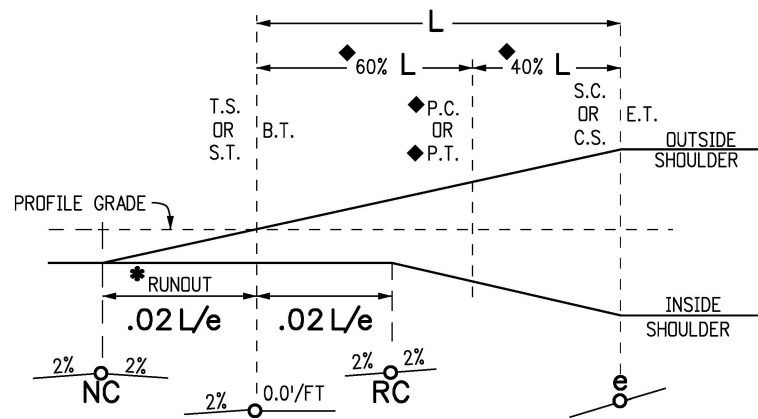
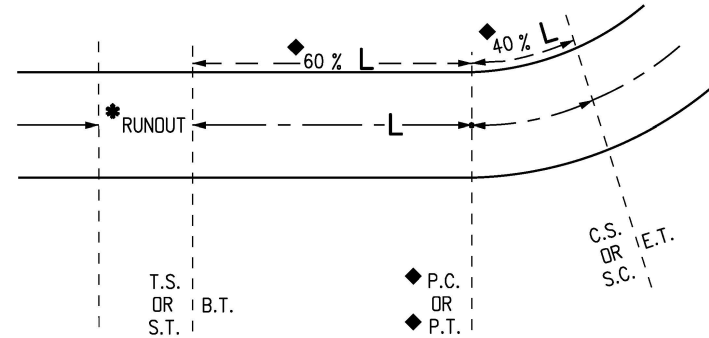
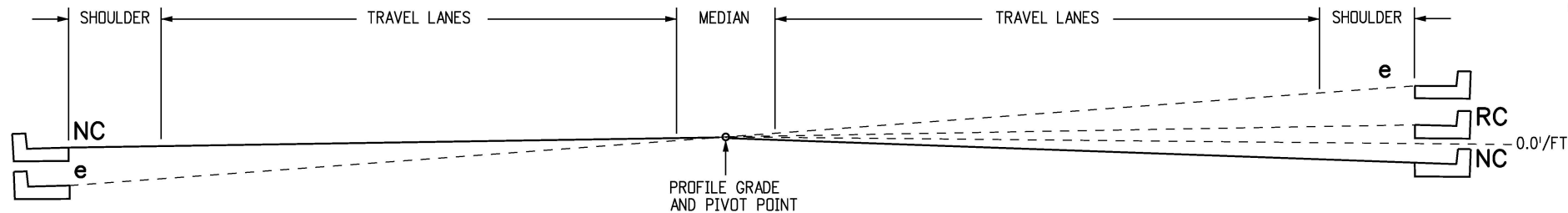


VC - TO OBTAIN SMOOTH PROFILES ON PAVEMENT EDGES, VERTICAL CURVES MAY BE INSERTED AT THE ANGULAR BREAK POINTS. UNLESS RESTRAINING CONDITIONS EXIST, THE LENGTH OF VERTICAL CURVE SELECTED, IN FEET, SHOULD BE AT LEAST NUMERICALLY EQUAL TO THE DESIGN SPEED, AND NO MORE THAN $.04L/e$.



- = 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 $.02L/e$ WHEN CONDITIONS ARE SUCH THAT THIS LENGTH IS NOT SUITABLE, THE DESIGNER SHALL CHOOSE ANOTHER LENGTH TO SUIT CONDITIONS.

R - RADIUS OF CURVE
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L - LENGTH OF SUPERELEVATION RUNOFF OR SPIRAL LENGTH
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RC - REMOVE ADVERSE CROWN, SUPERELEVATE AT NORMAL CROWN SLOPE
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PI - POINT OF INTERSECTION
PT - POINT OF TANGENT
CS - CURVE TO SPIRAL
SC - SPIRAL TO CURVE



SUPERELEVATION DIAGRAMS

$$e_{\max} = 4\%$$

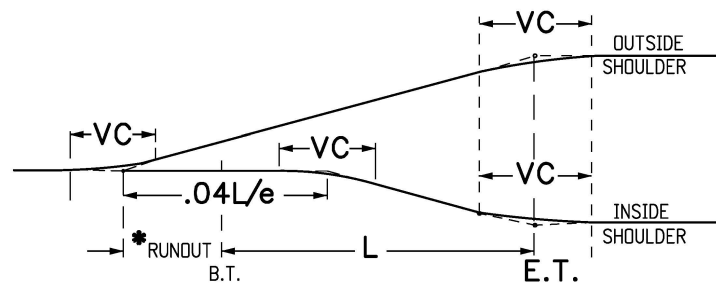
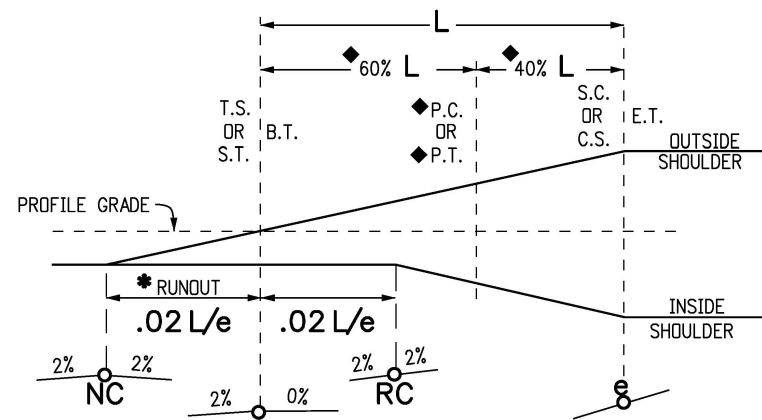
IF THE CALCULATED RADIUS FALLS BETWEEN TWO RADII, GO TO THE NEXT LOWEST RADIUS VALUE.

e (%)	Vd=15 mph			Vd=20 mph			Vd=25 mph			Vd=30 mph			Vd=35 mph			Vd=40 mph			Vd=45 mph			Vd=50 mph			Vd=55 mph			Vd=60 mph			e (%)
	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	
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	1600<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<1600	102	153	1500<2010	107	160	4.0

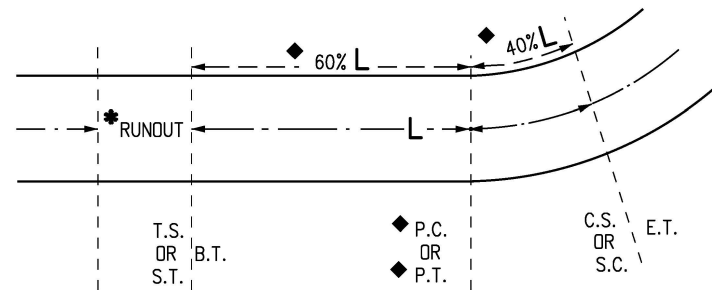
SUPERELEVATION NOTES

- 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.
- USE OF $e_{\max} = 4\%$ SHOULD BE LIMITED TO URBAN CONDITIONS.
- VALUES ARE FOR DESIGN ELEMENTS RELATED TO DESIGN SPEED AND HORIZONTAL CURVATURE FOR TWO LANE AND FOUR LANE STREETS.
- WHERE SIDE STREETS OR ROADS INTERSECT, THE RATE OF SUPERELEVATION MAY BE REDUCED TO FACILITATE A SMOOTH INTERSECTION OF THE PROFILE GRADES.
- NUMBER OF LANES ROTATED:
 - ONE LANE ROTATED IS TYPICAL FOR A TWO-LANE HIGHWAY.
 - TWO LANES ROTATED ARE TYPICAL FOR A FOUR-LANE HIGHWAY.
- 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		(R-X) (R-X) (R-X) (R-X)	Sheet Revisions		 Colorado Department of Transportation 2829 West Howard Place CDOT HQ, 3rd Floor Denver, CO 80204 Phone: 303-757-9021 FAX: 303-757-9868 Project Development Branch JBK	SUPERELEVATION STREETS		STANDARD PLAN NO.	
Creation Date: 07/31/19			Date:	Comments		M-203-12		Standard Sheet No. 1 of 2	
Designer Initials: JBK									
Last Modification Date: 07/31/19									
Detailer Initials: LTA									
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English								Issued by the Project Development Branch: July 31, 2019	
						Project Sheet Number:			



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 $.04L/e$.

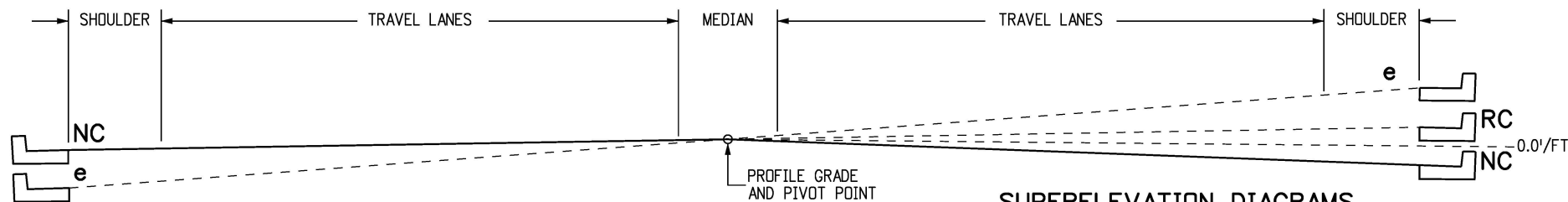


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- PI - POINT OF INTERSECTION
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- SC - SPIRAL TO CURVE

SUPERELEVATION NOTES

- 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.
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SUPERELEVATION DIAGRAMS

$e_{max} = 6\%$

	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			
	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	R (FT.)	1 LN	2 LNS	
e (%)	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
3.2	300<341	49	74	566<635	52	78	850<944	55	82	1200<1320	58	87	1600<1760	62	93	2080<2270	66	99	2600<2840	71	107	3200<3480	77	115	3860<4200	82	123	4600<4990	85	128	3.2
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
4.0	151<176	62	92	309<358	65	97	511<583	69	103	766<864	73	109	1070<1190	77	116	1440<1590	83	124	1840<2010	89	133	2300<2490	96	144	2810<3040	102	153	3390<3650	107	160	4.0
4.2	131<151	65	97	270<309	68	102	452<511	72	108	684<766	76	115	960<1070	81	122	1310<1440	87	130	1680<1840	93	140	2110<2300	101	151	2590<2810	107	161	3140<3390	112	168	4.2
4.4	116<131	68	102	238<270	71	107	402<452	75	113	615<684	80	120	868<960	85	128	1190<1310	91	137	1540<1680	98	147	1940<2110	106	158	2400<2590	112	169	2920<3140	117	176	4.4
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
5.0	82<91	77	115	169<189	81	122	292<324	86	129	456<502	91	136	654<718	97	145	911<995	103	155	1190<1300	111	167	1510<1640	120	180	1890<2050	128	191	2330<2510	133	200	5.0
5.2	73<82	80	120	152<169	84	126	264<292	89	134	413<456	95	142	595<654	101	151	833<911	108	161	1090<1190	116	173	1390<1510	125	187	1750<1890	133	199	2160<2330	139	208	5.2
5.4	65<73	83	125	136<152	88	131	237<264	93	139	373<413	98	147	540<595	105	157	759<833	112	168	995<1090	120	180	1280<1390	130	194	1610<1750	138	207	1990<2160	144	216	5.4
5.6	58<65	86	129	121<136	91	136	212<237	96	144	335<373	102	153	487<540	108	163	687<759	116	174	903<995	124	187	1160<1280	134	202	1470<1610	143	214	1830<1990	149	224	5.6
5.8	51<58	89	134	106<121	94	141	186<212	99	149	296<335	105	158	431<487	112	168	611<687	120	180	806<903	129	193	1040<1160	139	209	1320<1470	148	222	1650<1830	155	232	5.8
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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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English

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Sheet Revisions

Date:	Comments

Colorado Department of Transportation



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Denver, CO 80204
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Project Development Branch

JBK

SUPERELEVATION STREETS

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.

M-203-12

Standard Sheet No. 2 of 2

Project Sheet Number: