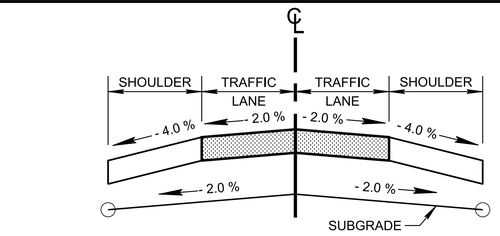
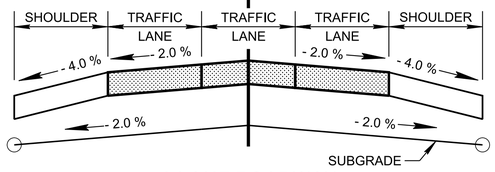
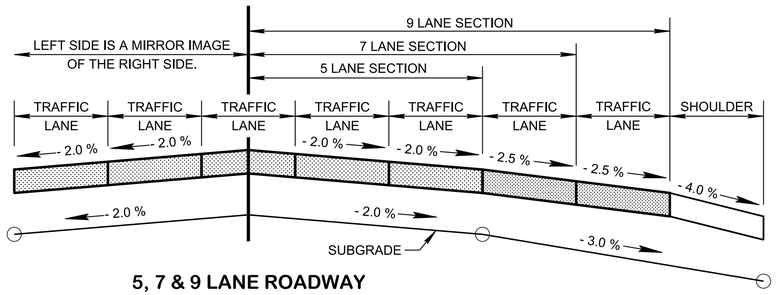


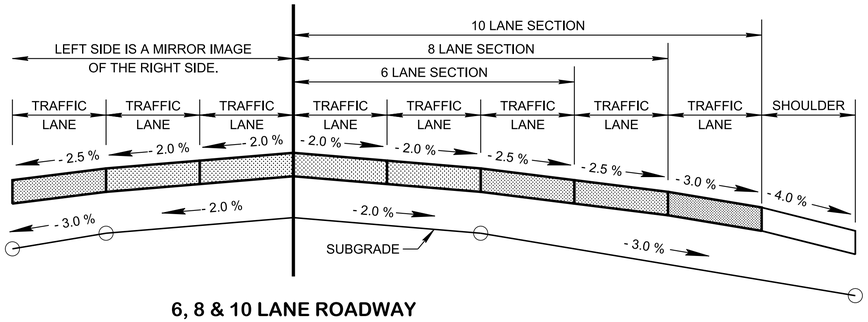

2 LANE ROADWAY




3 LANE ROADWAY

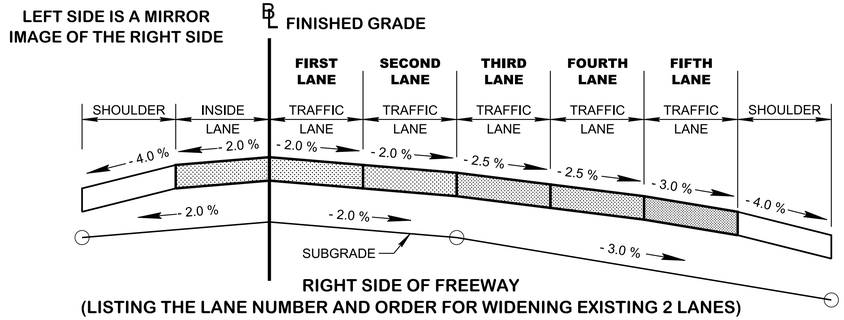



5, 7 & 9 LANE ROADWAY




6, 8 & 10 LANE ROADWAY

## PAVEMENT AND SUBGRADE MINIMUM CROSS SLOPE DETAILS FOR NON DIVIDED ROADWAYS




RIGHT SIDE OF FREEWAY
(LISTING THE LANE NUMBER AND ORDER FOR WIDENING EXISTING 2 LANES)

## PAVEMENT AND SUBGRADE MINIMUM CROSS SLOPE DETAILS FOR DIVIDED FREEWAYS

NOT TO SCALE

## SUPERELEVATION TRANSITION EQUATIONS

$$L = L_R + L_T$$

$$L_R = \frac{(W\, n\, 1)\, e_d}{\Delta\,\%}\,(b_w)$$

$$L_T = \frac{NC}{e_d} L_R$$

## SUPERELEVATION RUNOFF LENGTH ($L_R$) ADJUSTMENT FACTORS

| NUMBER OF TOTAL LANES | $n_1$ | $b_w$ |
|---|---|---|
| 2 | 1 | 1.00 |
| 3 | 1.5 | 0.83 |
| 4 | 2 | 0.75 |
| 5 | 2.5 | 0.70 |
| 6 | 3 | 0.67 |

## MAXIMUM RELATIVE GRADIENT

| V | Δ % | V | Δ % |
|---|---|---|---|
| 20 | 0.74 | 50 | 0.50 |
| 25 | 0.70 | 55 | 0.47 |
| 30 | 0.66 | 60 | 0.45 |
| 35 | 0.62 | 65 | 0.43 |
| 40 | 0.58 | 70 | 0.40 |
| 45 | 0.54 | | |

## MINIMUM RADII AND DESIGN SUPERELEVATION RATES

SEE "A POLICY OF GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011 (GREEN BOOK), P 3-33 THRU 3-58.

$e_{MAX}$ = 4% (15-45 MPH) P. 3-55, TABLE 3-13b (METHOD 2)
4% (50-60 MPH) P. 3-44, TABLE 3-8 (METHOD 5)

$e_{MAX}$ = 6% (15-45 MPH) P. 3-55, TABLE 3-13b (METHOD 2)
6% (50-60 MPH) P. 3-45, TABLE 3-9 (METHOD 5)

$e_{MAX}$ = 8% (15-70 MPH) P. 3-47, TABLE 3-10b (METHOD 5)

$e_{MAX}$ = 10% (15-70 MPH) P. 3-49, TABLE 3-11b (METHOD 5)

FOR SUPERELEVATION RUNOFF FOR HORIZONTAL CURVES SEE "A POLICY OF GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011 (GREEN BOOK), P 3-59 THRU 3-84.

SUPERELEVATION RUNOFF ( $L_R$ ) P. 3-65, TABLE 3-17b

NOTE: USE SUPERELEVATION TRANSITION EQUATIONS IF MORE THAN 2 LANES ( n1 ) ARE ROTATED. SEE P. 3-61 FOR ADDITIONAL INFORMATION.

## LEGEND

| | |
|---|---|
| R | MINIMUM RADIUS OF CURVE (FT) |
| V | ASSUMED DESIGN SPEED (MPH) |
| $e_d$ | DESIGNED RATE OF SUPERELEVATION (%) |
| W | LANE WIDTH (TABLES ASSUME LANE WIDTH OF 12 FT PER LANE) |
| $n_1$ | NUMBER OF LANES ROTATED |
| $b_w$ | ADJUSTMENT FACTOR FOR NUMBER OF LANES ROTATED |
| Δ % | MAXIMUM RELATIVE GRADIENT (%) |
| L | TOTAL TRANSITION LENGTH |
| $L_T$ | TANGENT RUNOUT LENGTH |
| $L_R$ | SUPERELEVATION RUNOFF LENGTH |
| NC | NORMAL CROWN (TABLES ASSUME 2% AS NC) (%) |
| RC | REVERSE CROWN |
| LN | NUMBER OF TRAVEL LANES |

## GENERAL NOTES

1. FOR SPECIFIC CONDITIONS NOT COVERED, REFERENCE SHOULD BE MADE TO "A POLICY OF GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011 (GREEN BOOK).
2. TABLE VALUES FOR URBAN LOW SPEED SUPERELEVATION (45 MPH OR LESS) ARE CALCULATED USING THE DISTRIBUTION METHOD 2 OF "A POLICY OF GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011 (GREEN BOOK). ALL OTHER VALUES ARE CALCULATED USING METHOD 5.
3. ALL HORIZONTAL CURVES SHALL BE SUPERELEVATED IN ACCORDANCE WITH "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011 AND SUPERELEVATION STANDARD DRAWINGS, UNLESS OTHERWISE SHOWN ON THE PLANS.
4. SPIRALS ARE RECOMMENDED FOR DESIGN SPEED OF 50 MPH OR GREATER AND DESIGN SUPERELEVATION OF 3 PERCENT OR GREATER.
5. DESIGNERS SHALL SELECT THE MORE CONSERVATIVE (LARGER VALUE) SUPERELEVATION RATE IF THE DESIGN RADIUS USED FALLS BETWEEN TWO RADII LISTED IN THE TABLE.
6. THE TRANSITION LENGTHS FOUND IN THE SUPERELEVATION TABLES ARE CONSIDERED MINIMUM AND MAY BE ROUNDED UP IN MULTIPLES OF 25 OR 50 FEET TO ALLOW FOR SIMPLIFIED CALCULATIONS.
7. WHEN USING THE 4 OR 6 LANE HIGHWAY WITH MEDIAN DETAIL, THE INSIDE EDGE OF PAVEMENT (MEDIAN) SHOULD BE HELD LEVEL AND THE DIFFERENCE IN ELEVATION BETWEEN THE EXTREME TRAVELED WAY EDGES SHOULD BE LIMITED TO THAT NEEDED TO SUPERELEVATE THE ROADWAY.
8. ALIGNMENT DESIGNS SHOULD BE SO ARRANGED AS TO AVOID SUPERELEVATION TRANSITIONS ON BRIDGE DECKS TO PREVENT PONDING IN THE AREAS OF ZERO SUPERELEVATION IN THE CROWN CHANGE ZONE.
9. USE RURAL SUPERELEVATION RATES ON ALL URBAN FREEWAYS AND EXPRESSWAYS EXCEPT VIADUCTS.
10. DESIGNERS SHALL MAINTAIN A MINIMUM PROFILE GRADE OF 0.5 PERCENT THROUGH THE TRANSITION SECTION.
11. DESIGNERS SHALL MAINTAIN A MINIMUM EDGE OF PAVEMENT GRADE OF 0.2 PERCENT (0.5 PERCENT FOR CURBED ROADS) THROUGH THE TRANSITION SECTION.
12. DESIGNERS SHALL MAINTAIN A CONSTANT GRADIENT THROUGHOUT THE TRANSITION LENGTH.
13. SEE STANDARD DRAWINGS FOR SUPERELEVATION TRANSITION DETAILS.
    1) TWO, THREE AND FIVE LANE UNDIVIDED: RD11-SE-2 AND RD11-SE-2A
    2) FOUR LANE DIVIDED: RD11-SE-3 AND RD11-SE-3A
14. FOR HIGH-TYPE ALIGNMENTS, SUPERELEVATION RUNOFF LENGTHS LONGER THAN THOSE SHOWN IN RD11-SE SERIES MAY BE DESIRABLE. IN THIS CASE, DRAINAGE NEEDS OR THE DESIRE FOR SMOOTHNESS IN THE TRAVELED-WAY-EDGE PROFILES MAY CALL FOR A SMALL INCREASE IN RUNOFF LENGTH (FROM PAGE 3-63 "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2011).

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

# TRANSITION AND CROSS SLOPE DETAILS

01-01-2019 | RD11-SE-1