Example 2

Given:

e_{max} = 8%

Design Speed, V_d = 55 mph

Four –lane Regional Arterial, Rural

Four 12-foot lanes; R = 1637 ft

Find:

1. Required Rate of Superelevation (e)
2. Length of Superelevation Runoff (L_r)
3. Length of Tangent Runout (L_t)
4. Length of Superelevation Transition (T)

Example 2 Solution

Minimum Radii for Superelevation rates, Design Speeds, and e_{max} = 8%

e (%)	V_d = 15 mph R (ft)	V_d = 20 mph R (ft)	V_d = 25 mph R (ft)	V_d = 30 mph R (ft)	V_d = 35 mph R (ft)	V_d = 40 mph R (ft)	V_d = 45 mph R (ft)	V_d = 50 mph R (ft)	V_d = 55 mph R (ft)	V_d = 60 mph R (ft)
NC	932	1640	2370	3240	4260	5410	6710	8150	9720	11500
RC	676	1190	1720	2370	3120	3970	4930	5990	7150	8440
2.2	605	1070	1550	2130	2800	3570	4440	5400	6450	7620
2.4	546	959	1400	1930	2540	3240	4030	4910	5870	6930
2.6	496	872	1280	1760	2320	2960	3690	4490	5370	6350
2.8	453	796	1170	1610	2130	2720	3390	4130	4950	5850
3.0	415	730	1070	1480	1960	2510	3130	3820	4580	5420
3.2	382	672	985	1370	1820	2330	2900	3550	4250	5040
3.4	352	620	911	1270	1690	2170	2700	3300	3970	4700
3.6	324	572	845	1180	1570	2020	2520	3090	3710	4400
3.8	300	530	784	1100	1470	1890	2360	2890	3480	4140
4.0	277	490	729	1030	1370	1770	2220	2720	3270	3890
4.2	255	453	678	955	1280	1660	2080	2560	3080	3670
4.4	235	418	630	893	1200	1560	1960	2410	2910	3470
4.6	215	384	585	834	1130	1470	1850	2280	2750	3290
4.8	193	349	542	779	1060	1390	1750	2160	2610	3120
5.0	172	314	499	727	991	1310	1650	2040	2470	2960
5.2	154	284	457	676	929	1230	1560	1930	2350	2820
5.4	139	258	420	627	870	1160	1480	1830	2230	2680
5.6	126	236	387	582	813	1090	1390	1740	2120	2550
5.8	115	216	358	542	761	1030	1320	1650	2010	2430
6.0	105	199	332	506	713	965	1250	1560	1920	2320
6.2	97	184	308	472	669	909	1180	1480	1820	2210
6.4	89	170	287	442	628	857	1110	1400	1730	2110
6.6	82	157	267	413	590	808	1050	1330	1650	2010
6.8	76	146	248	386	553	761	990	1260	1560	1910
7.0	70	135	231	360	518	716	933	1190	1480	1820

V_d = 55 mph
Radius = 1637 ft
R=1650' > 1637' >1560'
Use e_{req} for R = 1560'

e_{req} = **6.8%**

Exhibit 3-27

Example 2 Solution

Find Length of Superelevation Runoff (L_r)

For V_d = 55 mph, 2 lane rotated, and e_{req} = 5.8%

	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	
	Number of Lanes Rotated. Note that 1 lane rotated is typical for a 2-lane highway, 2 lanes rotated is typical																	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
e (%)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)	L_r (ft)
1.5	23	35	24	37	26	39	27	41	29	44	31	47	33	50	36	54	38	58
2.0	31	46	32	49	34	51	36	55	39	58	41	62	44	67	48	72	51	77
2.2	34	51	36	54	38	57	40	60	43	64	46	68	49	73	53	79	56	84
2.4	37	55	39	58	41	62	44	65	46	70	50	74	53	80	58	86	61	92
2.6	40	60	42	63	45	67	47	71	50	75	54	81	58	87	62	94	66	100
2.8	43	65	45	68	48	72	51	76	54	81	58	87	62	93	67	101	71	107
3.0	46	69	49	73	51	77	55	82	58	87	62	93	67	100	72	108	77	115
3.2	49	74	52	78	55	82	58	87	62	93	66	99	71	107	77	115	82	123
3.4	52	78	55	83	58	87	62	93	66	99	70	106	76	113	82	122	87	130
3.6	55	83	58	88	62	93	65	98	70	105	74	112	80	120	86	130	92	138
3.8	58	88	62	92	65	98	69	104	74	110	79	118	84	127	91	137	97	146
4.0	62	92	65	97	69	103	73	109	77	116	83	124	89	133	96	144	102	153
4.2	65	97	68	102	72	108	76	115	81	122	87	130	93	140	101	151	107	161
4.4	68	102	71	107	75	113	80	120	85	128	91	137	98	147	106	158	112	169
4.6	71	106	75	112	79	118	84	125	89	134	95	143	102	153	110	166	117	176
4.8	74	111	78	117	82	123	87	131	93	139	99	149	107	160	115	173	123	184
5.0	77	115	81	122	86	129	91	136	97	145	103	155	111	167	120	180	128	191
5.2	80	120	84	126	89	134	95	142	101	151	108	161	116	173	125	187	133	199
5.4	83	125	88	131	93	139	98	147	105	157	112	168	120	180	130	194	138	207
5.6	86	129	91	136	96	144	102	153	108	163	116	174	124	187	134	202	143	214
5.8	89	134	94	141	99	149	105	158	112	168	120	180	129	193	139	209	148	222
6.0	92	138	97	146	103	154	109	164	116	174	124	186	133	200	144	216	153	230
6.2	95	143	101	151	106	159	113	169	120	180	128	192	138	207	149	223	158	237
6.4	98	148	104	156	110	165	116	175	124	186	132	199	142	213	154	230	163	245
6.6	101	152	107	161	113	170	120	180	128	192	136	205	146	220	158	237	168	253
6.8	105	157	110	165	117	175	124	185	132	197	141	211	151	227	163	245	174	260
7.0	108	162	114	170	120	180	127	191	135	203	145	217	155	233	168	252	179	268

e= **6.8%**

Exhibit 3-32

L_r=260 ft

Example 2 Solution

Having determined the Superelvation Runoff, L_r = 260 ft,
Calculate Tangent Runout, L_t

$$L_t = \frac{e_{NC}}{e_d} L_r = \frac{2.0}{6.8}(260) = 76.471 \sim 76\,ft$$

Therefore Superelevation Transition,

$T = L_r + L_t = 260 + 76 = \underline{336\ ft}$