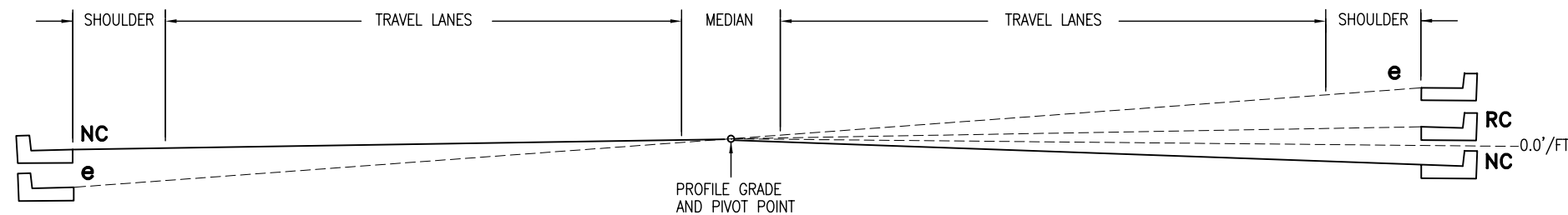
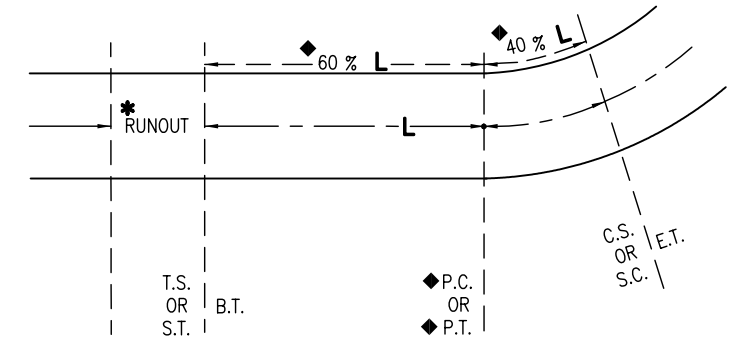


VC - TO OBTAIN SMOOTH PROFILES ON PAVEMENT EDGES, VERTICAL CURVES MAY BE INSERTED AT THE ANGULAR BREAK POINTS. UNLESS RESTRAINING CONDITIONS EXIST, THE LENGTH OF VERTICAL CURVE SELECTED, IN FEET, SHOULD BE AT LEAST NUMERICALLY EQUAL TO THE DESIGN SPEED, AND NO MORE THAN $.04 L/e$.



SUPERELEVATION DIAGRAMS

$e_{max} = 4\%$

IF THE CALCULATED RADIUS FALLS BETWEEN TWO RADII, GO TO THE NEXT LOWEST RADIUS VALUE.

e (%)	V _d =15 mph		V _d =20 mph		V _d =25 mph		V _d =30 mph		V _d =35 mph		V _d =40 mph		V _d =45 mph		V _d =50 mph		V _d =55 mph		V _d =60 mph		e (%)
	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	
2.0	506-<796	31 46	902-<1410	32 49	1340-<2050	34 51	1880-<2830	36 55	2490-<3730	39 58	3220-<4770	41 62	4040-<5930	44 67	4940-<7220	48 72	5950-<8650	51 77	7080-<10300	53 80	2.0
2.2	399-<506	34 51	723-<902	36 54	1110-<1340	38 57	1580-<1880	40 60	2120-<2490	43 64	2760-<3220	46 68	3480-<4040	49 73	4280-<4940	53 79	5180-<5950	56 84	6190-<7080	59 88	2.2
2.4	271-<399	37 55	513-<723	39 58	838-<1110	41 62	1270-<1580	44 65	1760-<2120	46 70	2340-<2760	50 74	2980-<3480	53 80	3690-<4280	58 86	4500-<5180	61 92	5410-<6190	64 96	2.4
2.6	201-<271	40 60	388-<513	42 63	650-<838	45 67	1000-<1270	47 71	1420-<1760	50 75	1930-<2340	54 81	2490-<2980	58 87	3130-<3690	62 94	3870-<4500	66 100	4700-<5410	69 104	2.6
2.8	157-<201	43 65	308-<388	45 68	524-<650	48 72	817-<1000	51 76	1170-<1420	54 81	1620-<1930	58 87	2100-<2490	62 93	2660-<3130	67 101	3310-<3870	71 107	4060-<4700	75 112	2.8
3.0	127-<157	46 69	251-<308	49 73	433-<524	51 77	681-<817	55 82	982-<1170	58 87	1370-<1620	62 93	1800-<2100	67 100	2290-<2660	72 108	2860-<3310	77 115	3530-<4060	80 120	3.0
3.2	105-<127	49 74	209-<251	52 78	363-<433	55 82	576-<681	58 87	835-<982	62 93	1180-<1370	66 99	1550-<1800	71 107	1980-<2290	77 115	2490-<2860	82 123	3090-<3530	85 128	3.2
3.4	88-<105	52 78	175-<209	55 83	307-<363	58 87	490-<576	62 93	714-<835	66 99	1010-<1180	70 106	1340-<1550	76 113	1720-<1980	82 122	2170-<2490	87 130	2700-<3090	91 136	3.4
3.6	73-<88	55 83	147-<175	58 88	259-<307	62 93	416-<490	65 98	610-<714	70 105	865-<1010	74 112	1150-<1340	80 120	1480-<1720	86 130	1880-<2170	92 138	2350-<2700	96 144	3.6
3.8	61-<73	58 88	122-<147	62 92	215-<259	65 98	348-<416	69 104	512-<610	74 110	730-<865	79 118	970-<1150	84 127	1260-<1480	91 137	1660-<1880	97 146	2010-<2350	101 152	3.8
4.0	42-<61	62 92	86-<122	65 97	154-<215	69 103	250-<348	73 109	371-<512	77 116	533-<730	83 124	711-<970	89 133	926-<1260	96 144	1190-<1660	102 153	1500-<2010	107 160	4.0

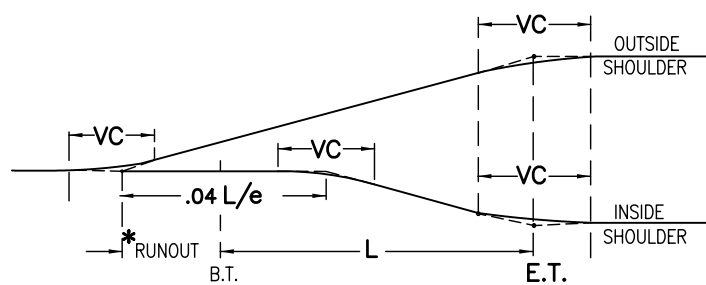
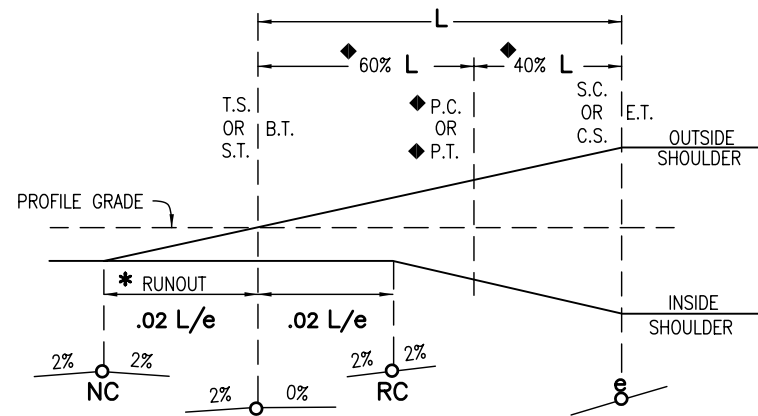
- = PIVOT
- ◆ = WHEN CURVE IS NOT SPIRALLED.
- e = MAXIMUM RATE OF SUPERELEVATION IN FEET (PER FOOT OF WIDTH) FOR THE GIVEN RADIUS OF CURVE AND DESIGN SPEED.
- * RUNOUT LENGTH SHOULD USUALLY BE $.02 L/e$ WHEN CONDITIONS ARE SUCH THAT THIS LENGTH IS NOT SUITABLE, THE DESIGNER SHALL CHOOSE ANOTHER LENGTH TO SUIT CONDITIONS.

- R - RADIUS OF CURVE
- V_d - ASSUMED DESIGN SPEED
- L - LENGTH OF SUPERELEVATION RUNOFF OR SPIRAL LENGTH
- NC - NORMAL CROWN SECTION
- RC - REMOVE ADVERSE CROWN, SUPERELEVATE AT NORMAL CROWN SLOPE
- VC - VERTICAL CURVE
- BT - BEGINNING OF TRANSITION
- ET - ENDING OF TRANSITION
- TS - TANGENT TO SPIRAL
- ST - SPIRAL TO TANGENT
- PC - POINT OF CURVATURE
- PI - POINT OF INTERSECTION
- PT - POINT OF TANGENT
- CS - CURVE TO SPIRAL
- SC - SPIRAL TO CURVE

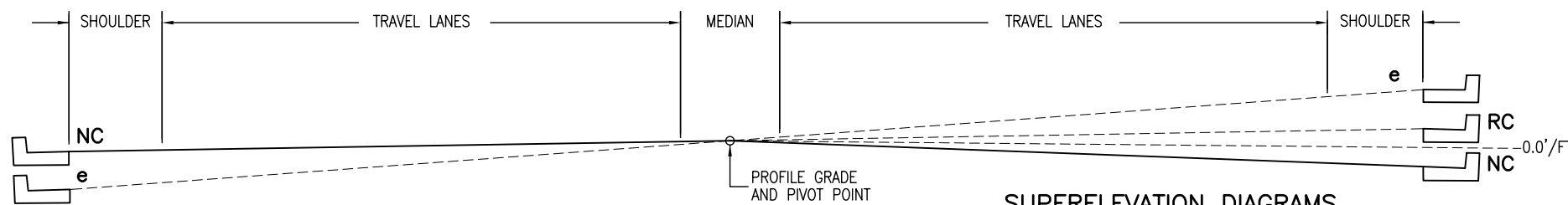
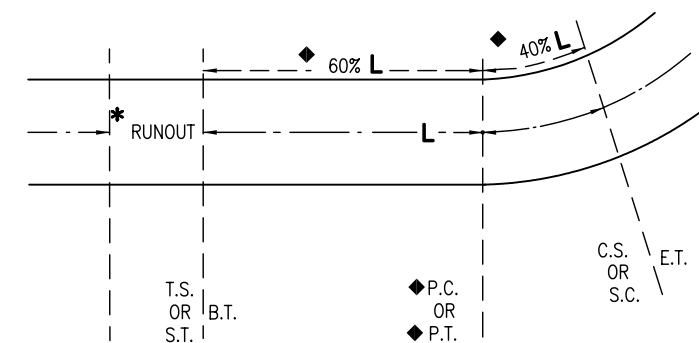
SUPERELEVATION NOTES

1. THIS STANDARD PLAN SHOWS THE REQUIRED RATES OF SUPERELEVATION FOR THE VARIOUS RADIUS LENGTHS AT DIFFERENT DESIGN SPEEDS FOR THE MAXIMUM SUPERELEVATION RATE OF 4%. ALTERNATIVE MAXIMUM RATE OF SUPERELEVATION SHALL BE USED FOR STREETS WHEN SPECIFIED ON THE PLANS.
2. USE OF $e_{max} = 4\%$ SHOULD BE LIMITED TO URBAN CONDITIONS.
3. VALUES ARE FOR DESIGN ELEMENTS RELATED TO DESIGN SPEED AND HORIZONTAL CURVATURE FOR TWO LANE AND FOUR LANE STREETS.
4. WHERE SIDE STREETS OR ROADS INTERSECT, THE RATE OF SUPERELEVATION MAY BE REDUCED TO FACILITATE A SMOOTH INTERSECTION OF THE PROFILE GRADES.
5. NUMBER OF LANES ROTATED:
 - A. ONE LANE ROTATED IS TYPICAL FOR A TWO-LANE HIGHWAY.
 - B. TWO LANES ROTATED ARE TYPICAL FOR A FOUR-LANE HIGHWAY.
6. SPIRALS ARE RECOMMENDED BELOW THE HEAVY LINE IN THE TABLES. SPIRALS ARE PERMISSIBLE BUT NOT RECOMMENDED ABOVE THE HEAVY LINES. SPIRAL LENGTHS MAY BE ROUNDED TO MULTIPLES OF 50 FEET FOR CALCULATION CONVENIENCE.

Computer File Information Creation Date: 07/04/06 Initials: SJR Last Modification Date: 07/04/06 Initials: LTA Full Path: www.dot.state.co.us/DesignSupport/ Drawing File Name: 2030120102.dwg CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	Sheet Revisions <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Date:</th> <th style="width: 90%;">Comments</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	Date:	Comments							Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820 Project Development Branch SRJ/LTA	<h1 style="margin: 0;">SUPERELEVATION STREETS</h1>	STANDARD PLAN NO. <div style="text-align: center; font-size: 1.2em; font-weight: bold;">M-203-12</div> <div style="text-align: center; font-size: 1.2em; font-weight: bold;">Sheet No. 1 of 2</div>
Date:	Comments											
Issued By: Project Development Branch on July 04, 2006												



VC - TO OBTAIN SMOOTH PROFILES ON PAVEMENT EDGES, VERTICAL CURVES MAY BE INSERTED AT THE ANGULAR BREAK POINTS. UNLESS RESTRAINING CONDITIONS EXIST, THE LENGTH OF VERTICAL CURVE SELECTED, IN FEET, SHOULD BE NO LESS THAN NUMERICALLY EQUAL TO THE DESIGN SPEED, AND NO MORE THAN .04 L/e .



SUPERELEVATION DIAGRAMS

$e_{max} = 6\%$

e (%)	V _d =15 mph		V _d =20 mph		V _d =25 mph		V _d =30 mph		V _d =35 mph		V _d =40 mph		V _d =45 mph		V _d =50 mph		V _d =55 mph		V _d =60 mph		e (%)
	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	R (FT.)	L (FT.)	
2.0	614-<868	31 46	1120-<1580	32 49	1630-<2290	34 51	2240-<3130	36 55	2950-<4100	39 58	3770-<5230	41 62	4680-<6480	44 67	5700-<7870	48 72	6820-<9410	51 77	8060-<11100	53 80	2.0
2.2	543-<614	34 51	991-<1120	36 54	1450-<1630	38 57	2000-<2240	40 60	2630-<2950	43 64	3370-<3770	46 68	4190-<4680	49 73	5100-<5700	53 79	6110-<6820	56 84	7230-<8060	59 88	2.2
2.4	482-<543	37 55	884-<991	39 58	1300-<1450	41 62	1790-<2000	44 65	2360-<2630	46 70	3030-<3370	50 74	3770-<4190	53 80	4600-<5100	58 86	5520-<6110	61 92	6540-<7230	64 96	2.4
2.6	430-<482	40 60	791-<884	42 63	1170-<1300	45 67	1610-<1790	47 71	2130-<2360	50 75	2740-<3030	54 81	3420-<3770	58 87	4170-<4600	62 94	5020-<5520	66 100	5950-<6540	69 104	2.6
2.8	384-<430	43 65	709-<791	45 68	1050-<1170	48 72	1460-<1610	51 76	1930-<2130	54 81	2490-<2740	58 87	3110-<3420	62 93	3800-<4170	67 101	4580-<5020	71 107	5440-<5950	75 112	2.8
3.0	341-<384	46 69	635-<709	49 73	944-<1050	51 77	1320-<1460	55 82	1760-<1930	58 87	2270-<2490	62 93	2840-<3110	67 100	3480-<3800	72 108	4200-<4580	77 115	4990-<5440	80 120	3.0
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3.4	256-<300	52 78	498-<566	55 83	761-<850	58 87	1080-<1200	62 93	1460-<1600	66 99	1900-<2080	70 106	2390-<2600	76 113	2940-<3200	82 122	3560-<3860	87 130	4250-<4600	91 136	3.4
3.6	209-<256	55 83	422-<498	58 88	673-<761	62 93	972-<1080	65 98	1320-<1460	70 105	1740-<1900	74 112	2190-<2390	80 120	2710-<2940	86 130	3290-<3560	92 138	3940-<4250	96 144	3.6
3.8	176-<209	58 88	358-<422	62 92	583-<673	65 98	864-<972	69 104	1190-<1320	74 110	1590-<1740	79 118	2010-<2190	84 127	2490-<2710	91 137	3040-<3290	97 146	3650-<3940	101 152	3.8
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4.6	102-<116	71 106	212-<238	75 112	360-<402	79 118	555-<615	84 125	788-<868	89 134	1090-<1190	95 143	1410-<1540	102 153	1780-<1940	110 166	2210-<2400	117 176	2710-<2920	123 184	4.6
4.8	91-<102	74 111	189-<212	78 117	324-<360	82 123	502-<555	87 131	718-<788	93 139	995-<1090	99 149	1300-<1410	107 160	1640-<1780	115 173	2050-<2210	123 184	2510-<2710	128 192	4.8
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6.0	39-<51	92 138	81-<106	97 146	144-<186	103 154	231-<296	109 164	340-<431	116 174	485-<611	124 186	643-<806	133 200	833-<1040	144 216	1060-<1320	153 230	1330-<1650	160 240	6.0

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- CS - CURVE TO SPIRAL
- SC - SPIRAL TO CURVE

SUPERELEVATION NOTES

1. THIS STANDARD PLAN SHOWS THE REQUIRED RATES OF SUPERELEVATION FOR THE VARIOUS RADIUS LENGTHS AT DIFFERENT DESIGN SPEEDS FOR THE MAXIMUM SUPERELEVATION RATE OF 6%. MAXIMUM RATE OF SUPERELEVATION SHALL BE USED FOR STREETS WHEN SPECIFIED ON THE PLANS.
2. VALUES ARE FOR DESIGN ELEMENTS RELATED TO DESIGN SPEED AND HORIZONTAL CURVATURE FOR TWO LANE AND FOUR LANE STREETS.
3. WHERE SIDE STREETS OR ROADS INTERSECT, THE RATE OF SUPERELEVATION MAY BE REDUCED TO FACILITATE A SMOOTH INTERSECTION OF THE PROFILE GRADES.
4. NUMBER OF LANES ROTATED:
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5. SPIRALS ARE RECOMMENDED BELOW THE HEAVY LINE IN THE TABLES. SPIRALS ARE PERMISSIBLE BUT NOT RECOMMENDED ABOVE THE HEAVY LINES. SPIRAL LENGTHS MAY BE ROUNDED TO MULTIPLES OF 50 FEET FOR CALCULATION CONVENIENCE.

Computer File Information	Sheet Revisions	Colorado Department of Transportation	SUPERELEVATION STREETS	STANDARD PLAN NO.
Creation Date: 07/04/06 Initials: SJR	Date: _____ Comments: _____	4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820		M-203-12
Last Modification Date: 07/04/06 Initials: LTA		Project Development Branch SRJ/LTA		Sheet No. 2 of 2
Full Path: www.dot.state.co.us/DesignSupport/			Issued By: Project Development Branch on July 04, 2006	
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