Appendix 3

Geometric Characteristics

Table 1 Horizontal Alignment Analysis

Curve PI[1] (RP)	Curve Type	Curve Length (ft)	Radius (ft)	Deflection Angle[2]	Superelevation Rate[3] Existing / Required	Design/Posted Speed (mph)	Min. Sight Obstruction (ft)	Meet Min. Sight Distance (SSD) (730 ft)	Curve Type Correct[4]	Correct Spiral Curve Dimensions	Meet Min. Radius (1810 ft)	Required Superelevation Rate	Meet Min. Curve Length (1,050 ft)[5]	Curve Pass/Fail
1.1	Simple	867	2,865	17°20'00"	UNKNOWN / 7%	70 / 45	23.2	YES	NO	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
1.4	Simple	275	5,730	2°45'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	NO	**PASS**
3.2	Simple	3,084	7,640	23°08'00"	UNKNOWN / 3%	70 / 70	8.7	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
5.8	Simple	2,133	5,730	21°20'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
7.3	Simple	485	11,460	2°25'30"	UNKNOWN / 2%	60 / 70	5.8	YES	YES	N/A[8]	YES	UNKNOWN	NO	**PASS**
9.5	Simple	945	5,730	9°27'00"	UNKNOWN / 4%	60 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
10.3	Simple	1,013	11,460	5°04'00"	UNKNOWN / 2%	60 / 70	5.8	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
12.1	Simple	2,152	5,730	21°31'00"	UNKNOWN / 4%	60 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
13.5	Simple	2,097	5,730	20°58'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
15.1	Simple	1,142	5,730	11°25'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
17.4	Simple	321	5,730	3°12'30"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	NO	**PASS**
18.3	Simple	1,993	3,820	29°54'00"	UNKNOWN / 6%	70 / 70	17.4	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
20.0	Simple	1,544	5,741	15°24'47"	3 / 3%	62 / 70	8.0	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
20.8	Simple	2,143	5,741	21°23'14"	3 / 3%	62 / 70	8.0	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
22.5	Simple	1,913	13,451	8°08'48"	0 / 0%	62 / 70	3.4	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
23.2	Simple	2,075	4,593	25°52'52"	4 / 4%	62 / 70	10.0	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
23.8	Simple	2,215	13,451	9°26'00"	0 / 0%	62 / 70	3.4	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
24.4	Simple	481	11,893	2°19'08"	0 / 0%	62 / 70	0.0	YES	YES	N/A[8]	YES	YES	NO	**PASS**
24.5	Simple	551	11,893	2°39'11"	0 / 0%	62 / 70	3.9	YES	YES	N/A[8]	YES	YES	NO	**PASS**
24.8	Simple	1,758	4,101	24°33'20"	4 / 4%	62 / 70	11.2	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
25.8	Simple	1,604	5,741	28°46'32"	3 / 3%	62 / 70	8.0	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
27.1	Simple	3,424	6,562	29°53'54"	3 / 3%	62 / 70	7.0	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
27.7	Simple	1,821	13,451	7°45'25"	0 / 0%	62 / 70	3.4	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
31.5	Simple	500	18,753	1°31'41"	0 / 0%	70 / 70	3.6	YES	YES	N/A[8]	YES	YES	NO	**PASS**
31.7	Simple	500	18,753	1°31'41"	0 / 0%	70 / 55	3.6	YES	YES	N/A[8]	YES	YES	NO	**PASS**
32.1	Simple	2,275	4,298	30°20'00"	4 / 5%	70 / 55	15.5	YES	YES	N/A[8]	YES	NO	N/A[9]	**FAIL**
32.7	Simple	400	11,460	2°00'00"	2 / 2%	70 / 55	5.8	YES	YES	N/A[8]	YES	YES	NO	**PASS**
32.9	Simple	423	11,460	2°07'00"	2 / 2%	70 / 70	5.8	YES	YES	N/A[8]	YES	YES	NO	**PASS**
34.5	Simple	2,428	4,248	32°22'30"	5 / 5%	70 / 70	15.7	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
35.6	Simple	529	22,920	1°19'22"	0 / 0%	70 / 70	2.9	YES	YES	N/A[8]	YES	YES	NO	**PASS**
36.0	Simple	1,489	22,920	3°43'22"	0 / 0%	70 / 70	2.9	YES	YES	N/A[8]	YES	YES	YES	**PASS**
37.1	Simple	1,787	22,920	4°28'00"	0 / 0%	70 / 70	2.9	YES	YES	N/A[8]	YES	YES	YES	**PASS**
37.8	Simple	1,617	7,640	12°07'30"	3 / 3%	70 / 70	8.7	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
38.3	Simple	1,357	11,460	6°47'00"	2 / 2%	70 / 70	5.8	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
39.9	Spiral	1,000	3,820	18°00'00"	5 / 6%	70 / 70	17.4	YES	YES	YES	YES	NO	N/A[9]	**FAIL**
41.2	Spiral	1,529	2,865	34°34'00"	6 / 7%	70 / 70	23.2	YES	YES	NO	YES	NO	N/A[9]	**FAIL**
41.7	Simple	1,773	4,584	22°10'00"	4 / 5%	70 / 70	14.5	YES	YES	N/A[8]	YES	NO	N/A[9]	**FAIL**
42.4	Simple	250	11,460	1°15'00"	2 / 2%	70 / 70	5.8	YES	YES	N/A[8]	YES	YES	NO	**PASS**
43.8	Simple	433	11,460	2°10'00"	UNKNOWN / 2%	70 / 70	5.8	YES	YES	N/A[8]	YES	UNKNOWN	NO	**PASS**
44.4	Simple	715	5,730	7°09'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
47.2	Simple	848	5,730	8°29'00"	UNKNOWN / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**

Curve PI[1] (RP)	Curve Type	Curve Length (ft)	Radius (ft)	Deflection Angle[2]	Superelevation Rate[3] Existing / Required	Design/Posted Speed (mph)	Min. Sight Obstruction (ft)	Meet Min. Sight Distance (SSD) (730 ft)	Curve Type Correct[4]	Correct Spiral Curve Dimensions	Meet Min. Radius (1810 ft)	Required Superelevation Rate	Meet Min. Curve Length (1,050 ft)[5]	Curve Pass/Fail
48.0	Spiral	1,348	3,820	23°13'00"	UNKNOWN / 6%	70 / 70	17.4	YES	YES	YES	YES	UNKNOWN	N/A[9]	**PASS**
48.6	Simple	1,744	7,640	13°05'00"	UNKNOWN / 3%	70 / 70	8.7	YES	YES	N/A[8]	YES	UNKNOWN	N/A[9]	**PASS**
52.7	Simple	300	9,292	1°51'00"	0 / 3%	70 / 45	7.2	YES	YES	N/A[8]	YES	NO	NO	**FAIL**
52.7	Simple	300	7,813	2°12'00"	0 / 3%	70 / 45	8.5	YES	YES	N/A[8]	YES	NO	NO	**FAIL**
53.2	Simple	999	85,579	0°40'10"	0 / 0%	70 / 45	0.8	YES	YES	N/A[8]	YES	YES	NO	**PASS**
53.5	Simple	999	85,587	0°40'10"	0 / 0%	70 / 70	0.8	YES	YES	N/A[8]	YES	YES	NO	**PASS**
53.7	No H.C.[6]	N/A[7]	N/A[7]	0°1'00"	0 / 0%	70 / 70	N/A[7]	N/A[7]	NO	N/A[7]	N/A[7]	YES	YES	**PASS**
55.6	Simple	900	57,296	0°54'01"	0 / 0%	70 / 70	1.2	YES	YES	N/A[8]	YES	YES	NO	**PASS**
55.9	Simple	900	57,276	0°54'01"	0 / 0%	70 / 70	1.2	YES	YES	N/A[8]	YES	YES	NO	**PASS**
56.4	No H.C. [6]	N/A[7]	N/A[7]	0°6'30"	0 / 0%	70 / 70	N/A[7]	N/A[7]	NO	N/A[7]	N/A[7]	YES	YES	**PASS**
57.8	Simple	800	26,675	1°43'06"	0 / 0%	70 / 70	2.5	YES	YES	N/A[8]	YES	YES	NO	**PASS**
58.1	Simple	839	4,297	11°10'55"	5 / 5%	70 / 70	15.5	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
59.2	Simple	895	5,730	8°57'01"	4 / 4%	70 / 70	11.6	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
60.2	Simple	1,343	11,459	6°43'00"	2 / 2%	70 / 70	5.8	YES	YES	N/A[8]	YES	YES	N/A[9]	**PASS**
60.9	Spiral	592	1,910	25°15'00"	8 / 8%	70 / 70	34.8	YES	YES	YES	YES	YES	N/A[9]	**PASS**
61.6	Spiral	643	2,865	15°51'00"	5 / 7%	70 / 70	23.2	YES	YES	NO	YES	NO	N/A[9]	**FAIL**

Source: MDT, 2012; DOWL HKM, 2012; MDT Record Drawings; MDT Road Design Manual, pages 9.2(1), 9.2(7), 9.5(1), 12(7). All values are approximated based on available data. Red text indicates information considered in the Pass/Fail determination.

(1) PI indicates the point of tangent intersection, which is defined as the intersection of the initial and final tangents.

(2) Deflection angle indicates the average degree of curvature and is a measure of the sharpness of the curve. A larger deflection angle indicates a sharper curve.

(3) Superelevation rate was considered in the Pass/Fail determination where necessary data was available.

(4) Per MDT Road Design Manual page 9.2(1), it is MDT practice to use a spiral curve when the radius is less than 3,820 ft. Because curve type is not listed as a design requirement, curve type is not considered in the Pass/Fail determination.

(5) Per MDT Road Design Manual page 9.2(7), it is MDT practice to specify a minimum curve length of 1,050 ft. for a design speed of 70 mph. Because curve length is not listed as a design requirement, curve length is not considered in the Pass/Fail determination.

(6) No H.C. = no horizontal curve. Per MDT Road Design Manual page 9.2(6), horizontal deflections 1-degree or less do not require a curve.

(7) No horizontal curve was constructed at the horizontal deflection.

(8) Horizontal curve is a simple type curve.

(9) Minimum curve length only applies to deflections less than 5-degrees.

Table 2 Vertical Alignment Analysis

Curve PVI[1] (RP)	Curve Type[2]	Curve Length (ft)	K Value[3] 247 (crest) 181 (sag)	Grade Back	Grade Ahead	Design / Posted Speed (mph)	Meet Min. K Value	Meet Max. Grade (3% - Level, 4% Rolling Terrain)	Meet Min. Grade (0.5%)	Meet Min. Curve Length[4] (210 ft required / 1,000 ft recommended)	Curve/Tangent Pass/Fail
1.0	SAG	400	1,231	-0.373%	-0.048%	70 / 45	YES	YES	NO	YES	**PASS**
1.4	CREST	1,000	532	-0.048%	-1.926%	70 / 70	YES	YES	NO	YES	**PASS**
1.7	SAG	1,000	571	-1.926%	-0.176%	70 / 70	YES	YES	NO	YES	**PASS**
2.3	SAG	1,000	419	-0.176%	2.212%	70 / 70	YES	YES	NO	YES	**PASS**
2.7	CREST	1,400	350	2.212%	-1.793%	70 / 70	YES	YES	YES	YES	**PASS**
3.0	SAG	800	332	-1.793%	0.618%	70 / 70	YES	YES	YES	YES	**PASS**
3.4	CREST	800	948	0.618%	-0.226%	70 / 70	YES	YES	NO	YES	**PASS**
3.9	SAG	800	230	-0.226%	3.252%	70 / 70	YES	NO	NO	YES	**FAIL**
4.0	CREST	850	253	3.252%	-0.112%	70 / 70	YES	NO	NO	YES	**FAIL**
4.9	SAG	1,000	336	-0.112%	2.866%	70 / 70	YES	YES	NO	YES	**PASS**
5.2	CREST	1,200	404	2.866%	-0.105%	70 / 70	YES	YES	NO	YES	**PASS**
5.6	SAG	1,000	614	-0.105%	1.523%	70 / 70	YES	YES	NO	YES	**PASS**
5.8	CREST	1,000	290	1.523%	-1.920%	70 / 70	YES	YES	YES	YES	**PASS**
5.9	SAG	800	870	-1.920%	-1.000%	70 / 70	YES	YES	YES	YES	**PASS**
6.2	SAG	600	1,054	-1.000%	-0.431%	60 / 70	YES	YES	NO	YES	**PASS**
6.4	CREST	800	1,191	-0.431%	-1.103%	60 / 70	YES	YES	NO	YES	**PASS**
6.9	SAG	600	625	-1.103%	-0.143%	60 / 70	YES	YES	NO	YES	**PASS**
7.2	CREST	1,600	2,614	-0.143%	-0.755%	60 / 70	YES	YES	NO	YES	**PASS**
7.5	SAG	800	1,822	-0.755%	-0.316%	60 / 70	YES	YES	NO	YES	**PASS**
8.1	SAG	800	687	-0.316%	0.849%	60 / 70	YES	YES	NO	YES	**PASS**
8.6	CREST	1,200	2,963	0.849%	0.444%	60 / 70	YES	YES	NO	YES	**PASS**
8.9	CREST	800	12,698	0.444%	0.381%	60 / 70	YES	YES	NO	YES	**PASS**
9.7	CREST	2,600	821	0.381%	-2.784%	60 / 70	YES	YES	NO	YES	**PASS**
10.1	SAG	1,200	286	-2.784%	1.405%	60 / 70	YES	YES	YES	YES	**PASS**
10.5	CREST	2,000	1,340	1.405%	-0.088%	60 / 70	YES	YES	NO	YES	**PASS**
11.4	CREST	2,600	1,444	-0.088%	-1.889%	60 / 70	YES	YES	NO	YES	**PASS**
11.8	SAG	800	389	-1.889%	0.167%	60 / 70	YES	YES	NO	YES	**PASS**
12.2	No V.C.[5]	N/A[5]	N/A[5]	0.167%	0.066%	60 / 70	N/A[5]	YES	N/A[5]	NO	**PASS**
12.5	SAG	800	318	0.066%	2.583%	60 / 70	YES	YES	NO	YES	**PASS**
12.8	CREST	1,800	1,137	2.583%	1.000%	60 / 70	YES	YES	YES	YES	**PASS**
13.1	CREST	1,800	707	1.000%	-1.545%	70 / 70	YES	YES	YES	YES	**PASS**
13.8	SAG	1,000	290	-1.545%	1.905%	70 / 70	YES	YES	YES	YES	**PASS**
14.4	CREST	1,600	1,113	1.905%	0.468%	70 / 70	YES	YES	NO	YES	**PASS**
15.0	CREST	2,300	421	0.468%	-5.000%	70 / 70	YES	NO	NO	YES	**FAIL**
15.3	SAG	800	164	-5.000%	-0.110%	70 / 70	NO	NO	NO	YES	**FAIL**
15.6	SAG	800	155	-0.110%	5.049%	70 / 70	NO	NO	NO	YES	**FAIL**
16.1	CREST	2,500	355	5.049%	-1.988%	70 / 70	YES	NO	YES	YES	**FAIL**
16.7	SAG	1,000	236	-1.988%	2.250%	70 / 70	YES	YES	YES	YES	**PASS**
17.0	CREST	1,900	380	2.250%	-2.750%	70 / 70	YES	YES	YES	YES	**PASS**
17.4	SAG	1,600	1,302	-2.750%	-1.521%	70 / 70	YES	YES	YES	YES	**PASS**
17.6	CREST	800	1,457	-1.521%	-2.070%	70 / 70	YES	YES	YES	YES	**PASS**

Curve PVI[1] (RP)	Curve Type[2]	Curve Length (ft)	K Value[3] 247 (crest) 181 (sag)	Grade Back	Grade Ahead	Design / Posted Speed (mph)	Meet Min. K Value	Meet Max. Grade (3% - Level, 4% Rolling Terrain)	Meet Min. Grade (0.5%)	Meet Min. Curve Length[4] (210 ft required / 1,000 ft recommended)	Curve/Tangent Pass/Fail
18.0	SAG	900	521	-2.070%	-0.343%	70 / 70	YES	YES	NO	YES	**PASS**
18.2	SAG	200	798	-0.343%	-0.093%	70 / 70	YES	YES	NO	NO	**PASS**
18.3	CREST	500	456	-0.093%	-1.190%	70 / 70	YES	YES	NO	YES	**PASS**
18.4	SAG	500	442	-1.190%	-0.060%	70 / 70	YES	YES	NO	YES	**PASS**
18.7	CREST	700	337	-0.060%	-2.140%	70 / 70	YES	YES	NO	YES	**PASS**
19.1	CREST	300	231	-0.203%	-1.500%	62 / 70	YES	YES	NO	YES	**PASS**
18.9	SAG	300	115	-1.500%	1.106%	62 / 70	YES	YES	YES	YES	**PASS**
19.2	CREST	300	358	1.106%	0.267%	62 / 70	YES	YES	NO	YES	**PASS**
19.4	SAG	300	112	0.267%	2.953%	62 / 70	YES	YES	NO	YES	**PASS**
19.6	CREST	300	111	2.953%	0.248%	62 / 70	YES	YES	NO	YES	**PASS**
20.5	CREST	600	942	0.248%	-0.389%	62 / 70	YES	YES	NO	YES	**PASS**
21.4	CREST	400	1,342	-0.389%	-0.687%	62 / 70	YES	YES	NO	YES	**PASS**
21.9	SAG	400	823	-0.687%	-0.201%	62 / 70	YES	YES	NO	YES	**PASS**
23.0	SAG	300	743	-0.201%	0.203%	62 / 70	YES	YES	NO	YES	**PASS**
23.4	SAG	300	248	0.203%	1.411%	62 / 70	YES	YES	NO	YES	**PASS**
23.9	CREST	600	2,083	1.411%	1.123%	62 / 70	YES	YES	YES	YES	**PASS**
24.6	CREST	200	656	-1.237%	-1.542%	62 / 70	YES	YES	YES	YES	**PASS**
24.7	CREST	200	173	-1.542%	-2.696%	62 / 70	YES	YES	YES	YES	**PASS**
25.0	SAG	500	114	-2.696%	1.681%	62 / 70	YES	YES	YES	YES	**PASS**
25.4	SAG	300	160	1.681%	3.554%	62 / 70	YES	YES	YES	YES	**PASS**
25.8	CREST	700	209	3.554%	0.204%	62 / 70	YES	YES	NO	YES	**PASS**
26.4	CREST	700	209	0.204%	-3.148%	62 / 70	YES	YES	NO	YES	**PASS**
27.1	SAG	600	92	-3.148%	3.350%	62 / 70	YES	YES	YES	YES	**PASS**
27.9	CREST	800	141	3.350%	-2.332%	62 / 70	YES	YES	YES	YES	**PASS**
28.4	SAG	300	227	-2.332%	-1.008%	62 / 70	YES	YES	YES	YES	**PASS**
28.7	CREST	200	329	-1.008%	-1.615%	62 / 70	YES	YES	YES	YES	**PASS**
31.8	CREST	400	322	-0.258%	-1.500%	70 / 55	YES	YES	NO	YES	**PASS**
31.9	SAG	400	229	-1.500%	0.250%	70 / 55	YES	YES	NO	YES	**PASS**
32.1	CREST	300	164	0.250%	-1.580%	70 / 70	NO	YES	NO	YES	**FAIL**
32.3	SAG	600	405	-1.580%	-0.100%	70 / 70	YES	YES	NO	YES	**PASS**
32.5	SAG	600	297	-0.100%	1.918%	70 / 70	YES	YES	NO	YES	**PASS**
32.6	CREST	340	226	1.918%	0.410%	70 / 70	NO	YES	NO	YES	**FAIL**
32.9	CREST	1,200	453	2.556%	-0.092%	70 / 70	YES	YES	NO	YES	**PASS**
34.3	SAG	1,200	3,625	-0.081%	0.250%	70 / 70	YES	YES	NO	YES	**PASS**
34.8	CREST	1,200	2,226	0.250%	-0.289%	70 / 70	YES	YES	NO	YES	**PASS**
35.3	SAG	1,200	8,511	-0.284%	-0.143%	70 / 70	YES	YES	NO	YES	**PASS**
35.8	SAG	1,200	1,171	-0.143%	0.882%	70 / 70	YES	YES	NO	YES	**PASS**
36.1	CREST	1,800	812	0.882%	-1.336%	70 / 70	YES	YES	YES	YES	**PASS**
36.4	SAG	1,200	836	-1.336%	0.100%	70 / 70	YES	YES	NO	YES	**PASS**
37.0	CREST	1,200	2,709	0.100%	-0.343%	70 / 70	YES	YES	NO	YES	**PASS**
37.7	CREST	1,200	1,400	-0.343%	-1.200%	70 / 70	YES	YES	NO	YES	**PASS**
37.9	SAG	1,200	922	-1.200%	0.102%	70 / 70	YES	YES	NO	YES	**PASS**
39.0	SAG	1,200	3,488	0.102%	0.446%	70 / 70	YES	YES	NO	YES	**PASS**
39.2	CREST	1,200	1,788	0.446%	-0.225%	70 / 70	YES	YES	NO	YES	**PASS**
39.6	CREST	1,200	897	-0.225%	-1.563%	70 / 70	YES	YES	NO	YES	**PASS**

Curve PVI[1] (RP)	Curve Type[2]	Curve Length (ft)	K Value[3] 247 (crest) 181 (sag)	Grade Back	Grade Ahead	Design / Posted Speed (mph)	Meet Min. K Value	Meet Max. Grade (3% - Level, 4% Rolling Terrain)	Meet Min. Grade (0.5%)	Meet Min. Curve Length[4] (210 ft required / 1,000 ft recommended)	Curve/Tangent Pass/Fail
39.9	SAG	1,200	914	-1.563%	-0.250%	70 / 70	YES	YES	NO	YES	**PASS**
40.4	SAG	1,200	3,133	-0.250%	0.133%	70 / 70	YES	YES	NO	YES	**PASS**
40.9	SAG	1,200	5,581	0.133%	0.348%	70 / 70	YES	YES	NO	YES	**PASS**
41.4	SAG	1,200	1,128	0.348%	1.412%	70 / 70	YES	YES	NO	YES	**PASS**
41.7	CREST	1,200	732	1.412%	-0.227%	70 / 70	YES	YES	NO	YES	**PASS**
41.9	CREST	1,200	20,339	-0.227%	-0.286%	70 / 70	YES	YES	NO	YES	**PASS**
42.1	SAG	400	1,778	-0.286%	-0.061%	70 / 70	YES	YES	NO	YES	**PASS**
42.7	No V.C.[5]	N/A[5]	N/A[5]	-0.061%	-0.200%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
42.9	No V.C.[5]	N/A[5]	N/A[5]	-0.200%	-0.142%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
43.5	CREST	1,600	726	-0.142%	-2.346%	70 / 70	YES	YES	NO	YES	**PASS**
43.7	SAG	800	354	-2.346%	-0.083%	70 / 70	YES	YES	NO	YES	**PASS**
44.0	No V.C.[5]	N/A[5]	N/A[5]	-0.083%	-0.091%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
44.2	No V.C.[5]	N/A[5]	N/A[5]	-0.091%	0.083%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
44.5	No V.C.[5]	N/A[5]	N/A[5]	0.083%	-0.100%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
44.9	No V.C.[5]	N/A[5]	N/A[5]	-0.100%	0.086%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
45.0	CREST	400	1,347	0.086%	-0.211%	70 / 70	YES	YES	NO	YES	**PASS**
45.2	SAG	400	1,190	-0.211%	0.125%	70 / 70	YES	YES	NO	YES	**PASS**
45.3	No V.C.[5]	N/A[5]	N/A[5]	0.125%	-0.054%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
45.8	No V.C.[5]	N/A[5]	N/A[5]	-0.054%	-0.061%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
46.2	No V.C.[5]	N/A[5]	N/A[5]	-0.061%	0.146%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
46.5	No V.C.[5]	N/A[5]	N/A[5]	0.146%	0.083%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
46.7	No V.C.[5]	N/A[5]	N/A[5]	0.083%	-0.136%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
46.9	No V.C.[5]	N/A[5]	N/A[5]	-0.136%	-0.067%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
47.2	No V.C.[5]	N/A[5]	N/A[5]	-0.067%	-0.154%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
47.5	No V.C.[5]	N/A[5]	N/A[5]	-0.154%	0.047%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
47.7	No V.C.[5]	N/A[5]	N/A[5]	0.047%	-0.068%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
47.9	SAG	800	339	-0.068%	2.295%	70 / 70	YES	YES	NO	YES	**PASS**
48.1	CREST	1,200	507	2.295%	-0.073%	70 / 70	YES	YES	NO	YES	**PASS**
48.3	No V.C.[5]	N/A[5]	N/A[5]	-0.073%	-0.190%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
48.5	No V.C.[5]	N/A[5]	N/A[5]	-0.190%	0.090%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
48.7	CREST	400	1,208	0.090%	-0.241%	70 / 70	YES	YES	NO	YES	**PASS**
48.9	No V.C.[5]	N/A[5]	N/A[5]	-0.241%	-0.047%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
49.2	No V.C.[5]	N/A[5]	N/A[5]	-0.047%	-0.062%	70 / 70	N/A[5]	YES	NO	N/A[5]	**PASS**
49.7	CREST	800	1,322	-0.062%	-0.667%	70 / 70	YES	YES	NO	YES	**PASS**
49.8	SAG	500	609	-0.667%	0.154%	70 / 45	YES	YES	NO	YES	**PASS**
50.0	No V.C.[5]	N/A[5]	N/A[5]	0.154%	0.100%	70 / 45	N/A[5]	YES	NO	N/A[5]	**PASS**
50.3	No V.C.[5]	N/A[5]	N/A[5]	0.100%	0.250%	70 / 45	N/A[5]	YES	NO	N/A[5]	**PASS**
52.6	CREST	200	339	0.250%	-0.340%	70 / 45	YES	YES	NO	NO	**PASS**
52.9	SAG	200	313	-0.340%	0.300%	70 / 45	YES	YES	NO	NO	**PASS**
52.9	CREST	200	294	0.300%	-0.380%	70 / 45	YES	YES	NO	NO	**PASS**
53.0	SAG	200	345	-0.380%	0.200%	70 / 45	YES	YES	NO	NO	**PASS**
53.1	CREST	200	370	0.200%	-0.340%	70 / 45	YES	YES	NO	NO	**PASS**
53.2	SAG	200	286	-0.340%	0.360%	70 / 45	YES	YES	NO	NO	**PASS**
53.3	CREST	200	357	0.360%	-0.200%	70 / 45	YES	YES	NO	NO	**PASS**
53.8	SAG	1,000	2,500	-0.200%	0.200%	70 / 70	YES	YES	NO	YES	**PASS**

Curve PVI[1] (RP)	Curve Type[2]	Curve Length (ft)	K Value[3] 247 (crest) 181 (sag)	Grade Back	Grade Ahead	Design / Posted Speed (mph)	Meet Min. K Value	Meet Max. Grade (3% - Level, 4% Rolling Terrain)	Meet Min. Grade (0.5%)	Meet Min. Curve Length[4] (210 ft required / 1,000 ft recommended)	Curve/Tangent Pass/Fail
54.0	CREST	1,000	2,500	0.200%	-0.200%	70 / 70	YES	YES	NO	YES	**PASS**
56.2	SAG	1,000	3,125	-0.200%	0.120%	70 / 70	YES	YES	NO	YES	**PASS**
55.0	CREST	1,000	4,000	0.120%	-0.130%	70 / 70	YES	YES	NO	YES	**PASS**
55.9	SAG	1,000	4,348	-0.130%	0.100%	70 / 70	YES	YES	NO	YES	**PASS**
56.3	CREST	1,000	5,000	0.100%	-0.100%	70 / 70	YES	YES	NO	YES	**PASS**
56.9	SAG	1,000	3,125	-0.100%	0.220%	70 / 70	YES	YES	NO	YES	**PASS**
57.6	SAG	1,000	1,639	0.220%	0.830%	70 / 70	YES	YES	NO	YES	**PASS**
58.1	CREST	2,000	1,189	0.830%	-0.852%	70 / 70	YES	YES	YES	YES	**PASS**
58.7	SAG	1,000	774	-0.852%	0.440%	70 / 70	YES	YES	NO	YES	**PASS**
59.1	CREST	2,000	1,449	0.440%	-0.940%	70 / 70	YES	YES	NO	YES	**PASS**
59.5	SAG	2,000	1,754	-0.940%	0.200%	70 / 70	YES	YES	NO	YES	**PASS**
60.4	SAG	1,000	2,439	0.200%	0.610%	70 / 70	YES	YES	NO	YES	**PASS**
61.0	CREST	2,000	1,357	0.610%	-0.864%	70 / 70	YES	YES	YES	YES	**PASS**
61.7	SAG	2,000	1,880	-0.864%	0.200%	70 / 70	YES	YES	NO	YES	**PASS**
62.1	SAG	500	1,064	0.200%	0.670%	70 / 70	YES	YES	NO	YES	**PASS**
62.4	CREST	1,000	719	0.670%	-0.720%	70 / 70	YES	YES	YES	YES	**PASS**

Source: MDT, 2012; DOWL HKM, 2012; MDT Record Drawings; MDT Road Design Manual, pages 10.5(1), 10.5(3), 10.5 (5), 10.5(7), 12(7). All values are approximated based on available data. Red text indicates information considered in the Pass/Fail determination.

(1) PVI indicates the point of vertical intersection, which is defined as the intersection of the initial and final grades.

(2) Sag curves have a positive grade change (as in a valley); crest curves have a negative grade change (as on a hill).

(3) K value is the horizontal distance needed to produce a one percent change in gradient.

(4) See MDT Road Design Manual pages 10.5(3) and 10.5(7).

(5) No vertical curve was installed at the PVI (vertical grade only).