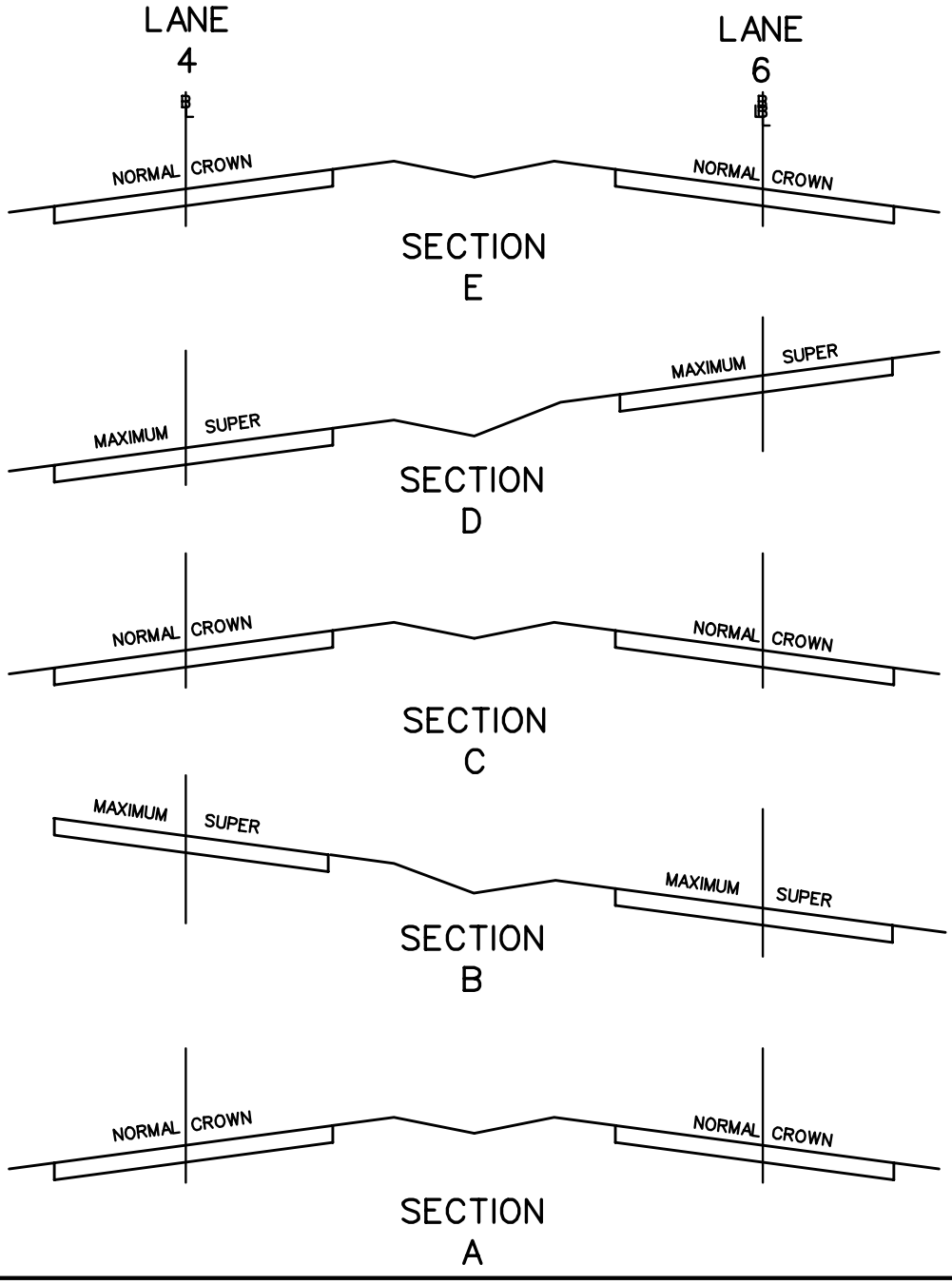
EXAMPLE FOR FOUR LANE ROADWAYS

VIRGINIA DEPARTMENT OF TRANSPORTATION

NEW 10/02

802.09

TC-5.01



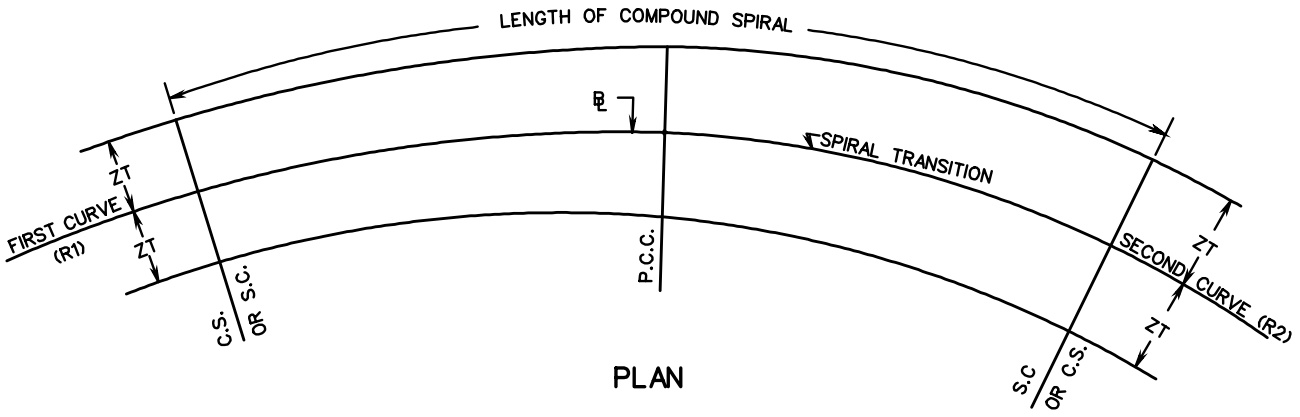
CROSS SECTION - FOUR LANE ROADWAY

VIRGINIA DEPARTMENT OF TRANSPORTATION

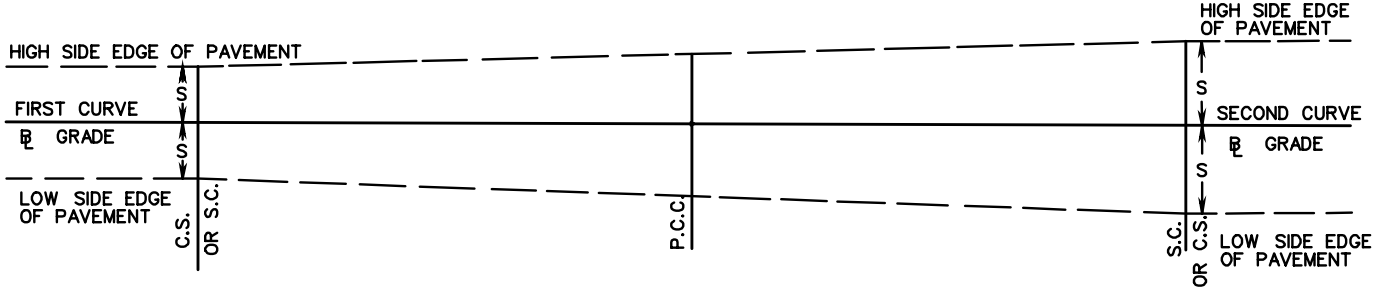
SPECIFICATION REFERENCE

NEW 10/02

802.10



PLAN



PROFILE

NOTE:

1. FOR COMPOUND CURVES ON OPEN ROADWAYS, THE RATIO OF FLATTER RADIUS (R1) TO THE SHARPER RADIUS (R2) SHALL NOT EXCEED 1.5:1. WHERE PRACTICAL, A DESIRABLE MAXIMUM RATIO OF 1.75:1 SHOULD BE USED.
2. FOR COMPOUND CURVES ON RAMPS AND AT INTERSECTIONS, THE RATIO OF THE FLATTER RADIUS (R1) TO THE SHARPER RADIUS (R2) SHALL NOT EXCEED 2:1.
3. COMPUTE STRAIGHT LINE WIDENING AND SUPERELEVATION TRANSITION FROM MAXIMUM OF FIRST CURVE TO MAXIMUM OF SECOND CURVE.
4. REFER TO CHAPTER 3 OF THE AASHTO GREEN BOOK FOR ADDITIONAL COMPOUND CURVE DESIGN INFORMATION.

SPECIFICATION REFERENCE

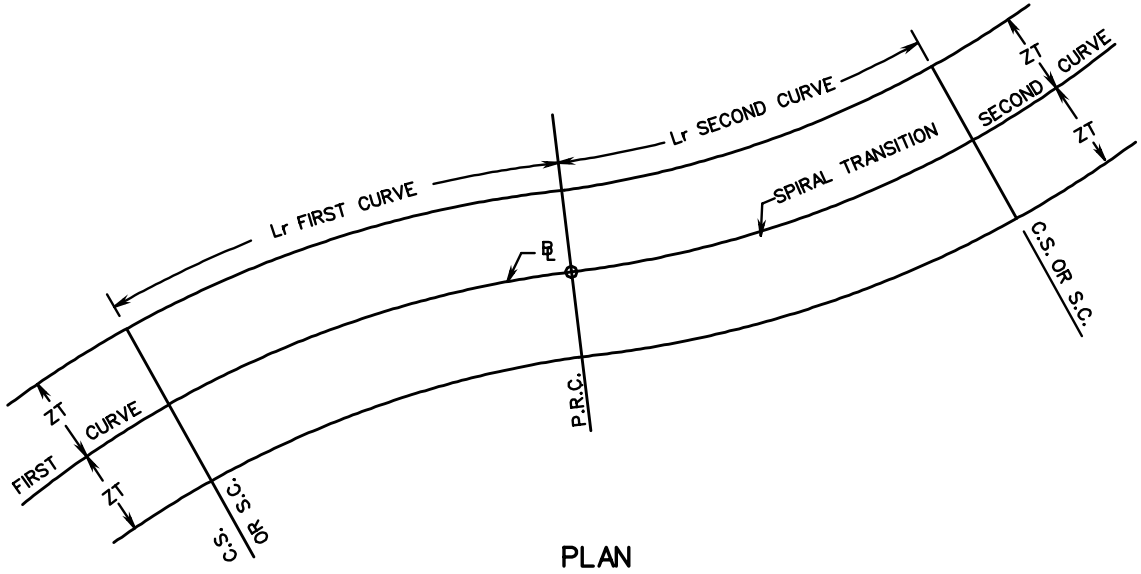
METHOD OF APPLYING TC-5.01 ON COMPOUND CURVES RURAL CONDITIONS WITH PAVEMENT WIDENING

VIRGINIA DEPARTMENT OF TRANSPORTATION

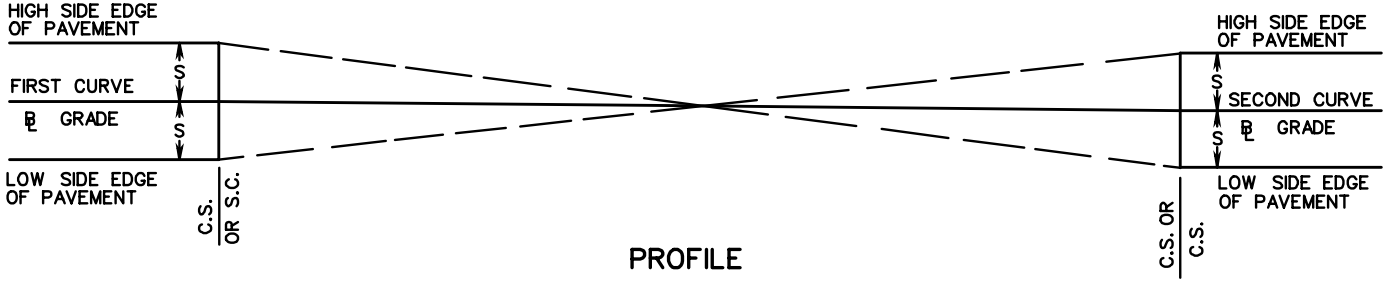
REV. 1/07

802.11

TC-5.01



PLAN



PROFILE

NOTE:

1. COMPUTE STRAIGHT LINE WIDENING AND SUPERELEVATION TRANSITION FROM MAXIMUM OF FIRST CURVE TO MAXIMUM OF SECOND CURVE.

2. REFER TO CHAPTER 3 OF THE AASHTO GREEN BOOK FOR ADDITIONAL REVERSE CURVE DESIGN INFORMATION.

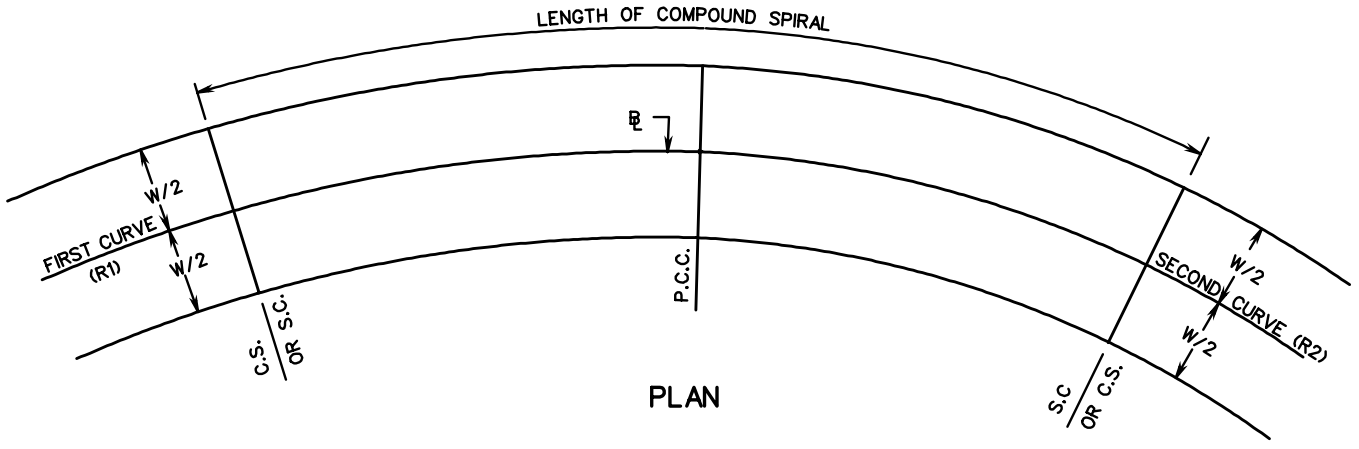
METHOD OF APPLYING TC-5.01 ON REVERSE CURVES RURAL CONDITIONS WITH PAVEMENT WIDENING

VIRGINIA DEPARTMENT OF TRANSPORTATION

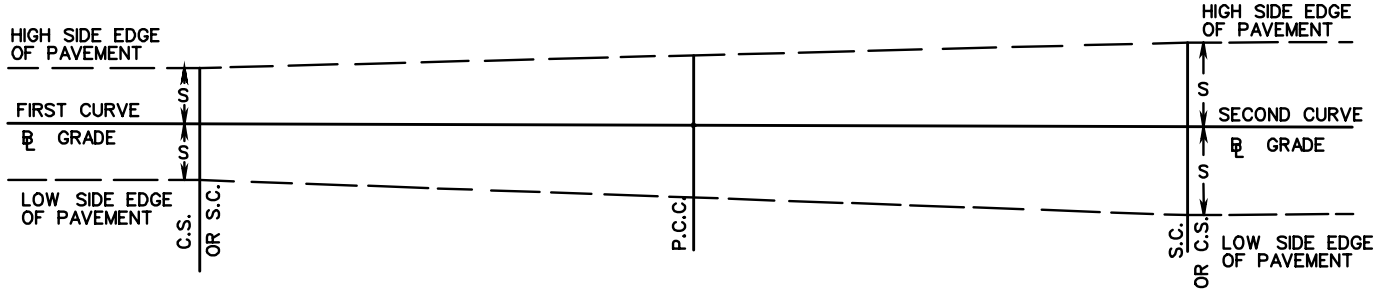
SPECIFICATION REFERENCE

REV. 1/07

802.12



PLAN



PROFILE

NOTE:

1. FOR COMPOUND CURVES ON ROADWAYS, THE RATIO OF FLATTER RADIUS (R1) TO THE SHARPER RADIUS (R2) SHALL NOT EXCEED 1.5:1 WHERE PRACTICAL, A DESIRABLE MAXIMUM RATIO OF 1.75:1 SHOULD BE USED.
2. FOR COMPOUND CURVES ON RAMPS, THE RATIO OF THE FLATTER RADIUS (R1) TO THE SHARPER RADIUS (R2) SHALL NOT EXCEED 2:1.
3. COMPUTE SUPERELEVATION TRANSITION FROM MAXIMUM OF FIRST CURVE TO MAXIMUM OF SECOND CURVE. LENGTH OF COMPOUND SPIRAL COMPUTED PER PAGE 802.22
4. REFER TO CHAPTER 3 OF THE AASHTO GREEN BOOK FOR ADDITIONAL COMPOUND CURVE DESIGN INFORMATION.

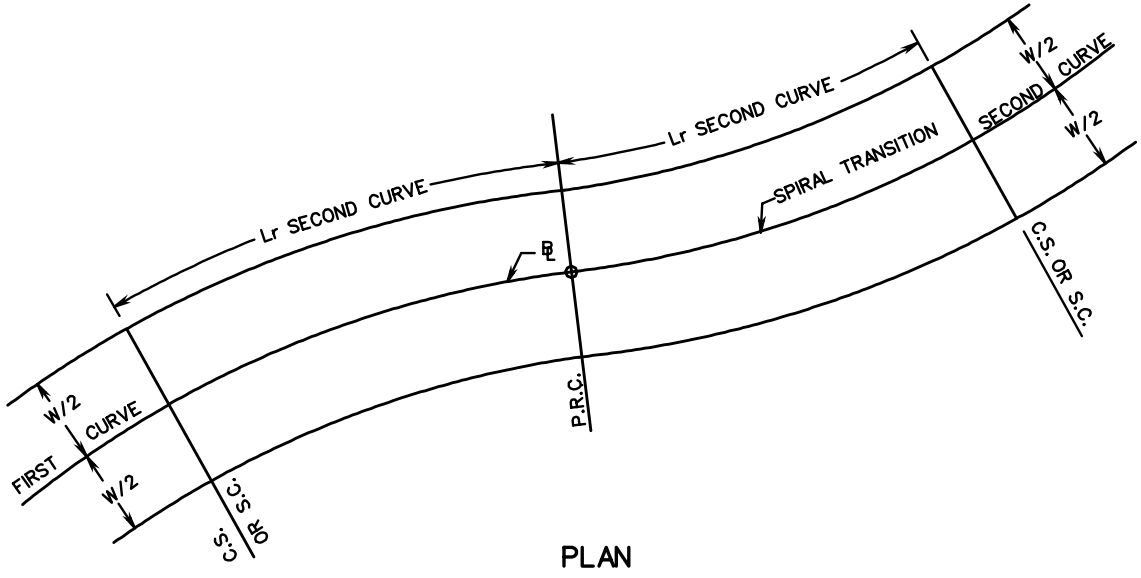
SPECIFICATION REFERENCE

METHOD OF APPLYING TC-5.01 ON COMPOUND CURVES URBAN CONDITIONS & RURAL CONDITIONS WITHOUT PAVEMENT WIDENING

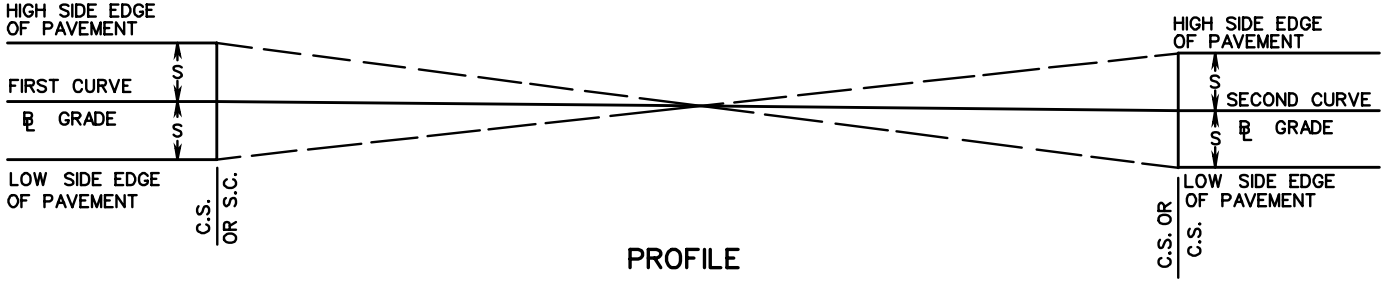
REV 1/07

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01



PLAN



PROFILE

NOTE:

1. COMPUTE SUPERELEVATION TRANSITION FROM MAXIMUM OF FIRST CURVE TO MAXIMUM OF SECOND CURVE. LENGTH OF SUPERELEVATION RUNOFF (Lr) COMPUTED PER FOURTH EDITION OF AASHTO'S A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS.

2. REFER TO CHAPTER 3 OF THE AASHTO GREEN BOOK FOR ADDITIONAL REVERSE CURVE DESIGN INFORMATION.

METHOD OF APPLYING TC-5.01 ON REVERSE CURVES URBAN CONDITIONS & RURAL CONDITIONS WITHOUT PAVEMENT WIDENING

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.14

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TC-5.01

TRANSITION TABLE

LENGTH OF TANGENT RUNOUT (Lt)	START/END OF SUPERELEVATION RUNOFF (Lr)	DISTANCE IN METERS FROM START/END OF SUPERELEVATION RUNOFF SECTION (Lr)				NORMAL CROWN
		1	2	3	4	
65	0	13	26	39	52	65
60	0	12	24	36	48	60
55	0	11	22	33	44	55
50	0	10	20	30	40	50
45	0	9	18	27	36	45
40	0	8	16	24	32	40
35	0	7	14	21	28	35
30	0	6	12	18	24	30
25	0	5	10	15	20	25
20	0	5	10	15	———	20
12	0	6	———	———	———	12

NOTE:

TABLE LISTS POSTIONS ON TRANSITIONS AT WHICH SLOPE STAKES SHOULD BE SET, CONSTRUCTION AND FINAL CROSS-SECTIONS TAKEN, FINE GRADING STAKES (BLUE TOP) SET, AND FORM STAKES SET (CONCRETE PAVEMENT ONLY).

SUPERELEVATION RUNOFF (Lr) / TANGENT RUNOUT (Lt) TABLE

SPECIFICATION REFERENCE

REV. 1/07

802.16

VIRGINIA DEPARTMENT OF TRANSPORTATION

URBAN CONDITIONS
RURAL CONDITIONS WITHOUT PAVEMENT WIDENING

FOR USE WITH FLEXIBLE AND CONCRETE PAVEMENT

(Lr POSITIONED 2/3 ±ON TANGENT, 1/3 ±ON CURVE)

LENGTH OF SUPERELEVATION RUNOFF (Lr)	END/ BEGIN TANGENT RUNOUT (Lt)	DISTANCE IN METERS FROM P.C. OR P.T. ON TANGENT						P.C. OR P.T.	DISTANCE IN METERS FROM P.C. OR P.T. ON CURVE			FULL SUPER ELEVATION (E)
		1	2	3	4	5	6		7	8	9	
150	100	85	70	55	40	25	10	STAKE	5	20	35	50
145	96.5	82	67.5	53	38.5	24	9.5	STAKE	5	19.5	34	48.5
140	93.5	79.5	65.5	51.5	37.5	23.5	9.5	STAKE	4.5	18.5	32.5	46.5
135	90	76.5	63	49.5	36	22.5	9	STAKE	4.5	18	31.5	45
130	87	74	61	48	35	22	9	STAKE	4	17	30	43
125	83.5	71	56.5	46	33.5	21	8.5	STAKE	4	16.5	29	41.5
120	80	68	56	44	32	20	8	STAKE	4	16	28	40
115	76.5	65	53.5	42	30.5	19	7.5	STAKE	4	15.5	27	38.5
110	73.5	62.5	51.5	40.5	29.5	18.5	7.5	STAKE	3.5	14.5	25.5	36.5
105	70	59.5	49	38.5	28	17.5	7	STAKE	3.5	14	24.5	35
100	67	57	47	37	27	17	7	STAKE	3	13	23	33
95	63.5	54	44.5	35	25.5	16	6.5	STAKE	3	12.5	22	31.5
90	60	51	42	33	24	15	6	STAKE	3	12	21	30
85	56.5	48	39.5	31	22.5	14	5.5	STAKE	3	11.5	20	28.5
80	53.5	45.5 *	37.5	29.5 *	21.5	13.5 *	5.5	STAKE *	2.5	10.5 *	18.5	26.5
75	50	42.5 *	35	27.5 *	20	12.5 *	5	STAKE *	2.5	10	17.5	25
70	46.5	39.5 *	32.5	25.5 *	18.5	11.5 *	4.5	STAKE *	2.5	9.5 *	16.5	23.5
65	43.5	37 *	30.5	24 *	17.5	11 *	4.5	STAKE *	2	8.5 *	15	21.5
60	40	34 *	28	22 *	16	10 *	4	STAKE *	2	8	14	20

NOTE :

TABLE GIVING POSITIONS ON CURVES AT WHICH SLOPE STAKES SHOULD BE SET, CONSTRUCTION AND FINAL CROSS-SECTIONS TAKEN, FINE GRADING STAKES (BLUE TOP) SET, AND FORM STAKES SET (CONCRETE PAVEMENT ONLY).

* DENOTES ADDITIONAL STAKING POSITIONS FOR USE WITH CONCRETE PAVEMENT ONLY.

SPECIFICATION REFERENCE

TABLE I

VIRGINIA DEPARTMENT OF TRANSPORTATION

REV. 1/07

802.17

TC-5.01

RURAL CONDITIONS WITH PAVEMENT WIDENING

FOR USE WITH FLEXIBLE AND CONCRETE PAVEMENT

LENGTH OF SUPERELEVATION RUNOFF (Lr)	T.S. OR S.T.	DISTANCE IN METERS FROM T.S. OR S.T. ALONG SPIRAL TRANSITION									S.C. OR C.S.
		1	2	3	4	5	6	7	8	9	
150	0	15	30	45	60	75	90	105	120	135	150
145	0	14.5	29	43.5	58	72.5	87	101.5	115	130.5	145
140	0	14	28	42	56	70	84	98	112	126	140
135	0	13.5	27	40.5	54	67.5	81	94.5	108	121.5	135
130	0	13	26	39	52	65	78	91	104	117	130
125	0	12.5	25	37.5	50	62.5	75	87.5	100	112.5	125
120	0	12	24	36	48	60	72	84	96	108	120
115	0	11.5	23	34.5	46	57.5	69	80.5	92	103.5	115
110	0	11	22	33	44	55	66	77	88	99	110
105	0	10.5	21	31.5	42	52.5	63	73.5	84	94.5	105
100	0	10	20	30	40	50	60	70	80	90	100
95	0	9.5	19	28.5	38	47.5	57	66.5	76	85.5	95
90	0	9	18	27	36	45	54	63	72	81	90
85	0	8.5	17	25.5	34	42.5	51	59.5	68	76.5	85
80	0	8 *	16	24 *	32	40 *	48	56 *	64	72 *	80
75	0	7.5 *	15	22.5 *	30	37.5 *	45	52.5 *	60	67.5 *	75
70	0	7 *	14	21 *	28	35 *	42	49 *	56	63 *	70
65	0	6.5 *	13	19.5 *	26	32.5 *	39	45.5 *	52	58.5 *	65
60	0	6 *	12	18 *	24	30 *	36	42 *	48	54 *	60
55	0	5.5 *	11	16.5 *	22	27.5 *	33	38.5 *	44	49.5 *	55
50	0	5 *	10	15 *	20	25 *	30	35 *	40	45 *	50
45	0	4.5 *	9	13.5 *	18	22.5 *	27	31.5 *	36	40.5 *	45

NOTE :

TABLE GIVING POSITIONS ON TRANSITION CURVES AT WHICH SLOPE STAKES SHOULD BE SET, CONSTRUCTION AND FINAL CROSS-SECTIONS TAKEN, FINE GRADING STAKES (BLUE TOP) SET, AND FORM STAKES SET (CONCRETE PAVEMENT ONLY).

* DENOTES ADDITIONAL STAKING POSITIONS FOR USE WITH CONCRETE PAVEMENT ONLY.

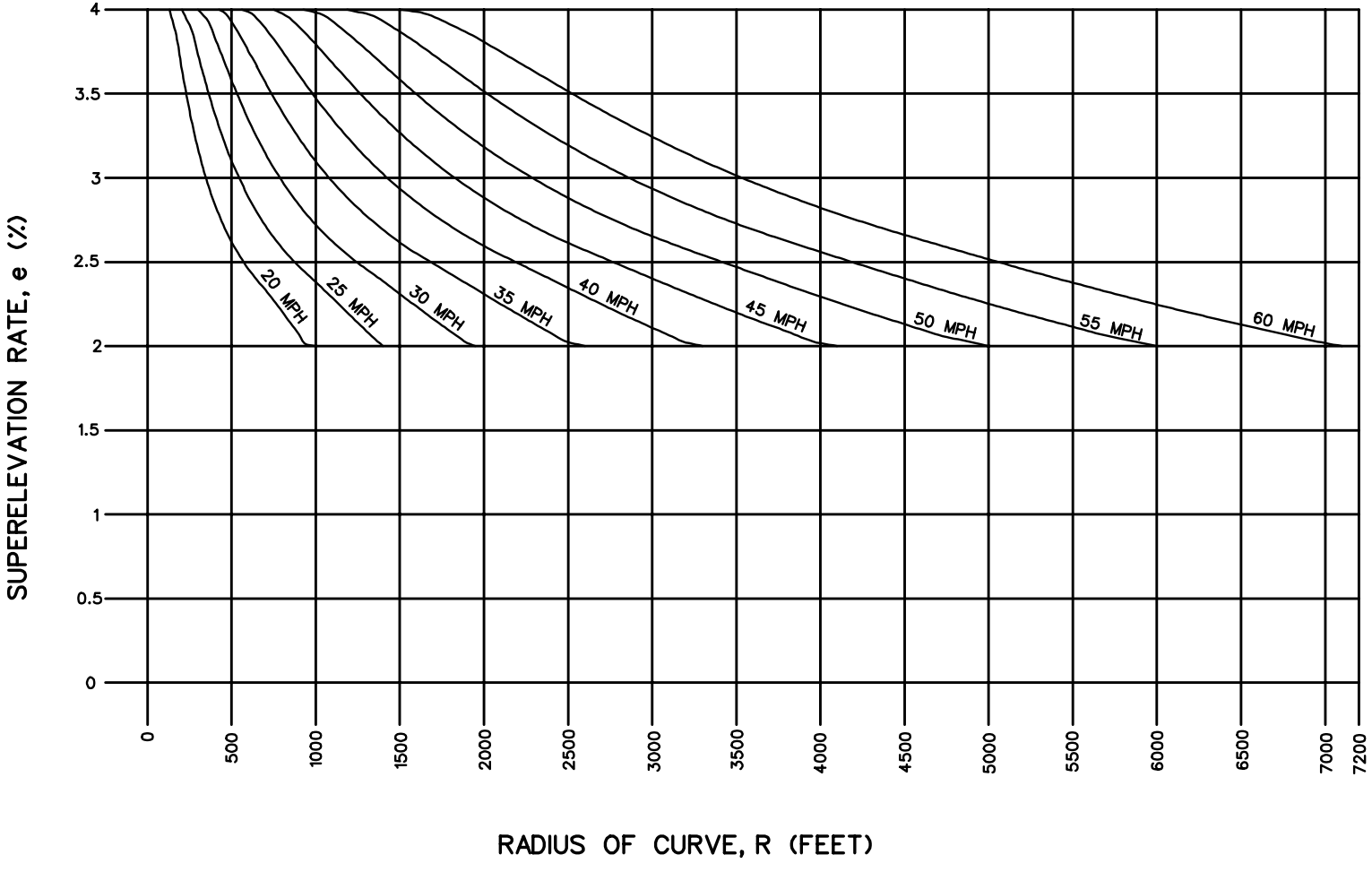
TABLE 2

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.18



NOTE:

INTERMEDIATE UNITS OF SUPERELEVATION AND RADII NOT LISTED ON GRAPH CAN BE GRAPHED USING A CIVIL ENGINEER'S 10 SCALE WITH EACH MARK EQUAL TO 100' OF RADIUS AND 0.1 % OF SUPERELEVATION.

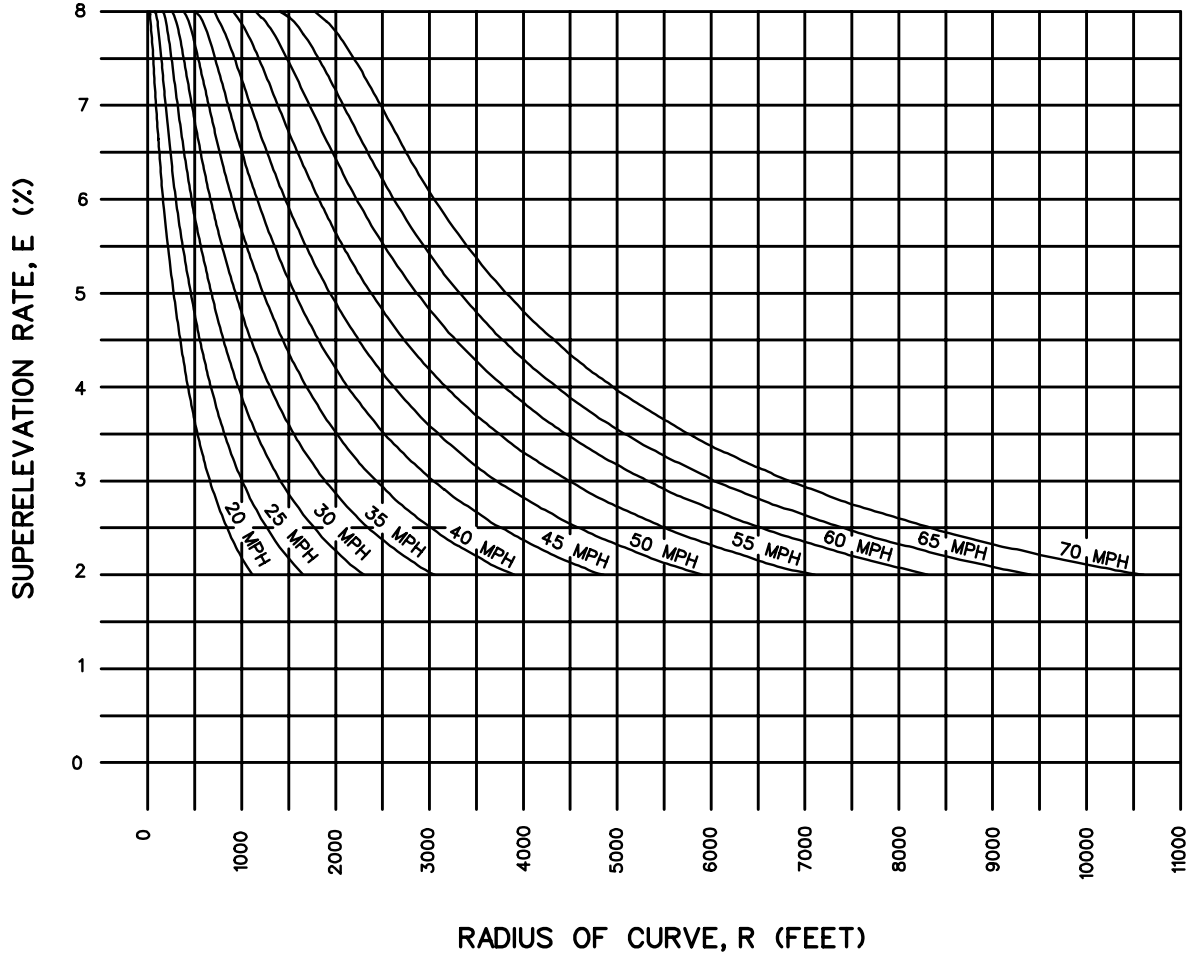
DESIGN SUPERELEVATION RATES
URBAN CONDITIONS

VIRGINIA DEPARTMENT OF TRANSPORTATION

NEW 10/02

802.19

TC-5.01



NOTE:

INTERMEDIATE UNITS OF SUPERELEVATION AND RADII NOT LISTED ON GRAPH CAN BE GRAPHED USING A CIVIL ENGINEER'S 20 SCALE WITH EACH MARK EQUAL TO 100' OF RADIUS AND 0.1% OF SUPERELEVATION.

DESIGN SUPERELEVATION RATES
RURAL CONDITIONS

VIRGINIA DEPARTMENT OF TRANSPORTATION

NEW 10/02

802.20

LEGEND

C- RATE OF CHANGE OF SIDE FRICTION (f) IN m/sec^3

e- SUPERELEVATION RATE IN PERCENT.

f- FRICTION FACTOR.

Lr- LENGTH OF SUPERELEVATION TRANSITION.

R- RADIUS OF CURVE.

DV- DESIGN VELOCITY UTILIZING SUPERELEVATION.

NC- MAXIMUM VELOCITY WITH NO SUPERELEVATION (NORMAL CROWN).

URBAN LOW SPEED DESIGN TABLE

DV/NC (Km/h)	MAX. f	C	MIN. Lr (METERS)
70	0.163	1.00	30
60	0.186	1.05	30
50	0.214	1.10	25
40	0.252	1.15	25
30	0.312	1.20	20

FRICTION FACTORS (f) FOR ODD VELOCITIES NOT LISTED SHOULD BE DERIVED BY INTERPOLATION.

FOR Lr LENGTHS FOR INTERMEDIATE VELOCITIES NOT LISTED IN TABLE USE THE Lr FOR NEAREST VELOCITY IN TABLE.

GENERAL DESIGN CONSIDERATIONS

1. WHEN "URBAN LOW SPEED" DESIGNS UTILIZE SUPERELEVATION, THEY WILL BE SUPERELEVATED BY AN AMOUNT EQUAL TO THE NORMAL CROWN (TYPICALLY 2.0%) AND THE APPROXIMATE MAXIMUM SAFE SPEED (DV) AFFORDED THEREBY.
2. WHEN "URBAN LOW SPEED DESIGN" WITH NO SUPERELEVATION, THE APPROXIMATE MAXIMUM SAFE SPEED (NC) IS CALCULATED USING A NEGATIVE NORMAL CROWN (TYPICALLY -2.0 %).
3. WHEN THE CURVE IS SUPERELEVATED, THE Lr IS APPLIED IN THE SAME MANNER AS IN URBAN CONDITIONS WITH THE CROWN RUNOFF (Lt) BEING EQUAL TO THE Lr VALUE. THE CROWN RUNOFF (Lt) IS ALWAYS ACHIEVED OUTSIDE OF THE TRANSITION (Lr).
4. PLEASE NOTE THAT THE RADIUS VALUES LISTED ON PAGE 802.24 HAVE BEEN ROUNDED UP TO THE NEAREST METER INCREMENT.

EXAMPLES

DV = 31 km/h

e = +2.0 %

f = MAXf ± INTERPOLATED DIFFERENCE BETWEEN LISTED FRICTION FACTORS

f = .252 + .9(.312 − .252) = .306

Lr = 2.72 f DV

Lr = 2.72(.306)(31) = 21.5 m

Rmin. = $DV^2/127(e+f)$

Rmin. = $(31)^2/127(.02 + .306)$ = 23.2 m

NC = 57 km/h

e = −2.0 %

f = MAXf ± INTERPOLATED DIFFERENCE BETWEEN LISTED FRICTION FACTORS

f = .186 + .3(.214 − .186) = 0.1944

Rmin. = $NC^2/127(-e+f)$

Rmin. = $(57)^2/127(-.02 + .1944)$ = 146.69 m

SPECIFICATION REFERENCE

METHODOLOGIES FOR CALCULATING TC-5.01 VALUES FOR URBAN LOW-SPEED STREETS

VIRGINIA DEPARTMENT OF TRANSPORTATION

URBAN LOW SPEED DESIGN TABLE					
DV/NC (Km/h)	70	60	50	40	30
MAX. f	0.150	0.171	0.190	0.233	0.285

FRICTION FACTORS (f) FOR ODD VELOCITIES NOT LISTED SHOULD BE DERIVED BY INTERPOLATION.

LEGEND

e- SUPERELEVATION RATE IN PERCENT.

f- FRICTION FACTOR.

Lr- LENGTH OF SUPERELEVATION RUNOFF SECTION.

Lt- LENGTH OF TANGENT RUNOUT SECTION.

R- RADIUS OF CURVE.

DV- DESIGN VELOCITY UTILIZING SUPERELEVATION.

NC- MAXIMUM VELOCITY WITH NO SUPERELEVATION (NORMAL CROWN).

GENERAL DESIGN CONSIDERATIONS

1. WHEN "URBAN LOW SPEED" DESIGNS UTILIZE SUPERELEVATION, THEY WILL BE SUPERELEVATED BY AN AMOUNT EQUAL TO THE NORMAL CROWN (TYPICALLY 2.0%) AND THE APPROXIMATE MAXIMUM SAFE SPEED (DV) AFFORDED THEREBY.
2. WHEN "URBAN LOW SPEED DESIGN" WITH NO SUPERELEVATION, THE APPROXIMATE MAXIMUM SAFE SPEED (NC) IS CALCULATED USING A NEGATIVE NORMAL CROWN (TYPICALLY -2.0 %).
3. WHEN THE CURVE IS SUPERELEVATED, THE LS IS APPLIED IN THE SAME MANNER AS IN URBAN CONDITIONS WITH THE CROWN RUNOFF (CR) BEING EQUAL TO THE LS VALUE. THE CROWN RUNOFF (CR) IS ALWAYS ACHIEVED OUTSIDE OF THE TRANSITION (LS).
4. PLEASE NOTE THAT THE RADIUS VALUES LISTED ON PAGE 802.24 HAVE BEEN ROUNDED UP TO THE NEAREST METER INCREMENT.

EXAMPLES

DV = 31 km/h

e = +2.0 %

f MAXf ± INTERPOLATED DIFFERENCE BETWEEN LISTED FRICTION FACTORS

f = 0.233 + 0.9(0.285 − 0.233) = 0.280

Rmin. = DV^2 /127(e+f)

Rmin. = $(31)^2$ /127(0.02 + 0280) = 25.2 m

NC = 57 km/h

e = −2.0 %

f = MAXf ± INTERPOLATED DIFFERENCE BETWEEN LISTED FRICTION FACTORS

f = 0.171 + 0.3(0.19 − 0.171) = 0.176

Rmin. = NC^2 /127(−e+f)

Rmin. = $(57)^2$/127(−0.02 + 0.176) = 164 m

SPECIFICATION REFERENCE

METHODOLOGIES FOR CALCULATING TC-5.04 VALUES FOR URBAN LOW-SPEED STREETS

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01

CURVE WIDENING TABLES

SU DESIGN VEHICLE

COMPONENT	SIZE
OVERALL WIDTH (u)	2.4 m
WHEELBASE (L)	6.1 m
FRONT OVERHANG (A)	1.2 m

LATERAL CLEARANCE

LANE WIDTH	CLEARANCE (C)
2.7 m	.45 m
3.0 m	.60 m
3.3 m	.75 m
3.6 m	.90 m
4.8 m	1.5 m

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 Km\h	MAXIMUM RELATIVE GRADIENT (rg)	MIN. TRANSITION LENGTH IN METERS 2 SECOND RULE RURAL CONDITIONS WITH PAVEMENT WIDENING AND REVERSE CURVES FOR ALL CONDITIONS	
		URBAN	RURAL
30	0.75	20	30
40	0.70	25	30
50	0.65	30	30
60	0.60	35	35
70	0.55	40	40
80	0.50	45	45
90	0.47	50	50
100	0.44	60	60
110	0.41	65	65

DEFINITIONS

A - FRONT OVERHANG OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

b_w - ADJUSTMENT FACTOR FROM TABLE.

C - LATERAL CLEARANCE OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

E - SUPERELEVATION RATE FROM APPROPRIATE TABLE OR CALCULATED PER AASHTO METHOD 5.

F_A - CALCULATED WIDTH OF OVERHANG FOR DESIGN VEHICLE.

L - WHEELBASE OF DESIGN VEHICLE FROM APPROPRIATE TABLE.

Lt - LENGTH OF TANGENT RUNOUT SECTION.

Lr - LENGTH SUPERELEVATION RUNOUT SECTION.

M - MULTIPLE LANE FACTOR.

N - NUMBER OF LANES.

n_1 - NUMBER OF LANES ROTATED (FROM TABLE).

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.

GENERAL DESIGN CONSIDERATIONS

1. WHERE PAVEMENT WIDENING IS REQUIRED, THE APPROPRIATE WIDENING IS ADDED TO THE LANE WIDTH WHEN CALCULATING THE TRANSITION LENGTH (Lr).
2. THE COMPUTED SUPERELEVATION RUNOFF LENGTH (LR) IS ROUNDED UP TO THE NEAREST METER.
3. WHEN THE SUPERELEVATION RUNOFF LENGTH (LR) IS CALCULATED, IT MUST BE COMPARED WITH THE MINIMUM VALUE LISTED IN THE APPROPRIATE COLUMN ON THE RELATIVE GRADIENT TABLE.
4. TANGENT RUNOUT (Lt) IS ALWAYS ACHIEVED OUTSIDE OF THE TRANSITION.
5. NO PAVEMENT WIDENING IS REQUIRED FOR URBAN ROADWAYS.
6. NO PAVEMENT WIDENING IS REQUIRED FOR RURAL ROADWAYS WITH A CURVE RADIUS GREATER THAN 850 METERS.
7. NO PAVEMENT WIDENING IS REQUIRED FOR RURAL ROADWAYS WITH 3.6 METERS WIDE LANES AND A CURVE RADIUS GREATER THAN 230 METERS.
8. PAVEMENT WIDENING IS APPLIED ONLY WHEN CALCULATED WIDENING (w) IS EQUAL TO OR GREATER THAN 0.6 METERS.
9. WHEN CALCULATING WIDENING (w) FOR MULTI-LANE RURAL ROADWAYS, WIDENING IS FIRST CALCULATED USING THE SINGLE LANE WIDTH FOR "W".
10. AN ALTERNATE METHOD FOR MULTI-LANE UNDIVIDED PAVEMENTS (14.4 m). THE LR IS 1.5 TIMES (M=1.5) THE CORRESPONDING LENGTH FOR TWO LANE HIGHWAYS; AND FOR SIX LANE UNDIVIDED PAVEMENTS (21.6 m), THE LR IS TWO TIMES (M=2) THE CORRESPONDING LENGTH FOR TWO LANE HIGHWAYS.
11. CALCULATED WIDENING IS ROUNDED UP TO THE NEAREST 0.1 METER.

FORMULAS USED TO CALCULATE TRANSITION LENGTH (Lr) AND WIDENING (w)

NO WIDENING REQUIRED

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

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

WIDENING REQUIRED

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

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

$$U = u + R - \sqrt{R^2 - L^2}$$

$$F_A = \sqrt{R^2 + A(2L + A)} - R$$

$$Z = (V_D/\sqrt{R})$$

$$W_C = N(U + C) + F_A + Z$$

$$w = W_C - 2W_n$$

FOR SOLVED PROBLEMS USING THIS METHODOLOGY, SEE THE EXAMPLES ON PAGE 802.23

METHODOLOGIES FOR CALCULATING TC-5.01 VALUES

SPECIFICATION REFERENCE

RURAL EXAMPLE

6.0 m PAVEMENT WIDTH
(DESIGN SOFTWARE - 1 LANE AT 3.0 m)

$V_D = 80$ km/h R = 375 m
$W_n = 3.0$ m rg = 0.50
E = 6.9 (PER 802.39)

$U = u + R - \sqrt{R^2 - L^2}$
$U = 2.4 + 375 - \sqrt{(375)^2 - (6.1)^2}$
$U = 2.4496$

$F_A = \sqrt{R^2 + A\,(2L + A)} - R$
$F_A = \sqrt{(375)^2 + 1.2[2(6.1 + 1.2)]} - 375$
$F_A = .0214$

$Z = .1(V_D/\sqrt{R})$
$Z = .1(80/\sqrt{375})$
$Z = .4131$

$W_c = N\,(U + C) + F_A + Z$
$W_c = 2(2.4496 + .6) + 0.214 + .4131$
$W_c = 6.5337$

$w = W_c - 2W_n = 6.5337 - 2(3.0) = .5337$ (ROUND TO .6)

(R<850 & w>.6 THEREFORE WIDENING IS REQUIRED)
$Lr = [E\ n_1(W + w/2)/\ rg\ ]\ b_w$
$Lr = [(6.9)(1)(3.0 + .6/2)\ /\ 0.50]\ 1$
$Lr = 6.9(3.3)/.5$
$Lr = 45.54$ (ROUND TO 46)

RURAL EXAMPLE

2.16 m PAVEMENT WIDTH
(DESIGN SOFTWARE - 3 LANES AT 3.6 m)

$V_D = 70$ km/h R = 200 m
$W_n = 3.6$ m rg = 0.55
E = 7.9 (PER PAGE 802.38)

$U = u + R - \sqrt{R^2 - L^2}$
$U = 2.4 + 200 - \sqrt{(200)^2 - (6.1)^2}$
$U = 2.4930$

$F_A = \sqrt{R^2 + A\,(2L + A)} - R$
$F_A = \sqrt{(200)^2 + 1.2[2(6.1 + 1.2)]} - 200$
$F_A = .0402$

$Z = .1(V_D/\sqrt{R})$
$Z = .1(70/\sqrt{200})$
$Z = .4950$

$W_c = 2\,(U + C) + F_A + Z$
$W_c = 2(2.4930 + .9) + .0402 + .4950$
$W_c = 7.3212$

$w = W_c - 2W_n = 7.3212 - 2(3.6) = .121$ (ROUND TO .2)

FOR 21.6 m PAVEMENT WIDTH
$w = 3(.2) = .6$

(R<230 & w>.6 THEREFORE WIDENING IS REQUIRED)
$Lr = [E\ n\ (W + W/3)/\ rg]\ b_w$
$Lr = [7.9(3)(3.6 + .6/3)/0.55]0.6667$
$Lr = (90/0.55)\ 0.6667$
$Lr = 109.1691$ (ROUND TO 110)
OR
$Lr = M[E(W + w/N)/rg]$
$Lr = 2[7.9(3.6 + .6/3)/0.55]$
$Lr = 2(30.02/0.55)$
$Lr = 109.1636$

URBAN EXAMPLES

7.2 m PAVEMENT WIDTH
(DESIGN SOFTWARE - 1 LANE AT 3.6 m)

$V_D = 60$ km/h R = 175 m
$W_n = 3.6$ m rg = 0.60
E = 4.0 (PER PAGE 802.29)

$Lr = (W\ n_1\ E/rg)\ b_w$
$Lr = [3.6(1)(4.0)/0.6](1)$
$Lr = 14.4/.6$
$Lr = 24$

19.8 m PAVEMENT WIDTH
(DESIGN SOFTWARE - 3 LANES AT 3.3 m)

$V_D = 60$ km/h R = 175 m
$W_n = 3.3$ m rg = 0.60
E = 4.0 (PER PAGE 801.29)

$Lr = b_w\ (W_n\ n_1 E/rg)$
$Lr = 0.6667[3.3(3)(4)/.6]$
$Lr = 0.6667\ (39.6/0.6)$
$Lr = 44.0022$
OR
$Lr = m\ (EW_n/rg)$
$Lr = 2[4(3.3)/0.6]$
$Lr = 2(13.2/0.6)$
$Lr = 44.0000$

SPECIFICATION REFERENCE

CALCULATED TC-5.01 EXAMPLES

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01

MINIMUM RADII AND TRANSITION LENGTHS FOR 2% SUPERELEVATION

RADIUS (METERS)	E (%)	F	DV (km/h)	Lr (METERS)	
				PAVEMENT WIDTH (W)	
				W ≤ 21.6 m	W > 21.6 m
>211	2.0	.163	70	32	NOTE: FOR PAVEMENT WIDTHS GREATER THAN 21.6 m USE LS VALUES DEVELOPED BY THE DESIGN SOFTWARE.
138	2.0	.186	60	30	
85	2.0	.214	50	27	
47	2.0	.252	40	25	
22	2.0	.312	30	25	

MINIMUM RADII FOR DESIGNS UTILIZING NORMAL PAVEMENT CROWN

RADIUS (METERS)	F	NC (km/h)
> 270	.163	70
171	.186	60
102	.214	50
55	.252	40
25	.312	30

SUMMARY OF STD. TC-5.01 ULS (URBAN-LOW SPEED) DESIGN FACTORS

SPECIFICATION REFERENCE

REV. 1/07

802.24

VIRGINIA DEPARTMENT OF TRANSPORTATION

MINIMUM RADII AND TRANSITION LENGTHS FOR 2% SUPERELEVATION

RADIUS (METERS)	E (%)	f	DV (Km/h)	LENGTH OF SUPERELEVATION TRANSITION (Lr) IN METERS						
				PAVEMENT WIDTH (W)						W > 28.8 m
				7.2 m (1 @ 3.6 m)	10.8 m (1.5 @ 3.6 m)	14.4 m (2 @ 3.6 m)	18 m (3 @ 3 m)	21.6 m (3 @ 3.3 m)	28.8 m (3 @ 3.6 m)	
> 227	2.0	0.150	70	14	17	20	23	27	30	*
149	2.0	0.171	60	12	15	18	21	25	27	*
94	2.0	0.190	50	12	14	17	20	23	25	*
50	2.0	0.233	40	11	13	16	18	21	24	*
24	2.0	0.285	30	10	12	15	17	20	22	*

* FOR PAVEMENT WIDTHS GREATER THAN 28.8 m USE Lr VALUES DEVELOPED BY THE DESIGN SOFTWARE.

MINIMUM RADII FOR DESIGNS UTILIZING NORMAL PAVEMENT CROWN

RADIUS (METERS)	f	NC (Km/h)
> 297	0.150	70
189	0.171	60
116	0.190	50
60	0.233	40
27	0.285	30

SUMMARY OF STD. TC-5.04 ULS (URBAN-LOW SPEED) DESIGN FACTORS

SPECIFICATION REFERENCE

REV 1/07

802.24A

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 30 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
400	NC	0	0	0	0	0	0	0	0	0	0	0	0
255	2.0	10	10	12	12	15	15	16	16	18	18	20	20
235	2.1	10	11	12	13	15	16	16	17	18	19	20	21
215	2.2	10	11	12	14	15	16	16	18	18	20	20	22
195	2.3	10	12	12	14	15	17	16	19	18	21	20	23
174	2.4	10	12	12	15	15	18	16	20	18	22	20	24
153	2.5	10	12	12	15	15	18	16	20	18	22	20	24
137	2.6	10	13	12	16	15	19	16	21	18	23	20	25
123	2.7	10	13	12	17	15	20	16	22	18	24	20	26
112	2.8	10	14	12	17	15	21	16	23	18	25	20	27
102	2.9	10	14	12	18	15	21	16	24	18	26	20	28
93	3.0	10	15	12	18	15	22	16	24	18	27	20	29
86	3.1	10	15	12	19	15	23	16	25	18	28	20	30
79	3.2	10	16	12	20	15	24	16	26	18	29	20	31
73	3.3	10	16	12	20	15	24	16	27	18	30	20	32
67	3.4	10	17	12	21	15	25	16	28	18	30	20	33
62	3.5	10	17	12	21	15	26	16	28	18	31	20	34
57	3.6	10	18	12	22	15	26	16	29	18	32	20	35
52	3.7	10	18	12	23	15	27	16	30	18	33	20	36
48	3.8	10	19	12	23	15	28	16	31	18	34	20	37
43	3.9	10	19	12	24	15	29	16	32	18	35	20	38
34	4.0	10	20	12	24	15	30	16	32	18	36	20	40

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

SPECIFICATION REFERENCE

TRANSITION CURVES - URBAN

30 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01

DESIGN FACTORS FOR A DESIGN SPEED OF 40 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	LR	Lt	LR	Lt	LR	Lt	LR	Lt	LR	Lt	LR
700	NC	0	0	0	0	0	0	0	0	0	0	0	0
453	2.0	11	11	13	13	16	16	18	18	19	19	21	21
417	2.1	11	11	13	14	16	17	18	18	19	20	21	22
382	2.2	11	12	13	15	16	17	18	19	19	21	21	23
347	2.3	11	12	13	15	16	18	18	20	19	22	21	24
308	2.4	11	13	13	16	16	19	18	21	19	23	21	25
272	2.5	11	13	13	17	16	20	18	22	19	24	21	26
243	2.6	11	14	13	17	16	21	18	23	19	25	21	27
219	2.7	11	14	13	18	16	21	18	24	19	26	21	28
199	2.8	11	15	13	18	16	22	18	24	19	27	21	29
181	2.9	11	15	13	19	16	23	18	25	19	28	21	30
166	3.0	11	16	13	20	16	24	18	26	19	29	21	31
152	3.1	11	16	13	20	16	24	18	27	19	30	21	32
140	3.2	11	17	13	21	16	25	18	28	19	31	21	33
129	3.3	11	17	13	22	16	26	18	29	19	32	21	34
119	3.4	11	18	13	22	16	27	18	30	19	33	21	35
110	3.5	11	18	13	23	16	27	18	30	19	33	21	36
101	3.6	11	19	13	24	16	28	18	31	19	34	21	38
93	3.7	11	20	13	24	16	29	18	32	19	35	21	39
84	3.8	11	20	13	25	16	30	18	33	19	36	21	40
76	3.9	11	21	13	25	16	31	18	34	19	37	21	41
60	4.0	11	22	13	26	16	32	18	36	19	38	21	42

NOTE:

Lt AND LR VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE LR VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND LR VALUES.

TRANSITION CURVES - URBAN

40 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.26

DESIGN FACTORS FOR A DESIGN SPEED OF 50 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
1000	NC	0	0	0	0	0	0	0	0	0	0	0	0
642	2.0	12	12	14	14	17	17	19	19	21	21	23	23
594	2.1	12	12	14	15	17	18	19	20	21	22	23	24
549	2.2	12	13	14	16	17	19	19	21	21	23	23	25
505	2.3	12	13	14	16	17	20	19	22	21	24	23	26
460	2.4	12	14	14	17	17	20	19	23	21	25	23	27
414	2.5	12	14	14	18	17	21	19	24	21	26	23	28
374	2.6	12	15	14	18	17	22	19	24	21	27	23	29
339	2.7	12	15	14	19	17	23	19	25	21	28	23	30
310	2.8	12	16	14	20	17	24	19	26	21	29	23	32
284	2.9	12	17	14	20	17	25	19	27	21	30	23	33
261	3.0	12	17	14	21	17	25	19	28	21	31	23	34
241	3.1	12	18	14	22	17	26	19	29	21	32	23	35
222	3.2	12	18	14	23	17	27	19	30	21	33	23	36
206	3.3	12	19	14	23	17	28	19	31	21	34	23	37
191	3.4	12	19	14	24	17	29	19	32	21	35	23	38
176	3.5	12	20	14	25	17	30	19	33	21	36	23	39
163	3.6	12	20	14	25	17	30	19	34	21	37	23	40
150	3.7	12	21	14	26	17	31	19	35	21	38	23	41
137	3.8	12	22	14	27	17	32	19	36	21	39	23	43
123	3.9	12	22	14	27	17	33	19	36	21	40	23	44
99	4.0	12	24	14	28	17	34	19	38	21	42	23	46

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

TRANSITION CURVES - URBAN

50 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01

DESIGN FACTORS FOR A DESIGN SPEED OF 60 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
1300	NC	0	0	0	0	0	0	0	0	0	0	0	0
894	2.0	12	12	15	15	18	18	20	20	22	22	24	24
830	2.1	12	13	15	16	18	19	20	21	22	24	24	26
769	2.2	12	14	15	17	18	20	20	22	22	25	24	27
711	2.3	12	14	15	18	18	21	20	23	22	26	24	28
655	2.4	12	15	15	18	18	22	20	24	22	27	24	29
597	2.5	12	15	15	19	18	23	20	25	22	28	24	30
542	2.6	12	16	15	20	18	24	20	26	22	29	24	32
495	2.7	12	17	15	21	18	25	20	27	22	30	24	33
454	2.8	12	17	15	21	18	26	20	28	22	31	24	34
418	2.9	12	18	15	22	18	27	20	29	22	32	24	35
386	3.0	12	18	15	23	18	27	20	30	22	33	24	36
357	3.1	12	19	15	24	18	28	20	31	22	35	24	38
331	3.2	12	20	15	24	18	29	20	32	22	36	24	39
307	3.3	12	20	15	25	18	30	20	33	22	37	24	40
284	3.4	12	21	15	26	18	31	20	34	22	38	24	41
264	3.5	12	21	15	27	18	32	20	35	22	39	24	42
244	3.6	12	22	15	27	18	33	20	36	22	40	24	44
225	3.7	12	23	15	28	18	34	20	37	22	41	24	45
206	3.8	12	23	15	29	18	35	20	38	22	42	24	46
186	3.9	12	24	15	30	18	36	20	39	22	43	24	47
150	4.0	12	24	15	30	18	36	20	40	22	44	24	48

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

TRANSITION CURVES - URBAN

60 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.28

DESIGN FACTORS FOR A DESIGN SPEED OF 70 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
2000	NC	0	0	0	0	0	0	0	0	0	0	0	0
1191	2.0	14	14	17	17	20	20	22	22	24	24	27	27
1108	2.1	14	14	17	18	20	21	22	23	24	26	27	28
1030	2.2	14	15	17	18	20	22	22	24	24	27	27	29
957	2.3	14	16	17	19	20	23	22	26	24	28	27	31
886	2.4	14	16	17	20	20	24	22	27	24	29	27	32
817	2.5	14	17	17	21	20	25	22	28	24	30	27	33
747	2.6	14	18	17	22	20	26	22	29	24	32	27	35
685	2.7	14	18	17	23	20	27	22	30	24	33	27	36
631	2.8	14	19	17	23	20	28	22	31	24	34	27	37
583	2.9	14	19	17	24	20	29	22	32	24	35	27	38
540	3.0	14	20	17	25	20	30	22	33	24	36	27	40
501	3.1	14	21	17	26	20	31	22	34	24	38	27	41
466	3.2	14	21	17	27	20	32	22	35	24	39	27	42
433	3.3	14	22	17	27	20	33	22	36	24	40	27	44
403	3.4	14	23	17	28	20	34	22	38	24	41	27	45
374	3.5	14	23	17	29	20	35	22	39	24	42	27	46
347	3.6	14	24	17	30	20	36	22	40	24	44	27	48
323	3.7	14	25	17	31	20	37	22	41	24	45	27	49
294	3.8	14	25	17	31	20	38	22	42	24	46	27	50
265	3.9	14	26	17	32	20	39	22	43	24	47	27	52
215	4.0	14	28	17	34	20	40	22	44	24	48	27	54

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

TRANSITION CURVES - URBAN

70 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

TC-5.01

DESIGN FACTORS FOR A DESIGN SPEED OF 80 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
2500	NC	0	0	0	0	0	0	0	0	0	0	0	0
1485	2.0	15	15	18	18	22	22	24	24	27	27	29	29
1383	2.1	15	16	18	19	22	23	24	26	27	28	29	31
1289	2.2	15	16	18	20	22	24	24	27	27	30	29	32
1199	2.3	15	17	18	21	22	25	24	28	27	31	29	34
1115	2.4	15	18	18	22	22	26	24	29	27	32	29	35
1032	2.5	15	18	18	23	22	27	24	30	27	33	29	36
950	2.6	15	19	18	24	22	29	24	32	27	35	29	38
874	2.7	15	20	18	25	22	30	24	33	27	36	29	39
807	2.8	15	21	18	26	22	31	24	34	27	37	29	41
747	2.9	15	21	18	26	22	32	24	35	27	39	29	42
694	3.0	15	22	18	27	22	33	24	36	27	40	29	44
645	3.1	15	23	18	28	22	34	24	38	27	41	29	45
600	3.2	15	24	18	29	22	35	24	39	27	43	29	47
559	3.3	15	24	18	30	22	36	24	40	27	44	29	48
521	3.4	15	25	18	31	22	37	24	41	27	45	29	49
485	3.5	15	26	18	32	22	38	24	42	27	47	29	51
450	3.6	15	26	18	33	22	39	24	44	27	48	29	52
416	3.7	15	27	18	34	22	40	24	45	27	49	29	54
382	3.8	15	28	18	35	22	42	24	46	27	51	29	55
346	3.9	15	29	18	35	22	43	24	47	27	52	29	57
280	4.0	15	30	18	36	22	44	24	48	27	54	29	58

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

TRANSITION CURVES - URBAN

80 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

REV. 1/07

802.30

DESIGN FACTORS FOR A DESIGN SPEED OF 90 km/h (URBAN) USING E= 4% MAX.

RADIUS (METERS)	E (%)	PAVEMENT WIDTH											
		7.2 m		10.8 m		14.4 m		18.0 m		19.8 m		21.6 m	
		DESIGN SPEED EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)											
		1 @ 3.6 m		1.5 @ 3.6 m		2 @ 3.6 m		3 @ 3.0 m		3 @ 3.3 m		3 @ 3.6 m	
		Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr	Lt	Lr
3000	NC	0	0	0	0	0	0	0	0	0	0	0	0
1830	2.0	16	16	20	20	23	23	26	26	29	29	31	31
1709	2.1	16	17	20	21	23	25	26	27	29	30	31	33
1597	2.2	16	17	20	21	23	26	26	29	29	31	31	34
1492	2.3	16	18	20	22	23	27	26	30	29	33	31	36
1393	2.4	16	19	20	23	23	28	26	31	29	34	31	37
1299	2.5	16	20	20	24	23	29	26	32	29	36	31	39
1208	2.6	16	20	20	25	23	30	26	34	29	37	31	40
1118	2.7	16	21	20	26	23	32	26	35	29	38	31	42
1038	2.8	16	22	20	27	23	33	26	36	29	40	31	43
965	2.9	16	23	20	28	23	34	26	38	29	41	31	45
900	3.0	16	23	20	29	23	35	26	39	29	43	31	46
840	3.1	16	24	20	30	23	36	26	40	29	44	31	48
784	3.2	16	25	20	31	23	37	26	41	29	45	31	50
733	3.3	16	26	20	32	23	38	26	43	29	47	31	51
685	3.4	16	27	20	33	23	40	26	44	29	48	31	53
639	3.5	16	27	20	34	23	41	26	45	29	50	31	54
595	3.6	16	28	20	35	23	42	26	46	29	51	31	56
552	3.7	16	29	20	36	23	43	26	48	29	52	31	57
508	3.8	16	30	20	37	23	44	26	49	29	54	31	59
461	3.9	16	30	20	38	23	45	26	50	29	55	31	60
376	4.0	16	32	20	40	23	46	26	52	29	58	31	62

NOTE:

Lt AND Lr VALUES IN METERS.

FOR PAVEMENT WIDTHS GREATER THAN 21.6 METERS USE Lr VALUES DEVELOPED BY DESIGN SOFTWARE.

LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, AND Lr VALUES.

TRANSITION CURVES - URBAN

90 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

TRANSITION CURVES - RURAL

30 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 30 km/h (RURAL) USING E= 8% MAX.

DESIGN VELOCITY -30		WIDTH= 5.4 m			WIDTH=6.0 m			WIDTH=6.6 m			WIDTH=7.2 m			WIDTH=14.4 m			INTERCHANGE RAMPS			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)															WIDTH			
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
500	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
322	2.0	20	20	0.7	8	8	0.0	9	9	0.0	10	10	0.0	15	15	0.0	12	12	12	12
305	2.1	20	20	0.7	8	9	0.0	9	10	0.0	10	11	0.0	15	16	0.0	12	12	12	13
289	2.2	19	20	0.7	8	9	0.0	9	10	0.0	10	11	0.0	15	16	0.0	12	13	12	14
275	2.3	18	20	0.7	8	10	0.0	9	11	0.0	10	12	0.0	15	17	0.0	12	13	12	14
262	2.4	17	20	0.7	8	10	0.0	9	11	0.0	10	12	0.0	15	18	0.0	12	14	12	15
250	2.5	16	20	0.7	8	10	0.0	9	11	0.0	10	12	0.0	15	18	0.0	12	15	12	15
239	2.6	16	20	0.7	8	11	0.0	9	12	0.0	10	13	0.0	15	19	0.0	12	15	12	16
228	2.7	15	20	0.7	8	11	0.0	9	12	0.0	10	13	0.0	15	20	0.0	12	16	12	17
219	2.8	15	20	0.8	8	12	0.0	9	13	0.0	10	14	0.0	15	21	0.0	12	16	12	17
210	2.9	14	20	0.8	8	12	0.0	9	13	0.0	10	14	0.0	15	21	0.0	12	17	12	18
201	3.0	14	20	0.8	8	12	0.0	9	14	0.0	10	15	0.0	15	22	0.0	12	17	12	18
193	3.1	13	20	0.8	8	13	0.0	9	14	0.0	10	15	0.0	15	23	0.0	12	18	12	19
186	3.2	13	20	0.8	8	13	0.0	9	15	0.0	10	16	0.0	15	24	0.0	12	19	12	20
179	3.3	13	20	0.8	8	14	0.0	9	15	0.0	10	16	0.0	15	24	0.0	12	19	12	20
172	3.4	12	20	0.8	8	14	0.0	9	15	0.0	10	17	0.0	15	25	0.0	12	20	12	21
166	3.5	12	20	0.9	9	16	0.6	9	16	0.0	10	17	0.0	15	26	0.0	12	20	12	21
160	3.6	12	20	0.9	12	20	0.6	9	16	0.0	10	18	0.0	15	26	0.0	12	21	12	22
155	3.7	11	20	0.9	11	20	0.6	9	17	0.0	10	18	0.0	15	27	0.0	12	21	12	23
149	3.8	11	20	0.9	11	20	0.6	9	17	0.0	10	19	0.0	15	28	0.0	12	22	12	23
144	3.9	11	20	0.9	11	20	0.6	9	18	0.0	10	19	0.0	15	29	0.0	12	23	12	24
139	4.0	10	20	0.9	10	20	0.6	9	18	0.0	10	20	0.0	15	29	0.0	12	23	12	24
135	4.1	10	20	0.9	10	20	0.6	9	19	0.0	10	20	0.0	15	30	0.0	12	24	12	25
130	4.2	10	20	1.0	10	20	0.7	9	19	0.0	10	21	0.0	15	31	0.0	12	24	12	26
126	4.3	10	20	1.0	10	20	0.7	9	19	0.0	10	21	0.0	15	31	0.0	12	25	12	26
121	4.4	10	20	1.0	9	20	0.7	9	20	0.0	10	22	0.0	15	32	0.0	12	25	12	27
117	4.5	9	20	1.0	9	21	0.7	9	20	0.0	10	22	0.0	15	33	0.0	12	26	12	27
114	4.6	9	20	1.0	9	21	0.7	9	21	0.0	10	23	0.0	15	34	0.0	12	26	12	28
110	4.7	9	21	1.1	10	22	0.8	9	21	0.0	10	23	0.0	15	34	0.0	12	27	12	29
106	4.8	9	21	1.1	10	22	0.8	9	22	0.0	10	24	0.0	15	35	0.0	12	28	12	29
102	4.9	9	22	1.1	10	23	0.8	9	22	0.0	10	24	0.0	15	36	0.0	12	28	12	30
99	5.0	9	22	1.1	10	23	0.8	9	22	0.0	10	24	0.0	15	36	0.0	12	29	12	30
95	5.1	9	23	1.1	10	24	0.8	9	23	0.0	10	25	0.0	15	37	0.0	12	29	12	31
92	5.2	9	23	1.2	10	24	0.9	10	25	0.6	10	25	0.0	16	41	0.6	12	30	12	32
88	5.3	9	24	1.2	10	25	0.9	10	26	0.6	10	26	0.0	16	42	0.6	12	30	12	32
85	5.4	9	24	1.2	10	25	0.9	10	26	0.6	10	26	0.0	16	43	0.6	12	31	12	33
82	5.5	9	25	1.2	10	26	0.9	10	27	0.6	10	27	0.0	16	43	0.6	12	32	12	33
79	5.6	9	26	1.3	10	27	1.0	10	28	0.7	10	27	0.0	16	45	0.8	12	32	12	34
76	5.7	9	26	1.3	10	27	1.0	10	28	0.7	10	28	0.0	16	46	0.8	12	33	12	35
74	5.8	9	26	1.3	10	28	1.0	10	29	0.7	10	28	0.0	16	47	0.8	12	33	12	35
71	5.9	9	27	1.3	10	28	1.0	10	29	0.7	10	29	0.0	16	48	0.8	12	34	12	36
69	6.0	10	28	1.4	10	29	1.1	10	30	0.8	10	29	0.0	17	50	1.0	12	34	12	36
66	6.1	10	28	1.4	10	29	1.1	10	31	0.8	10	30	0.0	17	51	1.0	12	35	12	37
64	6.2	10	29	1.4	10	30	1.1	10	31	0.8	10	30	0.0	17	51	1.0	12	36	12	38
62	6.3	10	29	1.5	10	31	1.2	10	32	0.9	11	33	0.6	17	53	1.2	12	36	12	38
60	6.4	10	30	1.5	10	31	1.2	10	32	0.9	11	34	0.6	17	54	1.2	12	37	12	39
58	6.5	10	30	1.5	10	32	1.2	10	33	0.9	11	34	0.6	17	55	1.2	12	37	12	39
56	6.6	10	31	1.6	10	33	1.3	11	34	1.0	11	35	0.7	18	57	1.4	12	38	12	40
54	6.7	10	32	1.6	10	33	1.3	11	34	1.0	11	36	0.7	18	58	1.4	12	38	12	41
52	6.8	10	32	1.6	10	34	1.3	11	35	1.0	11	36	0.7	18	59	1.4	12	39	12	41
50	6.9	10	33	1.7	10	35	1.4	11	36	1.1	11	37	0.8	18	61	1.6	12	39	12	42
49	7.0	10	34	1.7	10	35	1.4	11	36	1.1	11	38	0.8	18	62	1.6	12	40	12	42
47	7.1	10	35	1.8	10	36	1.5	11	37	1.2	11	39	0.9	18	64	1.8	12	41	12	43
45	7.2	10	35	1.8	10	36	1.5	11	38	1.2	11	39	0.9	18	65	1.8	12	41	12	44
44	7.3	10	36	1.9	11	37	1.6	11	39	1.3	11	40	1.0	19	68	2.0	12	42	12	44
42	7.4	10	37	1.9	11	38	1.6	11	39	1.3	11	41	1.0	19	69	2.0	12	42	12	45
41	7.5	10	37	2.0	11	39	1.7	11	40	1.4	12	42	1.1	19	71	2.2	12	43	12	45
39	7.6	10	38	2.0	11	40	1.7	11	41	1.4	12	43	1.1	19	72	2.2	12	43	12	46
37	7.7	10	39	2.1	11	41	1.8	11	42	1.5	12	44	1.2	20	74	2.4	12	44	12	47
35	7.8	11	40	2.2	11	42	1.9	11	43	1.6	12	45	1.3	20	77	2.6	12	45	12	47
33	7.9	11	41	2.3	11	43	2.0	12	44	1.7	12	46	1.4	20	79	2.8	12	45	12	48
29	8.0	11	43	2.5	11	44	2.2	12	46	1.9	12	47	1.6	21	84	3.2	12	46	12	48

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

SPECIFICATION REFERENCE

SPECIFICATION REFERENCE

TRANSITION CURVES - RURAL

40 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 40 km/h (RURAL) USING E- 8% MAX.

DESIGN VELOCITY -40		WIDTH- 5.4 m			WIDTH-6.0 m			WIDTH-6.6 m			WIDTH-7.2 m			WIDTH-14.4 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																		
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
800	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
571	2.0	25	25	0.6	9	9	0.0	10	10	0.0	11	11	0.0	16	16	0.0	13	13	13	13
541	2.1	24	25	0.6	9	9	0.0	10	10	0.0	11	11	0.0	16	17	0.0	13	13	13	14
513	2.2	23	25	0.6	9	10	0.0	10	11	0.0	11	12	0.0	16	17	0.0	13	14	13	15
488	2.3	22	25	0.6	9	10	0.0	10	11	0.0	11	12	0.0	16	18	0.0	13	14	13	15
465	2.4	21	25	0.6	9	11	0.0	10	12	0.0	11	13	0.0	16	19	0.0	13	15	13	16
444	2.5	20	25	0.6	9	11	0.0	10	12	0.0	11	13	0.0	16	20	0.0	13	16	13	17
424	2.6	20	25	0.7	9	12	0.0	10	13	0.0	11	14	0.0	16	21	0.0	13	16	13	17
406	2.7	19	25	0.7	9	12	0.0	10	13	0.0	11	14	0.0	16	21	0.0	13	17	13	18
388	2.8	18	25	0.7	9	12	0.0	10	14	0.0	11	15	0.0	16	22	0.0	13	18	13	18
372	2.9	18	25	0.7	9	13	0.0	10	14	0.0	11	15	0.0	16	23	0.0	13	18	13	19
357	3.0	17	25	0.7	9	13	0.0	10	15	0.0	11	16	0.0	16	24	0.0	13	19	13	20
343	3.1	17	25	0.7	9	14	0.0	10	15	0.0	11	16	0.0	16	24	0.0	13	19	13	20
330	3.2	16	25	0.7	9	14	0.0	10	16	0.0	11	17	0.0	16	25	0.0	13	20	13	21
318	3.3	16	25	0.7	9	15	0.0	10	16	0.0	11	17	0.0	16	26	0.0	13	21	13	22
306	3.4	15	25	0.7	9	15	0.0	10	17	0.0	11	18	0.0	16	27	0.0	13	21	13	22
295	3.5	15	25	0.7	9	15	0.0	10	17	0.0	11	18	0.0	16	27	0.0	13	22	13	23
285	3.6	14	25	0.7	9	16	0.0	10	17	0.0	11	19	0.0	16	28	0.0	13	22	13	24
274	3.7	14	25	0.8	9	16	0.0	10	18	0.0	11	20	0.0	16	29	0.0	13	23	13	24
265	3.8	14	25	0.8	9	17	0.0	10	18	0.0	11	20	0.0	16	30	0.0	13	24	13	25
256	3.9	13	25	0.8	9	17	0.0	10	19	0.0	11	21	0.0	16	31	0.0	13	24	13	26
247	4.0	13	25	0.8	9	18	0.0	10	19	0.0	11	21	0.0	16	31	0.0	13	25	13	26
239	4.1	13	25	0.8	9	18	0.0	10	20	0.0	11	22	0.0	16	32	0.0	13	25	13	27
231	4.2	12	25	0.8	9	18	0.0	10	20	0.0	11	22	0.0	16	33	0.0	13	26	13	27
223	4.3	12	25	0.8	9	19	0.0	10	21	0.0	11	23	0.0	16	34	0.0	13	27	13	28
216	4.4	12	25	0.8	9	19	0.0	10	21	0.0	11	23	0.0	16	34	0.0	13	27	13	29
208	4.5	12	25	0.8	9	20	0.0	10	22	0.0	11	24	0.0	16	35	0.0	13	28	13	29
201	4.6	11	25	0.9	11	25	0.6	10	22	0.0	11	24	0.0	16	36	0.0	13	28	13	30
195	4.7	11	25	0.9	11	25	0.6	10	23	0.0	11	25	0.0	16	37	0.0	13	29	13	31
188	4.8	11	25	0.9	11	25	0.6	10	23	0.0	11	25	0.0	16	38	0.0	13	30	13	31
182	4.9	11	25	0.9	11	25	0.6	10	24	0.0	11	26	0.0	16	38	0.0	13	30	13	32
175	5.0	10	25	0.9	10	25	0.6	10	24	0.0	11	26	0.0	16	39	0.0	13	31	13	33
169	5.1	10	25	0.9	10	25	0.6	10	25	0.0	11	27	0.0	16	40	0.0	13	31	13	33
163	5.2	10	25	0.9	10	25	0.6	10	25	0.0	11	27	0.0	16	41	0.0	13	32	13	34
157	5.3	10	25	1.0	10	26	0.7	10	25	0.0	11	28	0.0	16	41	0.0	13	33	13	35
151	5.4	10	25	1.0	10	26	0.7	10	26	0.0	11	28	0.0	16	42	0.0	13	33	13	35
145	5.5	10	26	1.0	10	27	0.7	10	26	0.0	11	29	0.0	16	43	0.0	13	34	13	36
140	5.6	10	26	1.0	10	27	0.7	10	27	0.0	11	29	0.0	16	44	0.0	13	35	13	36
135	5.7	10	27	1.0	10	28	0.7	10	27	0.0	11	30	0.0	16	44	0.0	13	35	13	37
130	5.8	10	27	1.0	10	28	0.7	10	28	0.0	11	30	0.0	16	45	0.0	13	36	13	38
126	5.9	10	28	1.1	10	29	0.8	10	28	0.0	11	31	0.0	16	46	0.0	13	36	13	38
121	6.0	10	28	1.1	10	30	0.8	10	29	0.0	11	31	0.0	16	47	0.0	13	37	13	39
117	6.1	10	29	1.1	10	30	0.8	10	29	0.0	11	32	0.0	16	48	0.0	13	38	13	40
113	6.2	10	29	1.1	10	31	0.8	10	30	0.0	11	32	0.0	16	48	0.0	13	38	13	40
110	6.3	10	30	1.1	10	31	0.8	10	30	0.0	11	33	0.0	16	49	0.0	13	39	13	41
106	6.4	10	31	1.2	10	32	0.9	11	33	0.6	11	33	0.0	17	54	0.6	13	39	13	42
102	6.5	10	31	1.2	10	33	0.9	11	34	0.6	11	34	0.0	17	55	0.6	13	40	13	42
99	6.6	10	32	1.2	10	33	0.9	11	34	0.6	11	34	0.0	17	56	0.6	13	41	13	43
96	6.7	10	32	1.2	10	34	0.9	11	35	0.6	11	35	0.0	17	56	0.6	13	41	13	44
92	6.8	10	33	1.3	10	34	1.0	11	36	0.7	11	35	0.0	18	59	0.8	13	42	13	44
89	6.9	10	34	1.3	10	35	1.0	11	36	0.7	11	36	0.0	18	60	0.8	13	42	13	45
86	7.0	10	34	1.3	10	35	1.0	11	37	0.7	11	36	0.0	18	60	0.8	13	43	13	45
83	7.1	10	34	1.3	10	36	1.0	11	38	0.7	11	37	0.0	18	61	0.8	13	44	13	46
80	7.2	10	35	1.4	11	37	1.1	11	39	0.8	11	38	0.0	18	64	1.0	13	44	13	47
77	7.3	10	36	1.4	11	38	1.1	11	39	0.8	11	38	0.0	18	65	1.0	13	45	13	47
75	7.4	10	36	1.4	11	38	1.1	11	40	0.8	11	39	0.0	18	66	1.0	13	45	13	48
72	7.5	10	37	1.5	11	39	1.2	11	41	0.9	12	42	0.6	18	68	1.2	13	46	13	49
69	7.6	10	38	1.5	11	40	1.2	11	41	0.9	12	43	0.6	18	69	1.2	13	47	13	49
66	7.7	10	38	1.5	11	40	1.2	11	42	0.9	12	43	0.6	18	70	1.2	13	47	13	50
62	7.8	10	39	1.6	11	41	1.3	11	43	1.0	12	45	0.7	19	72	1.4	13	48	13	51
58	7.9	11	41	1.7	11	42	1.4	11	44	1.1	12	46	0.8	19	75	1.6	13	48	13	51
51	8.0	11	42	1.8	11	43	1.5	12	45	1.2	12	47	0.9	20	78	1.8	13	49	13	52

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

TRANSITION CURVES - RURAL

50 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 50 km/h (RURAL) USING E= 8% MAX.

DESIGN VELOCITY -50		WIDTH= 5.4 m			WIDTH-6.0 m			WIDTH-6.6 m			WIDTH-7.2 m			WIDTH-14.4 m			INTERCHANGE RAMPS			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)															WIDTH			
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
1200		0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
851	2.0	9	9	0.0	10	10	0.0	11	11	0.0	12	12	0.0	17	17	0.0	13	13	14	14
850	2.0	30	30	0.6	10	10	0.0	11	11	0.0	12	12	0.0	17	17	0.0	13	13	14	14
796	2.0	30	30	0.6	10	10	0.0	11	11	0.0	12	12	0.0	17	17	0.0	13	13	14	14
754	2.1	29	30	0.6	10	10	0.0	11	11	0.0	12	12	0.0	17	18	0.0	13	14	14	15
716	2.2	28	30	0.6	10	11	0.0	11	12	0.0	12	13	0.0	17	19	0.0	13	15	14	16
682	2.3	27	30	0.6	10	11	0.0	11	12	0.0	12	13	0.0	17	20	0.0	13	15	14	16
650	2.4	25	30	0.6	10	12	0.0	11	13	0.0	12	14	0.0	17	20	0.0	13	16	14	17
620	2.5	24	30	0.6	10	12	0.0	11	13	0.0	12	14	0.0	17	21	0.0	13	17	14	18
593	2.6	24	30	0.6	10	12	0.0	11	14	0.0	12	15	0.0	17	22	0.0	13	17	14	18
568	2.7	23	30	0.6	10	13	0.0	11	14	0.0	12	15	0.0	17	23	0.0	13	18	14	19
544	2.8	22	30	0.6	10	13	0.0	11	15	0.0	12	16	0.0	17	24	0.0	13	19	14	20
523	2.9	21	30	0.7	10	14	0.0	11	15	0.0	12	17	0.0	17	25	0.0	13	19	14	21
502	3.0	20	30	0.7	10	14	0.0	11	16	0.0	12	17	0.0	17	25	0.0	13	20	14	21
483	3.1	20	30	0.7	10	15	0.0	11	16	0.0	12	18	0.0	17	26	0.0	13	21	14	22
465	3.2	19	30	0.7	10	15	0.0	11	17	0.0	12	18	0.0	17	27	0.0	13	21	14	23
448	3.3	19	30	0.7	10	16	0.0	11	17	0.0	12	19	0.0	17	28	0.0	13	22	14	23
432	3.4	18	30	0.7	10	16	0.0	11	18	0.0	12	19	0.0	17	29	0.0	13	23	14	24
417	3.5	18	30	0.7	10	17	0.0	11	18	0.0	12	20	0.0	17	30	0.0	13	23	14	25
402	3.6	17	30	0.7	10	17	0.0	11	19	0.0	12	20	0.0	17	30	0.0	13	24	14	25
389	3.7	17	30	0.7	10	18	0.0	11	19	0.0	12	21	0.0	17	31	0.0	13	24	14	26
376	3.8	16	30	0.7	10	18	0.0	11	20	0.0	12	22	0.0	17	32	0.0	13	25	14	27
363	3.9	16	30	0.7	10	18	0.0	11	20	0.0	12	22	0.0	17	33	0.0	13	26	14	27
352	4.0	15	30	0.7	10	19	0.0	11	21	0.0	12	23	0.0	17	34	0.0	13	26	14	28
340	4.1	15	30	0.8	10	19	0.0	11	21	0.0	12	23	0.0	17	35	0.0	13	27	14	29
329	4.2	15	30	0.8	10	20	0.0	11	22	0.0	12	24	0.0	17	35	0.0	13	28	14	30
319	4.3	14	30	0.8	10	20	0.0	11	22	0.0	12	24	0.0	17	36	0.0	13	28	14	30
309	4.4	14	30	0.8	10	21	0.0	11	23	0.0	12	25	0.0	17	37	0.0	13	29	14	31
300	4.5	14	30	0.8	10	21	0.0	11	23	0.0	12	25	0.0	17	38	0.0	13	30	14	32
290	4.6	14	30	0.8	10	22	0.0	11	24	0.0	12	26	0.0	17	39	0.0	13	30	14	32
281	4.7	13	30	0.8	10	22	0.0	11	24	0.0	12	27	0.0	17	40	0.0	13	31	14	33
273	4.8	13	30	0.8	10	23	0.0	11	25	0.0	12	27	0.0	17	40	0.0	13	32	14	34
265	4.9	13	30	0.8	10	23	0.0	11	25	0.0	12	28	0.0	17	41	0.0	13	32	14	34
256	5.0	12	30	0.8	10	24	0.0	11	26	0.0	12	28	0.0	17	42	0.0	13	33	14	35
249	5.1	12	30	0.8	10	24	0.0	11	26	0.0	12	29	0.0	17	43	0.0	13	34	14	36
241	5.2	12	30	0.9	12	30	0.6	11	27	0.0	12	29	0.0	17	44	0.0	13	34	14	36
233	5.3	12	30	0.9	12	30	0.6	11	27	0.0	12	30	0.0	17	45	0.0	13	35	14	37
226	5.4	12	30	0.9	12	30	0.6	11	28	0.0	12	30	0.0	17	45	0.0	13	36	14	38
219	5.5	11	30	0.9	11	30	0.6	11	28	0.0	12	31	0.0	17	46	0.0	13	36	14	39
212	5.6	11	30	0.9	11	30	0.6	11	29	0.0	12	32	0.0	17	47	0.0	13	37	14	39
205	5.7	11	30	0.9	11	30	0.6	11	29	0.0	12	32	0.0	17	48	0.0	13	37	14	40
198	5.8	11	30	0.9	11	30	0.6	11	30	0.0	12	33	0.0	17	49	0.0	13	38	14	41
192	5.9	11	30	0.9	11	30	0.6	11	30	0.0	12	33	0.0	17	50	0.0	13	39	14	41
186	6.0	10	30	1.0	11	31	0.7	11	31	0.0	12	34	0.0	17	50	0.0	13	39	14	42
180	6.1	10	31	1.0	11	32	0.7	11	31	0.0	12	34	0.0	17	51	0.0	13	40	14	43
175	6.2	10	31	1.0	11	32	0.7	11	32	0.0	12	35	0.0	17	52	0.0	13	41	14	43
170	6.3	10	32	1.0	11	33	0.7	11	32	0.0	12	35	0.0	17	53	0.0	13	41	14	44
164	6.4	10	32	1.0	11	33	0.7	11	33	0.0	12	36	0.0	17	54	0.0	13	42	14	45
159	6.5	10	32	1.0	11	34	0.7	11	33	0.0	12	36	0.0	17	54	0.0	13	43	14	45
154	6.6	10	33	1.0	11	35	0.7	11	34	0.0	12	37	0.0	17	55	0.0	13	43	14	46
150	6.7	10	34	1.1	11	36	0.8	11	35	0.0	12	38	0.0	17	56	0.0	13	44	14	47
145	6.8	10	34	1.1	11	36	0.8	11	35	0.0	12	38	0.0	17	57	0.0	13	45	14	48
141	6.9	10	35	1.1	11	37	0.8	11	36	0.0	12	39	0.0	17	58	0.0	13	45	14	48
136	7.0	10	35	1.1	11	37	0.8	11	36	0.0	12	39	0.0	17	59	0.0	13	46	14	49
132	7.1	10	36	1.1	11	38	0.8	11	37	0.0	12	40	0.0	17	59	0.0	13	47	14	50
127	7.2	10	36	1.1	11	38	0.8	11	37	0.0	12	40	0.0	17	60	0.0	13	47	14	50
123	7.3	11	38	1.2	11	39	0.9	12	41	0.6	12	41	0.0	18	66	0.6	13	48	14	51
119	7.4	11	38	1.2	11	40	0.9	12	41	0.6	12	41	0.0	18	67	0.6	13	48	14	52
114	7.5	11	39	1.2	11	40	0.9	12	42	0.6	12	42	0.0	18	68	0.6	13	49	14	52
110	7.6	11	39	1.2	11	41	0.9	12	43	0.6	12	43	0.0	18	69	0.6	13	50	14	53
105	7.7	11	40	1.3	11	42	1.0	12	44	0.7	12	43	0.0	19	72	0.8	13	50	14	54
100	7.8	11	41	1.3	11	42	1.0	12	44	0.7	12	44	0.0	19	72	0.8	13	51	14	54
94	7.9	11	41	1.3	11	43	1.0	12	45	0.7	12	44	0.0	19	73	0.8	13	52	14	55
83	8.0	11	43	1.5	12	45	1.2	12	47	0.9	12	48	0.6	20	78	1.2	13	52	14	56

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

SPECIFICATION REFERENCE

SPECIFICATION REFERENCE

TRANSITION CURVES - RURAL

60 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 60 km/h (RURAL) USING E- 8% MAX.

DESIGN VELOCITY -60		WIDTH- 5.4 m			WIDTH-6.0 m			WIDTH-6.6 m			WIDTH-7.2 m			WIDTH-14.4 m			WIDTH-21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
1500	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
1097	2.0	9	9	0.0	10	10	0.0	11	11	0.0	12	12	0.0	18	18	0.0	24	24	0.0	15	15	15	15
1040	2.1	9	10	0.0	10	11	0.0	11	12	0.0	12	13	0.0	18	19	0.0	24	26	0.0	15	15	15	16
988	2.2	9	10	0.0	10	11	0.0	11	13	0.0	12	14	0.0	18	20	0.0	24	27	0.0	15	16	15	17
940	2.3	9	11	0.0	10	12	0.0	11	13	0.0	12	14	0.0	18	21	0.0	24	28	0.0	15	17	15	18
896	2.4	9	11	0.0	10	12	0.0	11	14	0.0	12	15	0.0	18	22	0.0	24	29	0.0	15	17	15	18
856	2.5	9	12	0.0	10	13	0.0	11	14	0.0	12	15	0.0	18	23	0.0	24	30	0.0	15	18	15	19
851	2.6	9	12	0.0	10	13	0.0	11	15	0.0	12	16	0.0	18	24	0.0	24	32	0.0	15	19	15	20
850	2.6	27	35	0.6	10	13	0.0	11	15	0.0	12	16	0.0	18	24	0.0	24	32	0.0	15	19	15	20
819	2.6	27	35	0.6	10	13	0.0	11	15	0.0	12	16	0.0	18	24	0.0	24	32	0.0	15	19	15	20
785	2.7	26	35	0.6	10	14	0.0	11	15	0.0	12	17	0.0	18	25	0.0	24	33	0.0	15	20	15	21
753	2.8	25	35	0.6	10	14	0.0	11	16	0.0	12	17	0.0	18	26	0.0	24	34	0.0	15	20	15	21
723	2.9	25	35	0.6	10	15	0.0	11	16	0.0	12	18	0.0	18	27	0.0	24	35	0.0	15	21	15	22
695	3.0	24	35	0.6	10	15	0.0	11	17	0.0	12	18	0.0	18	27	0.0	24	36	0.0	15	22	15	23
669	3.1	23	35	0.6	10	16	0.0	11	18	0.0	12	19	0.0	18	28	0.0	24	38	0.0	15	22	15	24
644	3.2	22	35	0.7	10	16	0.0	11	18	0.0	12	20	0.0	18	29	0.0	24	39	0.0	15	23	15	24
621	3.3	22	35	0.7	10	17	0.0	11	19	0.0	12	20	0.0	18	30	0.0	24	40	0.0	15	24	15	25
599	3.4	21	35	0.7	10	17	0.0	11	19	0.0	12	21	0.0	18	31	0.0	24	41	0.0	15	24	15	26
578	3.5	20	35	0.7	10	18	0.0	11	20	0.0	12	21	0.0	18	32	0.0	24	42	0.0	15	25	15	27
559	3.6	20	35	0.7	10	18	0.0	11	20	0.0	12	22	0.0	18	33	0.0	24	44	0.0	15	26	15	27
540	3.7	19	35	0.7	10	19	0.0	11	21	0.0	12	23	0.0	18	34	0.0	24	45	0.0	15	27	15	28
523	3.8	19	35	0.7	10	19	0.0	11	21	0.0	12	23	0.0	18	35	0.0	24	46	0.0	15	27	15	29
506	3.9	18	35	0.7	10	20	0.0	11	22	0.0	12	24	0.0	18	36	0.0	24	47	0.0	15	28	15	30
490	4.0	18	35	0.7	10	20	0.0	11	22	0.0	12	24	0.0	18	36	0.0	24	48	0.0	15	29	15	30
475	4.1	18	35	0.7	10	21	0.0	11	23	0.0	12	25	0.0	18	37	0.0	24	50	0.0	15	29	15	31
460	4.2	17	35	0.7	10	21	0.0	11	24	0.0	12	26	0.0	18	38	0.0	24	51	0.0	15	30	15	32
446	4.3	17	35	0.7	10	22	0.0	11	24	0.0	12	26	0.0	18	39	0.0	24	52	0.0	15	31	15	33
433	4.4	16	35	0.7	10	22	0.0	11	25	0.0	12	27	0.0	18	40	0.0	24	53	0.0	15	32	15	33
420	4.5	16	35	0.8	10	23	0.0	11	25	0.0	12	27	0.0	18	41	0.0	24	54	0.0	15	32	15	34
407	4.6	16	35	0.8	10	23	0.0	11	26	0.0	12	28	0.0	18	42	0.0	24	56	0.0	15	33	15	35
395	4.7	15	35	0.8	10	24	0.0	11	26	0.0	12	29	0.0	18	43	0.0	24	57	0.0	15	34	15	36
384	4.8	15	35	0.8	10	24	0.0	11	27	0.0	12	29	0.0	18	44	0.0	24	58	0.0	15	34	15	36
373	4.9	15	35	0.8	10	25	0.0	11	27	0.0	12	30	0.0	18	45	0.0	24	59	0.0	15	35	15	37
362	5.0	14	35	0.8	10	25	0.0	11	28	0.0	12	30	0.0	18	45	0.0	24	60	0.0	15	36	15	38
352	5.1	14	35	0.8	10	26	0.0	11	29	0.0	12	31	0.0	18	46	0.0	24	62	0.0	15	36	15	39
341	5.2	14	35	0.8	10	26	0.0	11	29	0.0	12	32	0.0	18	47	0.0	24	63	0.0	15	37	15	39
332	5.3	14	35	0.8	10	27	0.0	11	30	0.0	12	32	0.0	18	48	0.0	24	64	0.0	15	38	15	40
322	5.4	13	35	0.8	10	27	0.0	11	30	0.0	12	33	0.0	18	49	0.0	24	65	0.0	15	39	15	41
313	5.5	13	35	0.8	10	28	0.0	11	31	0.0	12	33	0.0	18	50	0.0	24	66	0.0	15	39	15	42
303	5.6	13	35	0.8	10	28	0.0	11	31	0.0	12	34	0.0	18	51	0.0	24	68	0.0	15	40	15	42
294	5.7	13	35	0.9	13	35	0.6	11	32	0.0	12	35	0.0	18	52	0.0	24	69	0.0	15	41	15	43
286	5.8	13	35	0.9	13	35	0.6	11	32	0.0	12	35	0.0	18	53	0.0	24	70	0.0	15	41	15	44
277	5.9	12	35	0.9	12	35	0.6	11	33	0.0	12	36	0.0	18	54	0.0	24	71	0.0	15	42	15	45
269	6.0	12	35	0.9	12	35	0.6	11	33	0.0	12	36	0.0	18	54	0.0	24	72	0.0	15	43	15	45
262	6.1	12	35	0.9	12	35	0.6	11	34	0.0	12	37	0.0	18	55	0.0	24	74	0.0	15	44	15	46
254	6.2	12	35	0.9	11	35	0.6	11	35	0.0	12	38	0.0	18	56	0.0	24	75	0.0	15	44	15	47
247	6.3	12	35	0.9	11	35	0.6	11	35	0.0	12	38	0.0	18	57	0.0	24	76	0.0	15	45	15	48
240	6.4	11	35	0.9	11	36	0.6	11	36	0.0	12	39	0.0	18	58	0.0	24	77	0.0	15	46	15	48
233	6.5	11	35	0.9	11	36	0.6	11	36	0.0	12	39	0.0	18	59	0.0	24	78	0.0	15	46	15	49
226	6.6	11	35	0.9	11	37	0.6	11	37	0.0	12	40	0.0	18	60	0.0	24	80	0.0	15	47	15	50
219	6.7	11	36	1.0	12	38	0.7	11	37	0.0	12	41	0.0	18	61	0.0	24	81	0.0	15	48	15	51
213	6.8	11	37	1.0	12	38	0.7	11	38	0.0	12	41	0.0	18	62	0.0	24	82	0.0	15	48	15	51
207	6.9	11	37	1.0	12	39	0.7	11	38	0.0	12	42	0.0	18	63	0.0	24	83	0.0	15	49	15	52
200	7.0	11	38	1.0	12	40	0.7	11	39	0.0	12	42	0.0	18	63	0.0	24	84	0.0	15	50	15	53
194	7.1	11	38	1.0	12	40	0.7	11	40	0.0	12	43	0.0	18	64	0.0	24	86	0.0	15	51	15	54
188	7.2	11	39	1.0	12	41	0.7	11	40	0.0	12	44	0.0	18	65	0.0	24	87	0.0	15	51	15	54
182	7.3	11	39	1.0	12	41	0.7	11	41	0.0	12	44	0.0	18	66	0.0	24	88	0.0	15	52	15	55
176	7.4	11	41	1.1	12	42	0.8	11	41	0.0	12	45	0.0	18	67	0.0	26	94	0.6	15	53	15	56
170	7.5	11	41	1.1	12	43	0.8	11	42	0.0	12	45	0.0	18	68	0.0	26	95	0.6	15	53	15	57
163	7.6	11	42	1.1	12	44	0.8	11	42	0.0	12	46	0.0	18	69	0.0	26	97	0.6	15	54	15	57
157	7.7	11	42	1.1	12	44	0.8	11	43	0.0	12	47	0.0	18	70	0.0	26	98	0.6	15	55	15	58
149	7.8	11	43	1.1	12	45	0.8	11	43	0.0	12	47	0.0	18	71	0.0	26	99	0.6	15	56	15	59
141	7.9	11	44	1.2	12	46	0.9	12	48	0.6	12	48	0.0	18	72	0.0	26	103	0.9	15	56	15	60
124	8.0	12	45	1.3	12	48	1.0	13	50	0.7	12	48	0.0	18	73	0.0	27	108	1.2	15	58	15	61

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

REV. 1/07
802.36

TC-5.01

TRANSITION CURVES - RURAL

70 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

DESIGN FACTORS FOR A DESIGN SPEED OF 70 km/h (RURAL) USING E= 8% MAX.

DESIGN VELOCITY -70		WIDTH= 5.4 m			WIDTH=6.0 m			WIDTH=6.6 m			WIDTH=7.2 m			WIDTH=14.4 m			WIDTH=21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
2000	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
1447	2.0	10	10	0.0	11	11	0.0	12	12	0.0	14	14	0.0	20	20	0.0	27	27	0.0	16	16	17	17
1372	2.1	10	11	0.0	11	12	0.0	12	13	0.0	14	14	0.0	20	21	0.0	27	28	0.0	16	17	17	18
1304	2.2	10	11	0.0	11	12	0.0	12	14	0.0	14	15	0.0	20	22	0.0	27	29	0.0	16	18	17	18
1242	2.3	10	12	0.0	11	13	0.0	12	14	0.0	14	16	0.0	20	23	0.0	27	31	0.0	16	18	17	19
1184	2.4	10	12	0.0	11	14	0.0	12	15	0.0	14	16	0.0	20	24	0.0	27	32	0.0	16	19	17	20
1132	2.5	10	13	0.0	11	14	0.0	12	15	0.0	14	17	0.0	20	25	0.0	27	33	0.0	16	20	17	21
1083	2.6	10	13	0.0	11	15	0.0	12	16	0.0	14	18	0.0	20	26	0.0	27	35	0.0	16	21	17	22
1038	2.7	10	14	0.0	11	15	0.0	12	17	0.0	14	18	0.0	20	27	0.0	27	36	0.0	16	21	17	23
996	2.8	10	14	0.0	11	16	0.0	12	17	0.0	14	19	0.0	20	28	0.0	27	37	0.0	16	22	17	23
957	2.9	10	15	0.0	11	16	0.0	12	18	0.0	14	19	0.0	20	29	0.0	27	38	0.0	16	23	17	24
921	3.0	10	15	0.0	11	17	0.0	12	18	0.0	14	20	0.0	20	30	0.0	27	40	0.0	16	24	17	25
886	3.1	10	16	0.0	11	17	0.0	12	19	0.0	14	21	0.0	20	31	0.0	27	41	0.0	16	24	17	26
854	3.2	10	16	0.0	11	18	0.0	12	20	0.0	14	21	0.0	20	32	0.0	27	42	0.0	16	25	17	27
851	3.3	10	17	0.0	11	18	0.0	12	20	0.0	14	22	0.0	20	33	0.0	27	44	0.0	16	26	17	27
850	3.3	25	40	0.6	11	18	0.0	12	20	0.0	14	22	0.0	20	33	0.0	27	44	0.0	16	26	17	27
824	3.3	25	40	0.6	11	18	0.0	12	20	0.0	14	22	0.0	20	33	0.0	27	44	0.0	16	26	17	27
795	3.4	24	40	0.7	11	19	0.0	12	21	0.0	14	23	0.0	20	34	0.0	27	45	0.0	16	27	17	28
768	3.5	23	40	0.7	11	20	0.0	12	21	0.0	14	23	0.0	20	35	0.0	27	46	0.0	16	28	17	29
743	3.6	23	40	0.7	11	20	0.0	12	22	0.0	14	24	0.0	20	36	0.0	27	48	0.0	16	28	17	30
719	3.7	22	40	0.7	11	21	0.0	12	23	0.0	14	25	0.0	20	37	0.0	27	49	0.0	16	29	17	31
696	3.8	22	40	0.7	11	21	0.0	12	23	0.0	14	25	0.0	20	38	0.0	27	50	0.0	16	30	17	32
674	3.9	21	40	0.7	11	22	0.0	12	24	0.0	14	26	0.0	20	39	0.0	27	52	0.0	16	31	17	32
653	4.0	20	40	0.7	11	22	0.0	12	24	0.0	14	27	0.0	20	40	0.0	27	53	0.0	16	31	17	33
633	4.1	20	40	0.7	11	23	0.0	12	25	0.0	14	27	0.0	20	41	0.0	27	54	0.0	16	32	17	34
614	4.2	20	40	0.7	11	23	0.0	12	26	0.0	14	28	0.0	20	42	0.0	27	55	0.0	16	33	17	35
596	4.3	19	40	0.7	11	24	0.0	12	26	0.0	14	29	0.0	20	43	0.0	27	57	0.0	16	34	17	36
579	4.4	19	40	0.7	11	24	0.0	12	27	0.0	14	29	0.0	20	44	0.0	27	58	0.0	16	35	17	36
562	4.5	18	40	0.7	11	25	0.0	12	27	0.0	14	30	0.0	20	45	0.0	27	59	0.0	16	35	17	37
546	4.6	18	40	0.7	11	26	0.0	12	28	0.0	14	31	0.0	20	46	0.0	27	61	0.0	16	36	17	38
531	4.7	18	40	0.7	11	26	0.0	12	29	0.0	14	31	0.0	20	47	0.0	27	62	0.0	16	37	17	39
516	4.8	17	40	0.7	11	27	0.0	12	29	0.0	14	32	0.0	20	48	0.0	27	63	0.0	16	38	17	40
501	4.9	17	40	0.8	11	27	0.0	12	30	0.0	14	33	0.0	20	49	0.0	27	65	0.0	16	38	17	41
488	5.0	16	40	0.8	11	28	0.0	12	30	0.0	14	33	0.0	20	50	0.0	27	66	0.0	16	39	17	41
474	5.1	16	40	0.8	11	28	0.0	12	31	0.0	14	34	0.0	20	51	0.0	27	67	0.0	16	40	17	42
461	5.2	16	40	0.8	11	29	0.0	12	32	0.0	14	35	0.0	20	52	0.0	27	69	0.0	16	41	17	43
449	5.3	16	40	0.8	11	29	0.0	12	32	0.0	14	35	0.0	20	53	0.0	27	70	0.0	16	42	17	44
436	5.4	15	40	0.8	11	30	0.0	12	33	0.0	14	36	0.0	20	54	0.0	27	71	0.0	16	42	17	45
425	5.5	15	40	0.8	11	30	0.0	12	33	0.0	14	36	0.0	20	54	0.0	27	72	0.0	16	43	17	45
413	5.6	15	40	0.8	11	31	0.0	12	34	0.0	14	37	0.0	20	55	0.0	27	74	0.0	16	44	17	46
402	5.7	15	40	0.8	11	32	0.0	12	35	0.0	14	38	0.0	20	56	0.0	27	75	0.0	16	45	17	47
391	5.8	14	40	0.8	11	32	0.0	12	35	0.0	14	38	0.0	20	57	0.0	27	76	0.0	16	45	17	48
380	5.9	14	40	0.8	11	33	0.0	12	36	0.0	14	39	0.0	20	58	0.0	27	78	0.0	16	46	17	49
370	6.0	14	40	0.8	11	33	0.0	12	36	0.0	14	40	0.0	20	59	0.0	27	79	0.0	16	47	17	50
360	6.1	14	40	0.8	11	34	0.0	12	37	0.0	14	40	0.0	20	60	0.0	27	80	0.0	16	48	17	50
350	6.2	13	40	0.9	13	40	0.6	12	38	0.0	14	41	0.0	20	61	0.0	27	82	0.0	16	48	17	51
341	6.3	13	40	0.9	13	40	0.6	12	38	0.0	14	42	0.0	20	62	0.0	27	83	0.0	16	49	17	52
331	6.4	13	40	0.9	13	40	0.6	12	39	0.0	14	42	0.0	20	63	0.0	27	84	0.0	16	50	17	53
322	6.5	13	40	0.9	13	40	0.6	12	39	0.0	14	43	0.0	20	64	0.0	27	86	0.0	16	51	17	54
313	6.6	13	40	0.9	12	40	0.6	12	40	0.0	14	44	0.0	20	65	0.0	27	87	0.0	16	52	17	54
305	6.7	12	40	0.9	12	41	0.6	12	41	0.0	14	44	0.0	20	66	0.0	27	88	0.0	16	52	17	55
296	6.8	12	40	0.9	12	41	0.6	12	41	0.0	14	45	0.0	20	67	0.0	27	90	0.0	16	53	17	56
288	6.9	12	40	0.9	12	42	0.6	12	42	0.0	14	46	0.0	20	68	0.0	27	91	0.0	16	54	17	57
280	7.0	12	41	0.9	12	42	0.6	12	42	0.0	14	46	0.0	20	69	0.0	27	92	0.0	16	55	17	58
271	7.1	12	41	0.9	12	43	0.6	12	43	0.0	14	47	0.0	20	70	0.0	27	93	0.0	16	55	17	59
263	7.2	12	42	1.0	13	44	0.7	12	44	0.0	14	48	0.0	20	71	0.0	27	95	0.0	16	56	17	59
255	7.3	12	43	1.0	13	45	0.7	12	44	0.0	14	48	0.0	20	72	0.0	27	96	0.0	16	57	17	60
247	7.4	12	44	1.0	13	46	0.7	12	45	0.0	14	49	0.0	20	73	0.0	27	97	0.0	16	58	17	61
238	7.5	12	44	1.0	13	46	0.7	12	45	0.0	14	50	0.0	20	74	0.0	27	99	0.0	16	59	17	62
230	7.6	12	45	1.0	13	47	0.7	12	46	0.0	14	50	0.0	20	75	0.0	27	100	0.0	16	59	17	63
221	7.7	12	45	1.0	13	47	0.7	12	47	0.0	14	51	0.0	20	76	0.0	27	101	0.0	16	60	17	63
211	7.8	12	46	1.0	13	48	0.7	12	47	0.0	14	52	0.0	20	77	0.0	27	103	0.0	16	61	17	64
199	7.9	12	47	1.1	13	49	0.8	12	48	0.0	14	52	0.0	20	78	0.0	28	110	0.6	16	62	17	65
176	8.0	12	48	1.1	13	50	0.8	12	48	0.0	14	53	0.0	20	79	0.0	28	111	0.6	16	62	17	66

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

SPECIFICATION REFERENCE

TRANSITION CURVES - RURAL

80 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 80 km/h (RURAL) USING E- 8% MAX.

DESIGN VELOCITY -80		WIDTH- 5.4 m			WIDTH-6.0 m			WIDTH-6.6 m			WIDTH-7.2 m			WIDTH-14.4 m			WIDTH-21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
2500	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
1794	2.0	11	11	0.0	12	12	0.0	14	14	0.0	15	15	0.0	22	22	0.0	29	29	0.0	17	17	18	18
1701	2.1	11	12	0.0	12	13	0.0	14	14	0.0	15	16	0.0	22	23	0.0	29	31	0.0	17	18	18	19
1617	2.2	11	12	0.0	12	14	0.0	14	15	0.0	15	16	0.0	22	24	0.0	29	32	0.0	17	19	18	20
1541	2.3	11	13	0.0	12	14	0.0	14	16	0.0	15	17	0.0	22	25	0.0	29	34	0.0	17	20	18	21
1470	2.4	11	13	0.0	12	15	0.0	14	16	0.0	15	18	0.0	22	26	0.0	29	35	0.0	17	21	18	22
1405	2.5	11	14	0.0	12	15	0.0	14	17	0.0	15	18	0.0	22	27	0.0	29	36	0.0	17	22	18	23
1345	2.6	11	15	0.0	12	16	0.0	14	18	0.0	15	19	0.0	22	29	0.0	29	38	0.0	17	22	18	24
1289	2.7	11	15	0.0	12	17	0.0	14	18	0.0	15	20	0.0	22	30	0.0	29	39	0.0	17	23	18	25
1238	2.8	11	16	0.0	12	17	0.0	14	19	0.0	15	21	0.0	22	31	0.0	29	41	0.0	17	24	18	26
1190	2.9	11	16	0.0	12	18	0.0	14	20	0.0	15	21	0.0	22	32	0.0	29	42	0.0	17	25	18	27
1144	3.0	11	17	0.0	12	18	0.0	14	20	0.0	15	22	0.0	22	33	0.0	29	44	0.0	17	26	18	27
1102	3.1	11	17	0.0	12	19	0.0	14	21	0.0	15	23	0.0	22	34	0.0	29	45	0.0	17	27	18	28
1063	3.2	11	18	0.0	12	20	0.0	14	22	0.0	15	24	0.0	22	35	0.0	29	47	0.0	17	27	18	29
1025	3.3	11	18	0.0	12	20	0.0	14	22	0.0	15	24	0.0	22	36	0.0	29	48	0.0	17	28	18	30
990	3.4	11	19	0.0	12	21	0.0	14	23	0.0	15	25	0.0	22	37	0.0	29	49	0.0	17	29	18	31
957	3.5	11	19	0.0	12	21	0.0	14	24	0.0	15	26	0.0	22	38	0.0	29	51	0.0	17	30	18	32
926	3.6	11	20	0.0	12	22	0.0	14	24	0.0	15	26	0.0	22	39	0.0	29	52	0.0	17	31	18	33
896	3.7	11	20	0.0	12	23	0.0	14	25	0.0	15	27	0.0	22	40	0.0	29	54	0.0	17	32	18	34
868	3.8	11	21	0.0	12	23	0.0	14	26	0.0	15	28	0.0	22	42	0.0	29	55	0.0	17	32	18	35
851	3.9	11	22	0.0	12	24	0.0	14	26	0.0	15	29	0.0	22	43	0.0	29	57	0.0	17	33	18	36
850	3.9	24	45	0.7	12	24	0.0	14	26	0.0	15	29	0.0	22	43	0.0	29	57	0.0	17	33	18	36
841	3.9	24	45	0.7	12	24	0.0	14	26	0.0	15	29	0.0	22	43	0.0	29	57	0.0	17	33	18	36
815	4.0	23	45	0.7	12	24	0.0	14	27	0.0	15	29	0.0	22	44	0.0	29	58	0.0	17	34	18	36
791	4.1	22	45	0.7	12	25	0.0	14	28	0.0	15	30	0.0	22	45	0.0	29	60	0.0	17	35	18	37
768	4.2	22	45	0.7	12	26	0.0	14	28	0.0	15	31	0.0	22	46	0.0	29	61	0.0	17	36	18	38
745	4.3	21	45	0.7	12	26	0.0	14	29	0.0	15	31	0.0	22	47	0.0	29	62	0.0	17	37	18	39
724	4.4	21	45	0.7	12	27	0.0	14	30	0.0	15	32	0.0	22	48	0.0	29	64	0.0	17	38	18	40
704	4.5	20	45	0.7	12	27	0.0	14	30	0.0	15	33	0.0	22	49	0.0	29	65	0.0	17	38	18	41
684	4.6	20	45	0.7	12	28	0.0	14	31	0.0	15	34	0.0	22	50	0.0	29	67	0.0	17	39	18	42
665	4.7	20	45	0.7	12	29	0.0	14	32	0.0	15	34	0.0	22	51	0.0	29	68	0.0	17	40	18	43
647	4.8	19	45	0.7	12	29	0.0	14	32	0.0	15	35	0.0	22	52	0.0	29	70	0.0	17	41	18	44
630	4.9	19	45	0.7	12	30	0.0	14	33	0.0	15	36	0.0	22	53	0.0	29	71	0.0	17	42	18	45
613	5.0	18	45	0.7	12	30	0.0	14	33	0.0	15	36	0.0	22	54	0.0	29	72	0.0	17	43	18	45
596	5.1	18	45	0.8	12	31	0.0	14	34	0.0	15	37	0.0	22	56	0.0	29	74	0.0	17	43	18	46
581	5.2	18	45	0.8	12	32	0.0	14	35	0.0	15	38	0.0	22	57	0.0	29	75	0.0	17	44	18	47
565	5.3	17	45	0.8	12	32	0.0	14	35	0.0	15	39	0.0	22	58	0.0	29	77	0.0	17	45	18	48
551	5.4	17	45	0.8	12	33	0.0	14	36	0.0	15	39	0.0	22	59	0.0	29	78	0.0	17	46	18	49
536	5.5	17	45	0.8	12	33	0.0	14	37	0.0	15	40	0.0	22	60	0.0	29	80	0.0	17	47	18	50
523	5.6	17	45	0.8	12	34	0.0	14	37	0.0	15	41	0.0	22	61	0.0	29	81	0.0	17	48	18	51
509	5.7	16	45	0.8	12	35	0.0	14	38	0.0	15	42	0.0	22	62	0.0	29	83	0.0	17	48	18	52
496	5.8	16	45	0.8	12	35	0.0	14	39	0.0	15	42	0.0	22	63	0.0	29	84	0.0	17	49	18	53
483	5.9	16	45	0.8	12	36	0.0	14	39	0.0	15	43	0.0	22	64	0.0	29	85	0.0	17	50	18	54
470	6.0	15	45	0.8	12	36	0.0	14	40	0.0	15	44	0.0	22	65	0.0	29	87	0.0	17	51	18	54
458	6.1	15	45	0.8	12	37	0.0	14	41	0.0	15	44	0.0	22	66	0.0	29	88	0.0	17	52	18	55
446	6.2	15	45	0.8	12	38	0.0	14	41	0.0	15	45	0.0	22	67	0.0	29	90	0.0	17	53	18	56
435	6.3	15	45	0.8	12	38	0.0	14	42	0.0	15	46	0.0	22	69	0.0	29	91	0.0	17	54	18	57
424	6.4	15	45	0.8	12	39	0.0	14	43	0.0	15	47	0.0	22	70	0.0	29	93	0.0	17	54	18	58
412	6.5	14	45	0.9	14	45	0.6	14	43	0.0	15	47	0.0	22	71	0.0	29	94	0.0	17	55	18	59
402	6.6	14	45	0.9	14	45	0.6	14	44	0.0	15	48	0.0	22	72	0.0	29	96	0.0	17	56	18	60
391	6.7	14	45	0.9	14	45	0.6	14	45	0.0	15	49	0.0	22	73	0.0	29	97	0.0	17	57	18	61
380	6.8	14	45	0.9	14	45	0.6	14	45	0.0	15	49	0.0	22	74	0.0	29	98	0.0	17	58	18	62
370	6.9	14	45	0.9	14	46	0.6	14	46	0.0	15	50	0.0	22	75	0.0	29	100	0.0	17	59	18	63
360	7.0	13	45	0.9	14	47	0.6	14	47	0.0	15	51	0.0	22	76	0.0	29	101	0.0	17	59	18	63
350	7.1	13	45	0.9	14	47	0.6	14	47	0.0	15	52	0.0	22	77	0.0	29	103	0.0	17	60	18	64
340	7.2	13	46	0.9	14	48	0.6	14	48	0.0	15	52	0.0	22	78	0.0	29	104	0.0	17	61	18	65
329	7.3	13	46	0.9	14	49	0.6	14	49	0.0	15	53	0.0	22	79	0.0	29	106	0.0	17	62	18	66
319	7.4	13	47	0.9	14	49	0.6	14	49	0.0	15	54	0.0	22	80	0.0	29	107	0.0	17	63	18	67
309	7.5	13	48	1.0	14	51	0.7	14	50	0.0	15	54	0.0	22	81	0.0	29	108	0.0	17	64	18	68
298	7.6	13	49	1.0	14	51	0.7	14	51	0.0	15	55	0.0	22	83	0.0	29	110	0.0	17	64	18	69
286	7.7	13	50	1.0	14	52	0.7	14	51	0.0	15	56	0.0	22	84	0.0	29	111	0.0	17	65	18	70
274	7.8	13	50	1.0	14	53	0.7	14	52	0.0	15	57	0.0	22	85	0.0	29	113	0.0	17	66	18	71
259	7.9	13	51	1.0	14	53	0.7	14	53	0.0	15	57	0.0	22	86	0.0	29	114	0.0	17	67	18	72
230	8.0	13	52	1.1	14	55	0.8	14	53	0.0	15	58	0.0	22	87	0.0	31	122	0.6	17	68	18	72

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

TRANSITION CURVES - RURAL

90 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

DESIGN FACTORS FOR A DESIGN SPEED OF 90 km/h (RURAL) USING E- 8% MAX.

DESIGN VELOCITY -90		WIDTH- 5.4 m			WIDTH-6.0 m			WIDTH-6.6 m			WIDTH-7.2 m			WIDTH-14.4 m			WIDTH-21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
3000	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
2186	2.0	12	12	0.0	13	13	0.0	15	15	0.0	16	16	0.0	23	23	0.0	31	31	0.0	18	18	19	19
2074	2.1	12	13	0.0	13	14	0.0	15	15	0.0	16	17	0.0	23	25	0.0	31	33	0.0	18	19	19	20
1972	2.2	12	13	0.0	13	15	0.0	15	16	0.0	16	17	0.0	23	26	0.0	31	34	0.0	18	20	19	21
1880	2.3	12	14	0.0	13	15	0.0	15	17	0.0	16	18	0.0	23	27	0.0	31	36	0.0	18	21	19	22
1794	2.4	12	14	0.0	13	16	0.0	15	17	0.0	16	19	0.0	23	28	0.0	31	37	0.0	18	22	19	23
1716	2.5	12	15	0.0	13	16	0.0	15	18	0.0	16	20	0.0	23	29	0.0	31	39	0.0	18	23	19	24
1644	2.6	12	15	0.0	13	17	0.0	15	19	0.0	16	20	0.0	23	30	0.0	31	40	0.0	18	24	19	25
1576	2.7	12	16	0.0	13	18	0.0	15	19	0.0	16	21	0.0	23	32	0.0	31	42	0.0	18	24	19	26
1514	2.8	12	17	0.0	13	18	0.0	15	20	0.0	16	22	0.0	23	33	0.0	31	43	0.0	18	25	19	27
1456	2.9	12	17	0.0	13	19	0.0	15	21	0.0	16	23	0.0	23	34	0.0	31	45	0.0	18	26	19	28
1402	3.0	12	18	0.0	13	20	0.0	15	22	0.0	16	23	0.0	23	35	0.0	31	46	0.0	18	27	19	29
1352	3.1	12	18	0.0	13	20	0.0	15	22	0.0	16	24	0.0	23	36	0.0	31	48	0.0	18	28	19	30
1303	3.2	12	19	0.0	13	21	0.0	15	23	0.0	16	25	0.0	23	37	0.0	31	50	0.0	18	29	19	31
1258	3.3	12	19	0.0	13	22	0.0	15	24	0.0	16	26	0.0	23	38	0.0	31	51	0.0	18	30	19	32
1216	3.4	12	20	0.0	13	22	0.0	15	24	0.0	16	27	0.0	23	40	0.0	31	53	0.0	18	31	19	33
1176	3.5	12	21	0.0	13	23	0.0	15	25	0.0	16	27	0.0	23	41	0.0	31	54	0.0	18	32	19	34
1138	3.6	12	21	0.0	13	23	0.0	15	26	0.0	16	28	0.0	23	42	0.0	31	56	0.0	18	32	19	35
1102	3.7	12	22	0.0	13	24	0.0	15	26	0.0	16	29	0.0	23	43	0.0	31	57	0.0	18	33	19	36
1068	3.8	12	22	0.0	13	25	0.0	15	27	0.0	16	30	0.0	23	44	0.0	31	59	0.0	18	34	19	36
1036	3.9	12	23	0.0	13	25	0.0	15	28	0.0	16	30	0.0	23	45	0.0	31	60	0.0	18	35	19	37
1005	4.0	12	23	0.0	13	26	0.0	15	29	0.0	16	31	0.0	23	46	0.0	31	62	0.0	18	36	19	38
976	4.1	12	24	0.0	13	27	0.0	15	29	0.0	16	32	0.0	23	48	0.0	31	63	0.0	18	37	19	39
948	4.2	12	25	0.0	13	27	0.0	15	30	0.0	16	33	0.0	23	49	0.0	31	65	0.0	18	38	19	40
921	4.3	12	25	0.0	13	28	0.0	15	31	0.0	16	33	0.0	23	50	0.0	31	66	0.0	18	39	19	41
896	4.4	12	26	0.0	13	29	0.0	15	31	0.0	16	34	0.0	23	51	0.0	31	68	0.0	18	40	19	42
871	4.5	12	26	0.0	13	29	0.0	15	32	0.0	16	35	0.0	23	52	0.0	31	69	0.0	18	40	19	43
851	4.6	12	27	0.0	13	30	0.0	15	33	0.0	16	36	0.0	23	53	0.0	31	71	0.0	18	41	19	44
850	4.6	22	50	0.7	13	30	0.0	15	33	0.0	16	36	0.0	23	53	0.0	31	71	0.0	18	41	19	44
848	4.6	22	50	0.7	13	30	0.0	15	33	0.0	16	36	0.0	23	53	0.0	31	71	0.0	18	41	19	44
826	4.7	22	50	0.7	13	30	0.0	15	33	0.0	16	36	0.0	23	54	0.0	31	72	0.0	18	42	19	45
804	4.8	21	50	0.7	13	31	0.0	15	34	0.0	16	37	0.0	23	56	0.0	31	74	0.0	18	43	19	46
783	4.9	21	50	0.7	13	32	0.0	15	35	0.0	16	38	0.0	23	57	0.0	31	76	0.0	18	44	19	47
763	5.0	20	50	0.7	13	32	0.0	15	36	0.0	16	39	0.0	23	58	0.0	31	77	0.0	18	45	19	48
744	5.1	20	50	0.7	13	33	0.0	15	36	0.0	16	40	0.0	23	59	0.0	31	79	0.0	18	46	19	49
725	5.2	20	50	0.7	13	34	0.0	15	37	0.0	16	40	0.0	23	60	0.0	31	80	0.0	18	47	19	50
707	5.3	19	50	0.8	13	34	0.0	15	38	0.0	16	41	0.0	23	61	0.0	31	82	0.0	18	48	19	51
690	5.4	19	50	0.8	13	35	0.0	15	38	0.0	16	42	0.0	23	63	0.0	31	83	0.0	18	48	19	52
673	5.5	19	50	0.8	13	36	0.0	15	39	0.0	16	43	0.0	23	64	0.0	31	85	0.0	18	49	19	53
657	5.6	18	50	0.8	13	36	0.0	15	40	0.0	16	43	0.0	23	65	0.0	31	86	0.0	18	50	19	54
641	5.7	18	50	0.8	13	37	0.0	15	41	0.0	16	44	0.0	23	66	0.0	31	88	0.0	18	51	19	54
625	5.8	18	50	0.8	13	38	0.0	15	41	0.0	16	45	0.0	23	67	0.0	31	89	0.0	18	52	19	55
611	5.9	17	50	0.8	13	38	0.0	15	42	0.0	16	46	0.0	23	68	0.0	31	91	0.0	18	53	19	56
596	6.0	17	50	0.8	13	39	0.0	15	43	0.0	16	46	0.0	23	69	0.0	31	92	0.0	18	54	19	57
582	6.1	17	50	0.8	13	39	0.0	15	43	0.0	16	47	0.0	23	71	0.0	31	94	0.0	18	55	19	58
568	6.2	17	50	0.8	13	40	0.0	15	44	0.0	16	48	0.0	23	72	0.0	31	95	0.0	18	56	19	59
554	6.3	16	50	0.8	13	41	0.0	15	45	0.0	16	49	0.0	23	73	0.0	31	97	0.0	18	56	19	60
541	6.4	16	50	0.8	13	41	0.0	15	45	0.0	16	50	0.0	23	74	0.0	31	99	0.0	18	57	19	61
528	6.5	16	50	0.8	13	42	0.0	15	46	0.0	16	50	0.0	23	75	0.0	31	100	0.0	18	58	19	62
515	6.6	16	50	0.8	13	43	0.0	15	47	0.0	16	51	0.0	23	76	0.0	31	102	0.0	18	59	19	63
503	6.7	15	50	0.8	13	43	0.0	15	48	0.0	16	52	0.0	23	77	0.0	31	103	0.0	18	60	19	64
490	6.8	15	50	0.8	13	44	0.0	15	48	0.0	16	53	0.0	23	79	0.0	31	105	0.0	18	61	19	65
478	6.9	15	50	0.9	15	50	0.6	15	49	0.0	16	53	0.0	23	80	0.0	31	106	0.0	18	62	19	66
465	7.0	15	50	0.9	15	50	0.6	15	50	0.0	16	54	0.0	23	81	0.0	31	108	0.0	18	63	19	67
453	7.1	15	50	0.9	15	50	0.6	15	50	0.0	16	55	0.0	23	82	0.0	31	109	0.0	18	64	19	68
441	7.2	14	50	0.9	15	51	0.6	15	51	0.0	16	56	0.0	23	83	0.0	31	111	0.0	18	64	19	69
428	7.3	14	50	0.9	15	52	0.6	15	52	0.0	16	56	0.0	23	84	0.0	31	112	0.0	18	65	19	70
416	7.4	14	50	0.9	15	52	0.6	15	52	0.0	16	57	0.0	23	86	0.0	31	114	0.0	18	66	19	71
403	7.5	14	51	0.9	15	53	0.6	15	53	0.0	16	58	0.0	23	87	0.0	31	115	0.0	18	67	19	72
390	7.6	14	51	0.9	15	54	0.6	15	54	0.0	16	59	0.0	23	88	0.0	31	117	0.0	18	68	19	72
376	7.7	14	52	0.9	15	55	0.6	15	55	0.0	16	59	0.0	23	89	0.0	31	118	0.0	18	69	19	73
360	7.8	14	53	0.9	15	55	0.6	15	55	0.0	16	60	0.0	23	90	0.0	31	120	0.0	18	70	19	74
342	7.9	14	54	1.0	15	57	0.7	15	56	0.0	16	61	0.0	23	91	0.0	31	122	0.0	18	71	19	75
304	8.0	14	55	1.0	15	58	0.7	15	57	0.0	16	62	0.0	23	92	0.0	31	123	0.0	18	72	19	76

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

SPECIFICATION REFERENCE

TRANSITION CURVES - RURAL

100 Km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

DESIGN FACTORS FOR A DESIGN SPEED OF 100 km/h (RURAL) USING E= 8% MAX.

DESIGN VELOCITY =100		WIDTH= 5.4 m			WIDTH=6.0 m			WIDTH=6.6 m			WIDTH=7.2 m			WIDTH=14.4 m			WIDTH=21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
5000	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
2677	2.0	13	13	0.0	14	14	0.0	15	15	0.0	17	17	0.0	25	25	0.0	33	33	0.0	20	20	21	21
2541	2.1	13	13	0.0	14	15	0.0	15	16	0.0	17	18	0.0	25	26	0.0	33	35	0.0	20	21	21	22
2417	2.2	13	14	0.0	14	15	0.0	15	17	0.0	17	18	0.0	25	27	0.0	33	36	0.0	20	22	21	23
2304	2.3	13	15	0.0	14	16	0.0	15	18	0.0	17	19	0.0	25	29	0.0	33	38	0.0	20	23	21	24
2200	2.4	13	15	0.0	14	17	0.0	15	18	0.0	17	20	0.0	25	30	0.0	33	40	0.0	20	24	21	25
2105	2.5	13	16	0.0	14	18	0.0	15	19	0.0	17	21	0.0	25	31	0.0	33	41	0.0	20	24	21	26
2017	2.6	13	16	0.0	14	18	0.0	15	20	0.0	17	22	0.0	25	32	0.0	33	43	0.0	20	25	21	27
1935	2.7	13	17	0.0	14	19	0.0	15	21	0.0	17	23	0.0	25	34	0.0	33	45	0.0	20	26	21	28
1859	2.8	13	18	0.0	14	20	0.0	15	21	0.0	17	23	0.0	25	35	0.0	33	46	0.0	20	27	21	29
1788	2.9	13	18	0.0	14	20	0.0	15	22	0.0	17	24	0.0	25	36	0.0	33	48	0.0	20	28	21	30
1722	3.0	13	19	0.0	14	21	0.0	15	23	0.0	17	25	0.0	25	37	0.0	33	50	0.0	20	29	21	31
1661	3.1	13	20	0.0	14	22	0.0	15	24	0.0	17	26	0.0	25	39	0.0	33	51	0.0	20	30	21	32
1603	3.2	13	20	0.0	14	22	0.0	15	24	0.0	17	27	0.0	25	40	0.0	33	53	0.0	20	31	21	33
1548	3.3	13	21	0.0	14	23	0.0	15	25	0.0	17	27	0.0	25	41	0.0	33	54	0.0	20	32	21	34
1497	3.4	13	21	0.0	14	24	0.0	15	26	0.0	17	28	0.0	25	42	0.0	33	56	0.0	20	33	21	35
1448	3.5	13	22	0.0	14	24	0.0	15	27	0.0	17	29	0.0	25	43	0.0	33	58	0.0	20	34	21	36
1402	3.6	13	23	0.0	14	25	0.0	15	27	0.0	17	30	0.0	25	45	0.0	33	59	0.0	20	35	21	37
1359	3.7	13	23	0.0	14	26	0.0	15	28	0.0	17	31	0.0	25	46	0.0	33	61	0.0	20	36	21	38
1317	3.8	13	24	0.0	14	26	0.0	15	29	0.0	17	32	0.0	25	47	0.0	33	63	0.0	20	37	21	39
1278	3.9	13	24	0.0	14	27	0.0	15	30	0.0	17	32	0.0	25	48	0.0	33	64	0.0	20	38	21	40
1241	4.0	13	25	0.0	14	28	0.0	15	30	0.0	17	33	0.0	25	50	0.0	33	66	0.0	20	39	21	41
1206	4.1	13	26	0.0	14	28	0.0	15	31	0.0	17	34	0.0	25	51	0.0	33	68	0.0	20	40	21	42
1172	4.2	13	26	0.0	14	29	0.0	15	32	0.0	17	35	0.0	25	52	0.0	33	69	0.0	20	41	21	43
1139	4.3	13	27	0.0	14	30	0.0	15	33	0.0	17	36	0.0	25	53	0.0	33	71	0.0	20	42	21	44
1109	4.4	13	27	0.0	14	30	0.0	15	33	0.0	17	36	0.0	25	54	0.0	33	72	0.0	20	43	21	45
1079	4.5	13	28	0.0	14	31	0.0	15	34	0.0	17	37	0.0	25	56	0.0	33	74	0.0	20	44	21	46
1051	4.6	13	29	0.0	14	32	0.0	15	35	0.0	17	38	0.0	25	57	0.0	33	76	0.0	20	45	21	47
1023	4.7	13	29	0.0	14	33	0.0	15	36	0.0	17	39	0.0	25	58	0.0	33	77	0.0	20	46	21	48
997	4.8	13	30	0.0	14	33	0.0	15	36	0.0	17	40	0.0	25	59	0.0	33	79	0.0	20	47	21	49
972	4.9	13	31	0.0	14	34	0.0	15	37	0.0	17	41	0.0	25	61	0.0	33	81	0.0	20	48	21	50
948	5.0	13	31	0.0	14	35	0.0	15	38	0.0	17	41	0.0	25	62	0.0	33	82	0.0	20	48	21	51
925	5.1	13	32	0.0	14	35	0.0	15	39	0.0	17	42	0.0	25	63	0.0	33	84	0.0	20	49	21	52
902	5.2	13	32	0.0	14	36	0.0	15	39	0.0	17	43	0.0	25	64	0.0	33	86	0.0	20	50	21	53
881	5.3	13	33	0.0	14	37	0.0	15	40	0.0	17	44	0.0	25	66	0.0	33	87	0.0	20	51	21	54
860	5.4	13	34	0.0	14	37	0.0	15	41	0.0	17	45	0.0	25	67	0.0	33	89	0.0	20	52	21	56
851	5.5	13	34	0.0	14	38	0.0	15	42	0.0	17	45	0.0	25	68	0.0	33	90	0.0	20	53	21	57
850	5.5	22	60	0.7	14	38	0.0	15	42	0.0	17	45	0.0	25	68	0.0	33	90	0.0	20	53	21	57
839	5.5	22	60	0.7	14	38	0.0	15	42	0.0	17	45	0.0	25	68	0.0	33	90	0.0	20	53	21	57
820	5.6	22	60	0.8	14	39	0.0	15	42	0.0	17	46	0.0	25	69	0.0	33	92	0.0	20	54	21	58
801	5.7	22	60	0.8	14	39	0.0	15	43	0.0	17	47	0.0	25	70	0.0	33	94	0.0	20	55	21	59
782	5.8	21	60	0.8	14	40	0.0	15	44	0.0	17	48	0.0	25	72	0.0	33	95	0.0	20	56	21	60
765	5.9	21	60	0.8	14	41	0.0	15	45	0.0	17	49	0.0	25	73	0.0	33	97	0.0	20	57	21	61
747	6.0	20	60	0.8	14	41	0.0	15	45	0.0	17	50	0.0	25	74	0.0	33	99	0.0	20	58	21	62
731	6.1	20	60	0.8	14	42	0.0	15	46	0.0	17	50	0.0	25	75	0.0	33	100	0.0	20	59	21	63
714	6.2	20	60	0.8	14	43	0.0	15	47	0.0	17	51	0.0	25	77	0.0	33	102	0.0	20	60	21	64
698	6.3	20	60	0.8	14	43	0.0	15	48	0.0	17	52	0.0	25	78	0.0	33	104	0.0	20	61	21	65
683	6.4	19	60	0.8	14	44	0.0	15	48	0.0	17	53	0.0	25	79	0.0	33	105	0.0	20	62	21	66
667	6.5	19	60	0.8	14	45	0.0	15	49	0.0	17	54	0.0	25	80	0.0	33	107	0.0	20	63	21	67
652	6.6	19	60	0.8	14	45	0.0	15	50	0.0	17	54	0.0	25	81	0.0	33	108	0.0	20	64	21	68
637	6.7	18	60	0.8	14	46	0.0	15	51	0.0	17	55	0.0	25	83	0.0	33	110	0.0	20	65	21	69
622	6.8	18	60	0.8	14	47	0.0	15	51	0.0	17	56	0.0	25	84	0.0	33	112	0.0	20	66	21	70
607	6.9	18	60	0.8	14	48	0.0	15	52	0.0	17	57	0.0	25	85	0.0	33	113	0.0	20	67	21	71
592	7.0	18	60	0.8	14	48	0.0	15	53	0.0	17	58	0.0	25	86	0.0	33	115	0.0	20	68	21	72
577	7.1	17	60	0.8	14	49	0.0	15	54	0.0	17	59	0.0	25	88	0.0	33	117	0.0	20	69	21	73
562	7.2	17	60	0.9	17	60	0.6	15	54	0.0	17	59	0.0	25	89	0.0	33	118	0.0	20	70	21	74
547	7.3	17	60	0.9	17	60	0.6	15	55	0.0	17	60	0.0	25	90	0.0	33	120	0.0	20	71	21	75
532	7.4	17	60	0.9	17	60	0.6	15	56	0.0	17	61	0.0	25	91	0.0	33	122	0.0	20	72	21	76
516	7.5	16	60	0.9	16	60	0.6	15	57	0.0	17	62	0.0	25	93	0.0	33	123	0.0	20	72	21	77
500	7.6	16	60	0.9	16	60	0.6	15	57	0.0	17	63	0.0	25	94	0.0	33	125	0.0	20	73	21	78
483	7.7	16	60	0.9	16	60	0.6	15	58	0.0	17	63	0.0	25	95	0.0	33	126	0.0	20	74	21	79
464	7.8	16	60	0.9	16	60	0.6	15	59	0.0	17	64	0.0	25	96	0.0	33	128	0.0	20	75	21	80
441	7.9	16	60	0.9	16	60	0.6	15	60	0.0	17	65	0.0	25	97	0.0	33	130	0.0	20	76	21	81
394	8.0	15	60	1.0	16	61	0.7	15	60	0.0	17	66	0.0	25	99	0.0	33	131	0.0	20	77	21	82

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

REV. 1/07
802.40

TC-5.01

DESIGN FACTORS FOR A DESIGN SPEED OF 110 km/h (RURAL) USING E= 8% MAX.

DESIGN VELOCITY -110		WIDTH= 5.4 m			WIDTH=6.0 m			WIDTH=6.6 m			WIDTH=7.2 m			WIDTH=14.4 m			WIDTH=21.6 m			INTERCHANGE RAMPS WIDTH			
		DESIGN SOFTWARE EQUIVALENTS (NUMBER OF LANES AT LANE WIDTH)																					
		1 @ 2.7 m			1 @ 3.0 m			1 @ 3.3 m			1 @ 3.6 m			2 @ 3.6 m			3 @ 3.6 m			4.8 m		5.4 m	
RADIUS (m)	E (%)	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	w	Lt	Lr	Lt	Lr
5000	NC	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0.0	0	0	0	0
3096	2.0	14	14	0.0	15	15	0.0	17	17	0.0	18	18	0.0	27	27	0.0	36	36	0.0	21	21	23	23
2941	2.1	14	14	0.0	15	16	0.0	17	17	0.0	18	19	0.0	27	28	0.0	36	37	0.0	21	22	23	24
2799	2.2	14	15	0.0	15	17	0.0	17	18	0.0	18	20	0.0	27	29	0.0	36	39	0.0	21	23	23	25
2670	2.3	14	16	0.0	15	17	0.0	17	19	0.0	18	21	0.0	27	31	0.0	36	41	0.0	21	24	23	26
2551	2.4	14	16	0.0	15	18	0.0	17	20	0.0	18	22	0.0	27	32	0.0	36	43	0.0	21	26	23	27
2442	2.5	14	17	0.0	15	19	0.0	17	21	0.0	18	22	0.0	27	33	0.0	36	44	0.0	21	27	23	28
2341	2.6	14	18	0.0	15	20	0.0	17	21	0.0	18	23	0.0	27	35	0.0	36	46	0.0	21	28	23	29
2248	2.7	14	18	0.0	15	20	0.0	17	22	0.0	18	24	0.0	27	36	0.0	36	48	0.0	21	29	23	30
2161	2.8	14	19	0.0	15	21	0.0	17	23	0.0	18	25	0.0	27	37	0.0	36	50	0.0	21	30	23	31
2080	2.9	14	20	0.0	15	22	0.0	17	24	0.0	18	26	0.0	27	39	0.0	36	51	0.0	21	31	23	32
2004	3.0	14	20	0.0	15	22	0.0	17	25	0.0	18	27	0.0	27	40	0.0	36	53	0.0	21	32	23	34
1934	3.1	14	21	0.0	15	23	0.0	17	25	0.0	18	28	0.0	27	41	0.0	36	55	0.0	21	33	23	35
1867	3.2	14	22	0.0	15	24	0.0	17	26	0.0	18	29	0.0	27	43	0.0	36	57	0.0	21	34	23	36
1805	3.3	14	22	0.0	15	25	0.0	17	27	0.0	18	29	0.0	27	44	0.0	36	58	0.0	21	35	23	37
1746	3.4	14	23	0.0	15	25	0.0	17	28	0.0	18	30	0.0	27	45	0.0	36	60	0.0	21	36	23	38
1691	3.5	14	24	0.0	15	26	0.0	17	29	0.0	18	31	0.0	27	47	0.0	36	62	0.0	21	37	23	39
1639	3.6	14	24	0.0	15	27	0.0	17	29	0.0	18	32	0.0	27	48	0.0	36	64	0.0	21	38	23	40
1589	3.7	14	25	0.0	15	28	0.0	17	30	0.0	18	33	0.0	27	49	0.0	36	65	0.0	21	39	23	41
1542	3.8	14	26	0.0	15	28	0.0	17	31	0.0	18	34	0.0	27	51	0.0	36	67	0.0	21	40	23	42
1498	3.9	14	26	0.0	15	29	0.0	17	32	0.0	18	35	0.0	27	52	0.0	36	69	0.0	21	41	23	43
1455	4.0	14	27	0.0	15	30	0.0	17	33	0.0	18	36	0.0	27	53	0.0	36	71	0.0	21	42	23	45
1415	4.1	14	27	0.0	15	30	0.0	17	33	0.0	18	36	0.0	27	54	0.0	36	72	0.0	21	43	23	46
1376	4.2	14	28	0.0	15	31	0.0	17	34	0.0	18	37	0.0	27	56	0.0	36	74	0.0	21	44	23	47
1340	4.3	14	29	0.0	15	32	0.0	17	35	0.0	18	38	0.0	27	57	0.0	36	76	0.0	21	45	23	48
1305	4.4	14	29	0.0	15	33	0.0	17	36	0.0	18	39	0.0	27	58	0.0	36	78	0.0	21	46	23	49
1271	4.5	14	30	0.0	15	33	0.0	17	37	0.0	18	40	0.0	27	60	0.0	36	80	0.0	21	47	23	50
1239	4.6	14	31	0.0	15	34	0.0	17	38	0.0	18	41	0.0	27	61	0.0	36	81	0.0	21	48	23	51
1208	4.7	14	31	0.0	15	35	0.0	17	38	0.0	18	42	0.0	27	62	0.0	36	83	0.0	21	50	23	52
1178	4.8	14	32	0.0	15	36	0.0	17	39	0.0	18	43	0.0	27	64	0.0	36	85	0.0	21	51	23	53
1150	4.9	14	33	0.0	15	36	0.0	17	40	0.0	18	44	0.0	27	65	0.0	36	87	0.0	21	52	23	54
1123	5.0	14	33	0.0	15	37	0.0	17	41	0.0	18	44	0.0	27	66	0.0	36	88	0.0	21	53	23	56
1096	5.1	14	34	0.0	15	38	0.0	17	42	0.0	18	45	0.0	27	68	0.0	36	90	0.0	21	54	23	57
1071	5.2	14	35	0.0	15	39	0.0	17	42	0.0	18	46	0.0	27	69	0.0	36	92	0.0	21	55	23	58
1047	5.3	14	35	0.0	15	39	0.0	17	43	0.0	18	47	0.0	27	70	0.0	36	94	0.0	21	56	23	59
1023	5.4	14	36	0.0	15	40	0.0	17	44	0.0	18	48	0.0	27	72	0.0	36	95	0.0	21	57	23	60
1000	5.5	14	37	0.0	15	41	0.0	17	45	0.0	18	49	0.0	27	73	0.0	36	97	0.0	21	58	23	61
978	5.6	14	37	0.0	15	41	0.0	17	46	0.0	18	50	0.0	27	74	0.0	36	99	0.0	21	59	23	62
957	5.7	14	38	0.0	15	42	0.0	17	46	0.0	18	51	0.0	27	76	0.0	36	101	0.0	21	60	23	63
937	5.8	14	39	0.0	15	43	0.0	17	47	0.0	18	51	0.0	27	77	0.0	36	102	0.0	21	61	23	64
917	5.9	14	39	0.0	15	44	0.0	17	48	0.0	18	52	0.0	27	78	0.0	36	104	0.0	21	62	23	66
898	6.0	14	40	0.0	15	44	0.0	17	49	0.0	18	53	0.0	27	80	0.0	36	106	0.0	21	63	23	67
879	6.1	14	41	0.0	15	45	0.0	17	50	0.0	18	54	0.0	27	81	0.0	36	108	0.0	21	64	23	68
861	6.2	14	41	0.0	15	46	0.0	17	50	0.0	18	55	0.0	27	82	0.0	36	109	0.0	21	65	23	69
851	6.3	14	42	0.0	15	47	0.0	17	51	0.0	18	56	0.0	27	83	0.0	36	111	0.0	21	66	23	70
850	6.3	21	65	0.8	15	47	0.0	17	51	0.0	18	56	0.0	27	83	0.0	36	111	0.0	21	66	23	70
843	6.3	21	65	0.8	15	47	0.0	17	51	0.0	18	56	0.0	27	83	0.0	36	111	0.0	21	66	23	70
826	6.4	21	65	0.8	15	47	0.0	17	52	0.0	18	57	0.0	27	85	0.0	36	113	0.0	21	67	23	71
809	6.5	20	65	0.8	15	48	0.0	17	53	0.0	18	58	0.0	27	86	0.0	36	115	0.0	21	68	23	72
793	6.6	20	65	0.8	15	49	0.0	17	54	0.0	18	58	0.0	27	87	0.0	36	116	0.0	21	69	23	73
777	6.7	20	65	0.8	15	50	0.0	17	54	0.0	18	59	0.0	27	89	0.0	36	118	0.0	21	70	23	74
760	6.8	20	65	0.8	15	50	0.0	17	55	0.0	18	60	0.0	27	90	0.0	36	120	0.0	21	71	23	75
744	6.9	19	65	0.8	15	51	0.0	17	56	0.0	18	61	0.0	27	91	0.0	36	122	0.0	21	72	23	77
728	7.0	19	65	0.8	15	52	0.0	17	57	0.0	18	62	0.0	27	93	0.0	36	123	0.0	21	74	23	78
711	7.1	19	65	0.8	15	52	0.0	17	58	0.0	18	63	0.0	27	94	0.0	36	125	0.0	21	75	23	79
695	7.2	19	65	0.8	15	53	0.0	17	58	0.0	18	64	0.0	27	95	0.0	36	127	0.0	21	76	23	80
678	7.3	18	65	0.8	15	54	0.0	17	59	0.0	18	65	0.0	27	97	0.0	36	129	0.0	21	77	23	81
661	7.4	18	65	0.8	15	55	0.0	17	60	0.0	18	65	0.0	27	98	0.0	36	130	0.0	21	78	23	82
643	7.5	18	65	0.9	18	65	0.6	17	61	0.0	18	66	0.0	27	99	0.0	36	132	0.0	21	79	23	83
625	7.6	18	65	0.9	18	65	0.6	17	62	0.0	18	67	0.0	27	101	0.0	36	134	0.0	21	80	23	84
605	7.7	17	65	0.9	17	65	0.6	17	62	0.0	18	68	0.0	27	102	0.0	36	136	0.0	21	81	23	85
583	7.8	17	65	0.9	17	65	0.6	17	63	0.0	18	69	0.0	27	103	0.0	36	137	0.0	21	82	23	86
557	7.9	17	65	0.9	17	65	0.6	17	64	0.0	18	70	0.0	27	105	0.0	36	139	0.0	21	83	23	88
502	8.0	17	65	0.9	17	65	0.6	17	65	0.0	18	71	0.0	27	106	0.0	36	141	0.0	21	84	23	89

NOTE: Lt, Lr & w VALUES IN METERS. LISTED RADIUS IS THE MINIMUM ALLOWABLE RADIUS FOR THE CORRESPONDING E, Lt, Lr, AND w VALUES.

TRANSITION CURVES - RURAL

110 km/h DESIGN SPEED

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE