



VOLUME 6 - APPENDIX  
SECTION 6.4 – Railway geometry



Consultant Reference: LGA-1-GN-F-FRN-RT-0006\_00\_Appendix6.4  
2023-03-10



Stantec ■ DESFOR ■ SYSTRA

with subconsultant





# ENGINEERING CONSULTING SERVICES VOLUME 6 - APPENDIX SECTION 6.4 – RAILWAY GEOMETRY Feasibility Study Final Report Phase I



Consultant Reference: LGA-1-GN-F-FRN-RT-0006\_00\_LGA Final Technical Report  
2023-03-10



**Stantec** ■ **DESFOR** ■ **SYSTRA**

*with subconsultant*

**KPMG**



## Alignment Geometry (BDHR and GC)

Potential Billy Diamond Highway Railway alignment  
Horizontal Geometry

Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
1	1+425.89	787.14	2+213.02	1425.89	500	85	100	71	120
2	2+375.75	852.61	3+228.36	162.73	500	85	100	71	120
3	5+943.12	554.06	6+497.18	2714.76	1750	100	35	32	86
4	8+319.21	1155.02	9+474.23	1822.03	1750	100	35	32	86
5	10+265.35	2208.51	12+473.86	791.11	1750	100	35	32	86
6	13+492.34	1146.43	14+638.77	1018.48	1150	100	50	53	80
7	18+095.89	770.85	18+866.73	3457.12	1750	100	35	32	55
8	18+947.41	596.77	19+544.17	80.67	1150	100	50	53	95
9	19+751.03	506.53	20+257.56	206.86	1150	100	50	53	80
10	21+064.72	490.31	21+555.03	807.15	3000	100	20	19	40
11	22+936.63	1577.58	24+514.21	1381.6	3000	100	20	19	40
12	25+451.83	998.55	26+450.38	937.62	1300	100	45	46	65
13	26+573.89	910.66	27+484.55	123.51	1300	100	45	46	65
14	28+788.81	2852.31	31+641.12	1304.26	3500	100	20	14	50
15	31+720.33	856.01	32+576.34	79.21	700	100	95	74	120
16	34+148.66	1886.73	36+035.39	1572.33	1750	100	35	32	55
17	42+801.06	993.7	43+794.76	6765.67	1750	100	35	32	60
18	44+163.39	1173.27	45+336.66	368.63	1400	100	40	44	65
19	47+105.22	679.33	47+784.56	1768.57	700	100	95	74	120
20	56+109.78	1040.69	57+150.47	8325.23	1750	100	35	32	60
21	58+591.41	240.11	58+831.52	1440.94	3000	100	20	19	40
22	60+434.88	313.45	60+748.33	1603.36	1750	100	35	32	55
23	67+377.97	916.23	68+294.20	6629.64	3000	100	20	19	30
24	74+548.88	457.06	75+005.94	6254.68	3000	100	20	19	30
25	76+580.59	1997.62	78+578.21	1574.65	1150	100	50	53	80
26	79+276.00	970.7	80+246.70	697.79	1150	100	50	53	80
27	80+754.89	2319.55	83+074.44	508.19	1150	100	50	53	135
28	83+705.96	1830.88	85+536.84	631.52	1150	100	50	53	135
29	85+811.39	1253.55	87+064.95	274.55	1150	100	50	53	135
30	87+296.54	1163.7	88+460.24	231.6	1150	100	50	53	135
31	88+987.53	582.73	89+570.26	527.29	6000	100	10	10	30
32	90+312.02	653.13	90+965.15	741.76	1750	100	35	32	86
33	91+569.43	407.84	91+977.27	604.28	1750	100	35	32	86
34	95+130.61	657.8	95+788.41	3153.35	1750	100	35	32	86
35	96+378.04	1122.09	97+500.13	589.63	1750	100	35	32	86
36	97+855.99	1071.57	98+927.56	355.85	1750	100	35	32	86
37	100+728.15	521.81	101+249.96	1800.59	1750	100	35	32	86
38	101+805.25	843.4	102+648.65	555.29	1750	100	35	32	86
39	102+934.59	332.5	103+267.08	285.93	1750	100	35	32	86
40	104+102.39	432.9	104+535.29	835.3	1750	100	35	32	55

41	106+759.03	992.71	107+751.75	2223.74	3000	100	20	19	40
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Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
42	110+317.52	225.38	110+542.89	2565.77	3000	100	20	19	40
43	115+613.37	1208.53	116+821.90	5070.48	1750	100	35	32	86
44	116+866.32	774.82	117+641.14	44.42	1150	100	50	53	135
45	117+763.67	837.61	118+601.28	122.52	1150	100	50	53	135
46	119+933.01	337.92	120+270.93	1331.73	1750	100	35	32	55
47	121+840.79	382.87	122+223.66	1569.86	3000	100	20	19	30
48	131+569.09	694.23	132+263.31	9345.43	1750	100	35	32	55
49	134+425.41	655.53	135+080.94	2162.1	1750	100	35	32	86
50	137+284.61	698.82	137+983.43	2203.67	6000	100	10	10	30
51	140+773.28	1374.56	142+147.83	2789.85	1150	100	50	53	135
52	142+469.05	603.01	143+072.07	321.22	3000	100	20	19	50
53	144+008.78	513.87	144+522.65	936.71	1750	100	35	32	86
54	144+628.62	568.03	145+196.64	105.97	1150	100	50	53	135
55	145+380.26	852.95	146+233.21	183.61	700	100	95	74	120
56	147+018.83	1032.2	148+051.02	785.62	500	85	100	71	120
57	148+364.40	873.13	149+237.53	313.37	1000	100	60	58	95
58	149+713.51	1519.6	151+233.11	475.97	1750	100	35	32	86
59	152+236.64	563.2	152+799.83	1003.53	700	100	95	74	120
60	153+414.81	465.19	153+880.00	614.98	1150	100	50	53	80
61	155+529.27	495.13	156+024.40	1649.27	700	100	95	74	120
62	156+940.58	901.57	157+842.15	916.18	500	85	100	71	120
63	158+026.19	477.62	158+503.81	184.04	700	100	95	74	120
64	158+968.94	694.85	159+663.79	465.13	700	100	95	74	120
65	161+740.93	769.09	162+510.02	2077.14	1150	100	50	53	135
66	162+847.34	520.48	163+367.82	337.32	700	100	95	74	120
67	163+833.42	530.48	164+363.90	465.61	1750	100	35	32	86
68	164+643.74	471.41	165+115.15	279.84	1750	100	35	32	86
69	166+021.25	774.86	166+796.11	906.1	1750	100	35	32	55
70	167+043.51	545.55	167+589.06	247.4	700	100	95	74	120
71	167+791.25	1143.73	168+934.98	202.19	700	100	95	74	120
72	170+694.55	663.43	171+357.98	1759.57	700	100	95	74	120
73	171+507.86	763.49	172+271.35	149.88	700	100	95	74	120
74	172+345.35	764.71	173+110.06	74	700	100	95	74	120
75	173+176.05	430.78	173+606.83	66	700	100	95	74	120
76	174+573.63	485.41	175+059.04	966.81	1150	100	50	53	80
77	176+077.27	472.15	176+549.42	1018.23	1750	100	35	32	55
78	176+964.36	1179.72	178+144.07	414.94	1150	100	50	53	80
79	178+410.72	545.73	178+956.46	266.65	700	100	95	74	120
80	179+796.76	871.07	180+667.83	840.3	700	100	95	74	120
81	180+736.47	327.02	181+063.49	68.64	700	100	95	74	120
82	181+544.93	340.9	181+885.83	481.45	1150	100	50	53	80
83	182+105.76	602.53	182+708.29	219.93	700	100	95	74	120
84	184+192.21	286.69	184+478.90	1483.93	1150	100	50	53	80
85	184+896.30	604.97	185+501.27	417.4	700	100	95	74	120
86	185+638.09	1525.82	187+163.91	136.82	1150	100	50	53	80

87	188+147.72	623	188+770.73	983.81	1150	100	50	53	80
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Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
88	189+133.91	336.49	189+470.40	363.19	700	100	95	74	120
89	190+560.07	1085.63	191+645.70	1089.67	700	100	95	74	120
90	191+957.57	669.95	192+627.52	311.86	1150	100	50	53	80
91	192+982.36	349.7	193+332.06	354.83	1150	100	50	53	80
92	193+561.27	639.9	194+201.17	229.21	700	100	95	74	120
93	194+699.73	542.47	195+242.20	498.56	1750	100	35	32	86
94	195+793.63	780.57	196+574.20	551.42	3500	100	20	14	45
95	196+798.58	735.71	197+534.29	224.38	1750	100	35	32	86
96	197+724.92	706.18	198+431.10	190.63	1150	100	50	53	135
97	198+655.57	480.41	199+135.99	224.48	1750	100	35	32	86
98	200+056.94	285.99	200+342.93	920.95	3500	100	20	14	50
99	201+958.52	1463.59	203+422.11	1615.59	1500	100	40	39	95
100	203+790.88	812.64	204+603.52	368.77	700	100	95	74	120
101	206+056.23	801.29	206+857.52	1452.71	700	100	95	74	120
102	207+450.84	630.19	208+081.03	593.32	1200	100	50	48	80
103	211+005.06	481.37	211+486.44	2924.03	700	100	95	74	120
104	212+160.21	646.49	212+806.69	673.77	500	85	100	71	120
105	213+276.43	536.43	213+812.86	469.74	700	100	95	74	120
106	214+242.41	1047.13	215+289.54	429.55	1750	100	35	32	86
107	216+797.90	584.81	217+382.71	1508.36	1750	100	35	32	86
108	218+040.31	686.09	218+726.40	657.6	700	100	95	74	120
109	218+885.64	707.85	219+593.49	159.24	1150	100	50	53	80
110	220+128.27	1040.32	221+168.59	534.78	1150	100	50	53	80
111	223+929.33	1468.89	225+398.22	2760.74	1750	100	35	32	55
112	225+908.79	1330.15	227+238.94	510.57	1150	100	50	53	135
113	228+365.50	845.72	229+211.22	1126.55	1750	100	35	32	86
114	229+834.23	762.38	230+596.60	623.01	1150	100	50	53	135
115	231+125.28	811.33	231+936.61	528.67	1150	100	50	53	135
116	<del>234+982.36</del>	783.45	235+765.81	3045.75	1150	100	50	53	135
117	239+137.71	843.11	239+980.82	3371.9	1750	100	35	32	86
118	243+018.50	247.41	243+265.91	3037.68	3000	100	20	19	50
119	244+644.48	7061.31	251+705.80	1378.57	3900	100	15	15	50



Potential Billy Diamond Highway Railway alignment  
Vertical Geometry

PVI Station	Slope In	Slope Out	$\Delta$	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
0+000.00		0.00%	0.00%					
1+046.95	0.00%	-1.36%	1.36%	Crest	100	65	150	972.0
2+918.34	-1.36%	0.25%	-1.61%	Sag	100	65	200	1696.4
4+200.00	0.25%	1.42%	-1.17%	Sag	100	65	130	1116.7
5+042.66	1.42%	-0.01%	1.43%	Crest	100	65	155	700.2
5+736.21	-0.01%	-1.46%	1.45%	Crest	100	65	160	536.1
7+015.83	-1.46%	1.19%	-2.65%	Sag	100	65	285	1057.1
7+804.70	1.19%	1.46%	-0.27%	Sag	100	65	60	616.4
8+504.37	1.46%	0.56%	0.90%	Crest	100	65	100	619.7
9+171.28	0.56%	-0.73%	1.29%	Crest	100	65	140	546.9
9+900.00	-0.73%	-0.49%	-0.24%	Sag	100	65	60	628.7
11+400.00	-0.49%	0.52%	-1.01%	Sag	100	65	110	1415.0
12+189.30	0.52%	-0.61%	1.13%	Crest	100	65	125	671.8
13+230.13	-0.61%	-0.03%	-0.58%	Sag	100	65	65	945.8
13+830.13	-0.03%	1.24%	-1.27%	Sag	100	65	140	497.5
16+214.48	1.24%	-1.42%	2.66%	Crest	100	65	285	2171.9
17+250.39	-1.42%	0.99%	-2.40%	Sag	100	65	260	763.4
18+408.20	0.99%	-0.97%	1.96%	Crest	100	65	210	922.8
19+121.60	-0.97%	0.44%	-1.41%	Sag	100	65	155	530.9
20+726.06	0.44%	-0.63%	1.07%	Crest	100	65	115	1469.5
22+089.30	-0.63%	1.13%	-1.76%	Sag	100	65	205	1203.2
22+840.83	1.13%	0.17%	0.95%	Crest	100	65	105	596.5
24+044.55	0.17%	-0.36%	0.54%	Crest	100	65	60	1121.2
24+879.37	-0.36%	-0.84%	0.48%	Crest	100	65	105	752.3
25+751.50	-0.84%	0.78%	-1.62%	Sag	100	65	180	729.6
26+730.67	0.78%	-0.85%	1.64%	Crest	100	65	175	801.7
27+683.82	-0.85%	0.29%	-1.15%	Sag	100	65	125	803.2
28+431.46	0.29%	0.16%	0.14%	Crest	100	65	60	655.1
29+257.41	0.16%	0.58%	-0.42%	Sag	100	65	60	766.0
30+012.14	0.58%	-1.29%	1.87%	Crest	100	65	200	624.7
30+693.49	-1.29%	-1.22%	-0.07%	Sag	100	65	60	551.4
31+449.71	-1.22%	0.98%	-2.20%	Sag	100	65	240	606.2
32+349.05	0.98%	-0.15%	1.13%	Crest	100	65	125	716.8
32+977.18	-0.15%	-1.21%	1.06%	Crest	100	65	115	508.1
34+425.51	-1.21%	0.28%	-1.49%	Sag	100	65	160	1310.8
37+675.62	0.28%	1.33%	-1.05%	Sag	100	65	115	3112.6
39+175.79	1.33%	-1.47%	2.79%	Crest	100	65	300	1292.7
41+112.10	-1.47%	-0.18%	-1.28%	Sag	100	65	140	1716.3
42+141.70	-0.18%	0.23%	-0.42%	Sag	100	65	60	929.6
44+766.48	0.23%	0.89%	-0.65%	Sag	100	65	70	2559.8

46+549.34	0.89%	-1.40%	2.29%	Crest	100	65	250	1622.9
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PVI Station	Slope In	Slope Out	Δ	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
48+314.95	-1.40%	1.37%	-2.77%	Sag	100	65	305	1488.1
49+555.94	1.37%	0.22%	1.16%	Crest	100	65	125	1026.0
50+881.96	0.22%	0.85%	-0.63%	Sag	100	65	70	1228.5
52+029.86	0.85%	0.41%	0.44%	Crest	100	65	60	1082.9
55+138.45	0.41%	-0.80%	1.21%	Crest	100	65	130	3013.6
56+539.18	-0.80%	0.99%	-1.79%	Sag	100	65	195	1238.2
57+352.64	0.99%	-1.50%	2.49%	Crest	100	65	270	581.0
58+173.78	-1.50%	-0.56%	-0.94%	Sag	100	65	105	633.6
59+270.50	-0.56%	0.71%	-1.27%	Sag	100	65	140	974.2
60+042.49	0.71%	-0.13%	0.84%	Crest	100	65	95	654.5
62+596.19	-0.13%	-1.05%	0.92%	Crest	100	65	100	2456.2
63+396.19	-1.05%	-0.05%	-1.00%	Sag	100	65	110	695.0
64+519.79	-0.05%	0.62%	-0.66%	Sag	100	65	75	1031.1
66+662.64	0.62%	-0.87%	1.49%	Crest	100	65	160	2025.4
68+004.74	-0.87%	-0.21%	-0.66%	Sag	100	65	75	1224.6
69+666.30	-0.21%	0.56%	-0.77%	Sag	100	65	85	1581.6
72+997.59	0.56%	-0.39%	0.94%	Crest	100	65	105	3236.3
75+158.18	-0.39%	1.28%	-1.66%	Sag	100	65	180	2018.1
76+892.60	1.28%	-0.05%	1.33%	Crest	100	65	145	1571.9
78+343.52	-0.05%	-1.44%	1.39%	Crest	100	65	150	1303.4
81+509.56	-1.44%	0.58%	-2.02%	Sag	100	65	220	2981.0
82+908.49	0.58%	0.18%	0.40%	Crest	100	65	60	1258.9
83+928.69	0.18%	0.84%	-0.66%	Sag	100	65	75	952.7
84+772.11	0.84%	0.34%	0.50%	Crest	100	65	60	775.9
86+170.31	0.34%	1.44%	-1.10%	Sag	100	65	120	1308.2
88+084.91	1.44%	-1.44%	2.88%	Crest	100	65	310	1699.6
90+613.70	-1.44%	1.46%	-2.90%	Sag	100	65	315	2216.3
91+400.00	1.46%	0.95%	0.51%	Crest	100	65	60	598.8
92+180.00	0.95%	0.59%	0.35%	Crest	100	65	60	720.0
94+101.18	0.59%	-0.83%	1.42%	Crest	100	65	170	1806.2
95+983.29	-0.83%	0.35%	-1.18%	Sag	100	65	135	1729.6
96+915.84	0.35%	-1.46%	1.81%	Crest	100	65	200	765.1
98+450.33	-1.46%	0.65%	-2.11%	Sag	100	65	230	1319.5
100+027.63	0.65%	0.29%	0.35%	Crest	100	65	60	1432.3
102+388.42	0.29%	1.46%	-1.17%	Sag	100	65	130	2265.8
103+758.40	1.46%	-0.97%	2.43%	Crest	100	65	260	1175.0
105+110.14	-0.97%	-1.49%	0.52%	Crest	100	65	60	1191.7
106+665.56	-1.49%	-0.42%	-1.07%	Sag	100	65	115	1467.9
108+117.52	-0.42%	0.39%	-0.81%	Sag	100	65	90	1349.5
111+368.08	0.39%	1.50%	-1.11%	Sag	100	65	120	3145.6
113+335.83	1.50%	-1.50%	3.00%	Crest	100	65	325	1745.3
115+095.29	-1.50%	0.12%	-1.62%	Sag	100	65	175	1509.5
117+221.15	0.12%	1.34%	-1.22%	Sag	100	65	135	1970.9
119+400.00	1.34%	0.87%	0.47%	Crest	100	65	60	2081.4
121+319.03	0.87%	-0.52%	1.38%	Crest	100	65	150	1814.0

124+449.16	-0.52%	0.35%	-0.87%	Sag	100	65	95	3007.6
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PVI Station	Slope In	Slope Out	$\Delta$	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
126+598.08	0.35%	-1.47%	1.82%	Crest	100	65	195	2003.9
128+188.61	-1.47%	0.10%	-1.57%	Sag	100	65	170	1408.0
130+439.60	0.10%	1.00%	-0.89%	Sag	100	65	100	2116.0
131+435.02	1.00%	-0.88%	1.87%	Crest	100	65	205	842.9
134+800.00	-0.88%	-0.93%	0.05%	Crest	100	65	60	3232.5
135+816.36	-0.93%	0.45%	-1.37%	Sag	100	65	150	911.4
140+205.78	0.45%	-0.40%	0.85%	Crest	100	65	95	4266.9
140+993.90	-0.40%	-1.44%	1.03%	Crest	100	65	115	683.1
141+682.63	-1.44%	0.37%	-1.81%	Sag	100	65	195	533.7
142+770.56	0.37%	1.01%	-0.64%	Sag	100	65	70	955.4
144+265.71	1.01%	-0.11%	1.12%	Crest	100	65	125	1397.6
145+238.27	-0.11%	0.25%	-0.36%	Sag	100	65	60	880.1
146+600.00	0.25%	0.41%	-0.17%	Sag	100	65	60	1301.7
147+225.93	0.41%	0.15%	0.27%	Crest	100	65	60	565.9
148+798.46	0.15%	-1.43%	1.58%	Crest	100	65	170	1457.5
149+439.93	-1.43%	0.32%	-1.75%	Sag	100	65	190	461.5
151+031.49	0.32%	-0.32%	0.64%	Crest	100	65	70	1461.6
151+940.53	-0.32%	0.41%	-0.72%	Sag	100	65	85	831.5
153+016.37	0.41%	-0.95%	1.36%	Crest	100	65	150	958.3
154+668.01	-0.95%	0.02%	-0.97%	Sag	100	65	105	1524.1
155+372.76	0.02%	-0.30%	0.32%	Crest	100	65	60	622.3
156+805.13	-0.30%	-1.33%	1.03%	Crest	100	65	115	1344.9
157+619.81	-1.33%	-0.04%	-1.29%	Sag	100	65	140	687.2
158+586.58	-0.04%	1.37%	-1.42%	Sag	100	65	155	819.3
159+709.75	1.37%	0.58%	0.80%	Crest	100	65	90	1000.7
160+603.05	0.58%	-1.27%	1.85%	Crest	100	65	210	743.3
162+215.60	-1.27%	1.07%	-2.35%	Sag	100	65	255	1380.1
163+489.59	1.07%	-0.87%	1.94%	Crest	100	65	210	1041.5
164+429.94	-0.87%	0.31%	-1.18%	Sag	100	65	130	770.4
165+586.32	0.31%	-0.59%	0.90%	Crest	100	65	100	1041.4
166+834.92	-0.59%	-0.13%	-0.46%	Sag	100	65	60	1168.6
169+095.41	-0.13%	0.21%	-0.34%	Sag	100	65	60	2200.5
170+278.54	0.21%	-0.87%	1.08%	Crest	100	65	120	1093.1
171+873.04	-0.87%	0.63%	-1.50%	Sag	100	65	165	1452.0
173+391.44	0.63%	0.76%	-0.13%	Sag	100	65	60	1405.9
174+737.61	0.76%	-0.52%	1.28%	Crest	100	65	140	1246.2
176+313.34	-0.52%	0.16%	-0.68%	Sag	100	65	75	1468.2
177+155.47	0.16%	0.65%	-0.49%	Sag	100	65	60	774.6
178+741.14	0.65%	-0.97%	1.62%	Crest	100	65	175	1468.2
179+600.00	-0.97%	-0.43%	-0.54%	Sag	100	65	60	741.4
181+189.19	-0.43%	-0.13%	-0.30%	Sag	100	65	60	1529.2
182+465.06	-0.13%	0.51%	-0.64%	Sag	100	65	70	1210.9
185+919.44	0.51%	-0.04%	0.54%	Crest	100	65	60	3389.4
187+741.38	-0.04%	-0.64%	0.60%	Crest	100	65	65	1759.4
189+712.58	-0.64%	0.31%	-0.95%	Sag	100	65	105	1886.2

192+686.09	0.31%	1.35%	-1.03%	Sag	100	65	115	2863.5
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PVI Station	Slope In	Slope Out	$\Delta$	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
193+969.66	1.35%	-0.36%	1.71%	Crest	100	65	185	1133.6
195+447.44	-0.36%	-0.28%	-0.08%	Sag	100	65	60	1355.3
197+628.30	-0.28%	-0.10%	-0.19%	Sag	100	65	60	2120.9
199+642.33	-0.10%	-0.58%	0.49%	Crest	100	65	60	1954.0
200+420.77	-0.58%	0.22%	-0.80%	Sag	100	65	90	703.4
201+524.73	0.22%	-1.25%	1.47%	Crest	100	65	160	979.0
202+286.76	-1.25%	0.78%	-2.03%	Sag	100	65	220	572.0
203+649.55	0.78%	-0.15%	0.92%	Crest	100	65	100	1202.8
204+886.20	-0.15%	-0.59%	0.45%	Crest	100	65	60	1156.7
206+354.66	-0.59%	-0.01%	-0.58%	Sag	100	65	65	1406.0
207+944.68	-0.01%	-0.89%	0.88%	Crest	100	65	95	1510.0
208+868.87	-0.89%	-0.35%	-0.54%	Sag	100	65	60	846.7
210+240.16	-0.35%	-0.09%	-0.26%	Sag	100	65	60	1311.3
212+483.45	-0.09%	0.31%	-0.39%	Sag	100	65	60	2183.3
214+943.48	0.31%	-0.16%	0.46%	Crest	100	65	60	2400.0
216+644.21	-0.16%	-1.35%	1.19%	Crest	100	65	130	1605.7
217+902.57	-1.35%	1.22%	-2.57%	Sag	100	65	275	1055.9
219+220.00	1.22%	-0.37%	1.59%	Crest	100	65	170	1094.9
219+972.25	-0.37%	-1.44%	1.07%	Crest	100	65	125	604.8
220+942.70	-1.44%	0.29%	-1.73%	Sag	100	65	185	815.5
223+011.94	0.29%	-0.57%	0.86%	Crest	100	65	95	1929.2
225+838.47	-0.57%	0.66%	-1.23%	Sag	100	65	135	2711.5
226+740.87	0.66%	-0.44%	1.10%	Crest	100	65	120	774.9
227+781.51	-0.44%	0.48%	-0.92%	Sag	100	65	100	930.6
228+788.36	0.48%	-0.61%	1.09%	Crest	100	65	120	896.8
230+215.41	-0.61%	-0.20%	-0.41%	Sag	100	65	60	1337.1
232+875.96	-0.20%	0.64%	-0.84%	Sag	100	65	90	2585.5
235+589.87	0.64%	0.10%	0.54%	Crest	100	65	60	2638.9
238+351.41	0.10%	-0.29%	0.39%	Crest	100	65	60	2701.5
240+515.90	-0.29%	-1.07%	0.78%	Crest	100	65	85	2092.0
242+262.96	-1.07%	1.48%	-2.55%	Sag	100	65	275	1567.1
244+974.20	1.48%	-1.48%	2.95%	Crest	100	65	320	2413.7
246+623.48	-1.48%	-0.91%	-0.57%	Sag	100	65	65	1456.8
248+994.26	-0.91%	1.02%	-1.93%	Sag	100	65	210	2233.3
250+394.26	1.02%	-1.15%	2.17%	Crest	100	65	235	1177.5
252+508.54	-1.15%	0.36%	-1.51%	Sag	100	65	165	1914.3
253+112.50	0.36%							521.5

## Grevet Chapais alignment Horizontal Geometry

Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
1	123+449.76	464.12	123+913.89	470.04	550	90	100	74	120
2	124+292.01	444.65	124+736.66	378.12	2000	100	40	19	45
3	127+448.12	567.05	128+015.17	2711.46	1700	100	40	29	55
4	129+949.31	332.11	130+281.42	1934.14	1500	100	50	29	60
5	132+988.45	412.82	133+401.27	2707.03	1500	100	50	29	60
6	135+755.46	844.43	136+599.89	2354.19	1700	100	40	29	55
7	140+463.54	224.8	140+688.34	3863.65	2200	100	40	14	35
8	143+406.46	776.74	144+183.19	2718.12	1700	100	40	29	55
9	144+708.71	868.26	145+576.97	525.52	860	100	80	57	100
10	147+390.79	203.33	147+594.12	1813.82	2000	100	40	19	35
11	148+147.51	897.56	149+045.07	553.39	870	100	80	56	100
12	149+791.85	412.8	150+204.65	746.78	1070	100	80	30	90
13	152+296.78	453.22	152+750.00	2092.13	830	100	80	62	100
14	153+306.79	593.61	153+900.40	556.79	440	70	85	46	75
15	154+050.06	211.08	154+261.14	149.65	440	70	90	41	70
16	154+300.95	459.28	154+760.23	39.81	425	70	90	46	74
17	155+811.43	406.9	156+218.33	1051.2	1900	100	40	22	50
18	157+535.19	645.96	158+181.15	1316.86	1600	100	45	29	50
19	161+279.80	1080.05	162+359.84	3098.64	1710	100	40	29	50
20	164+572.51	257.79	164+830.30	2212.67	3000	100	25	14	30
21	167+981.29	564.89	168+546.18	3150.99	1800	100	40	26	50
22	168+948.00	500.28	169+448.28	401.82	580	90	90	75	120
23	170+472.68	710.53	171+183.21	1024.4	1750	100	40	27	50
24	173+772.33	966.37	174+738.70	2589.12	1800	100	40	26	50
25	175+625.18	548.46	176+173.64	886.49	1800	100	40	26	50
26	178+729.06	519.26	179+248.33	2555.42	580	90	90	75	120
27	180+961.43	315.75	181+277.18	1713.1	1800	100	40	26	50
28	182+378.80	215.89	182+594.70	1101.62	1500	100	50	29	60
29	182+950.95	422.09	183+373.04	356.25	580	90	90	75	120
30	183+818.16	483.05	184+301.22	445.12	850	100	80	59	100
31	185+685.86	469.04	186+154.90	1384.65	830	100	80	62	100
32	187+287.81	297.29	187+585.10	1132.91	1600	100	45	29	50
33	188+247.86	655.35	188+903.22	662.76	1800	100	40	26	50
34	189+198.29	397.76	189+596.05	295.07	425	75	85	71	120
35	191+491.12	477.54	191+968.65	1895.07	1650	100	40	32	50
36	194+884.28	495.5	195+379.78	2915.63	850	100	80	59	100
37	196+412.06	401.37	196+813.43	1032.28	580	90	90	75	120
38	197+664.26	235.9	197+900.16	850.82	1700	100	40	29	50
39	198+781.43	658.26	199+439.69	881.27	1850	100	40	24	50
40	200+124.23	291.34	200+415.58	684.55	2600	100	30	15	30

41	201+326.76	350.12	201+676.87	911.18	480	65	70	34	60
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Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
42	202+001.84	687.28	202+689.12	324.96	870	100	80	56	100
43	203+442.68	713.78	204+156.46	753.56	1150	100	60	43	70
44	205+006.22	516.88	205+523.11	849.76	1800	100	40	26	50
45	206+472.95	235.59	206+708.55	949.85	2000	100	40	19	45
46	209+503.00	405.8	209+908.81	2794.46	1700	100	40	29	50
47	211+447.14	390.77	211+837.91	1538.33	440	60	65	32	50
48	211+885.92	464.83	212+350.75	48.01	420	60	70	31	53
49	212+384.46	260.78	212+645.24	33.71	440	60	65	32	50
50	213+497.11	184.15	213+681.26	851.87	1750	100	40	27	50
51	214+971.94	623.6	215+595.53	1290.68	900	100	80	51	100
52	216+834.92	362.36	217+197.27	1239.38	900	100	70	61	100
53	219+091.43	474.95	219+566.38	1894.16	1750	100	40	27	50
54	221+754.90	421.73	222+176.64	2188.53	840	100	80	60	100
55	222+609.40	457.94	223+067.34	432.76	600	90	85	74	120
56	223+980.30	494.38	224+474.68	912.96	1750	100	40	27	50
57	224+581.81	398.24	224+980.04	107.13	850	100	80	59	100
58	225+589.75	342.82	225+932.58	609.71	800	100	90	58	100
59	226+078.24	388.77	226+467.00	145.66	560	90	100	71	120
60	227+427.15	398.84	227+825.98	960.15	900	100	70	61	100
61	228+337.97	422.34	228+760.31	511.98	870	100	80	56	100
62	232+689.04	555.33	233+244.37	3928.73	1750	100	40	27	50
63	233+289.19	346.86	233+636.05	44.82	760	100	95	60	103
64	234+076.58	302.19	234+378.77	440.52	1750	100	40	27	50
65	234+616.11	514.15	235+130.27	237.35	1700	100	40	29	50
66	235+279.45	449.6	235+729.05	149.19	1700	100	40	29	50
67	236+392.65	180.57	236+573.23	663.6	4000	100	25	5	30
68	239+500.15	377.95	239+878.11	2926.93	520	85	100	64	102
69	239+941.91	467.02	240+408.94	63.81	640	90	90	59	100
70	240+690.74	591.06	241+281.80	281.8	940	100	65	61	100
71	243+119.37	556.3	243+675.66	1837.57	920	100	65	63	100
72	244+786.78	528.59	245+315.37	1111.12	870	100	75	61	100
73	246+366.95	585.77	246+952.72	1051.58	870	100	75	61	100
74	248+196.39	443.35	248+639.73	1243.67	1800	100	35	31	50
75	248+936.62	582.43	249+519.05	296.88	1750	100	40	27	50
76	251+566.62	399.02	251+965.64	2047.57	1700	100	40	29	50
77	253+055.09	412.27	253+467.36	1089.45	2300	100	40	11	40
78	257+985.01	481.04	258+466.04	4517.65	580	90	95	70	120
79	258+677.60	470.21	259+147.81	211.56	590	90	95	67	120
80	259+912.83	383.49	260+296.33	765.03	2200	100	30	24	40
81	262+899.80	481.57	263+381.36	2603.47	420	75	85	73	130
82	264+119.56	409.1	264+528.66	738.2	550	90	100	74	120
83	267+214.19	480.21	267+694.40	2685.53	580	90	100	65	120
84	269+964.37	515.21	270+479.58	2269.97	430	75	80	74	130
85	271+181.11	334.12	271+515.23	701.53	1700	100	35	34	55
86	274+089.67	660.11	274+749.78	2574.44	430	75	90	64	130

87	275+508.95	299.74	275+808.69	759.17	2000	100	35	24	45
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Curve Nbr	From TS	Length (m) Curve + Spirales	To ST	Tangent Length	Radius R (m)	Selected Speed V (km/h)	Selected Superelevation E <sub>a</sub> (mm)	Unbalanced Superelevation E <sub>u</sub> (mm)	Spiral Length L <sub>s</sub> (m)
88	276+356.91	592.53	276+949.44	548.22	560	90	100	71	120
89	277+605.86	317.67	277+923.53	656.42	800	100	85	63	100
90	278+630.95	332.58	278+963.53	707.43	1000	100	65	53	90
91	280+446.40	401.82	280+848.22	1482.87	800	100	85	63	100
92	285+284.30	655.64	285+939.94	4436.08	850	100	80	59	100

Grevet Chapais alignment  
Vertical Geometry

PVI Station	Slope In	Slope Out	Δ	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
122+979.72		0.00%						
124+600.00	0.00%	-1.00%	1.00%	Crest	95	65	120	1560.3
125+694.11	-1.00%	0.00%	-1.00%	Sag	95	65	130	969.1
129+148.96	0.00%	0.69%	-0.69%	Sag	95	65	80	3349.9
130+092.20	0.69%	0.21%	0.48%	Crest	95	65	60	873.2
131+096.63	0.21%	-0.30%	0.51%	Crest	95	65	60	944.4
131+941.14	-0.30%	0.17%	-0.47%	Sag	95	65	60	784.5
132+800.00	0.17%	0.56%	-0.39%	Sag	95	65	60	798.9
133+600.00	0.56%	0.07%	0.49%	Crest	95	65	60	740.0
135+610.37	0.07%	0.15%	-0.08%	Sag	95	65	60	1950.4
136+675.99	0.15%	-0.31%	0.46%	Crest	95	65	60	1005.6
138+000.00	-0.31%	-0.91%	0.60%	Crest	95	65	80	1254.0
139+718.93	-0.91%	-0.50%	-0.40%	Sag	95	65	60	1648.9
141+400.00	-0.50%	-0.07%	-0.43%	Sag	95	65	60	1621.1
142+800.00	-0.07%	0.38%	-0.45%	Sag	95	65	60	1340.0
143+600.00	0.38%	-0.51%	0.88%	Crest	95	65	110	715.0
144+919.39	-0.51%	1.07%	-1.58%	Sag	95	65	180	1174.4
145+731.77	1.07%	-0.50%	1.57%	Crest	95	65	180	632.4
146+857.40	-0.50%	-0.19%	-0.31%	Sag	95	65	60	1005.6
148+527.45	-0.19%	1.00%	-1.19%	Sag	95	65	130	1575.1
149+700.00	1.00%	-0.26%	1.26%	Crest	95	65	140	1037.5
150+800.00	-0.26%	0.62%	-0.89%	Sag	95	65	100	980.0
152+513.86	0.62%	0.00%	0.62%	Crest	95	65	80	1623.9



153+507.62	0.00%	-1.21%	1.21%	Crest	95	65	130	888.8
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PVI Station	Slope In	Slope Out	$\Delta$	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
155+718.58	-1.21%	0.27%	-1.47%	Sag	95	65	160	2066.0
156+600.00	0.27%	-0.63%	0.89%	Crest	95	65	100	751.4
157+800.00	-0.63%	-0.10%	-0.53%	Sag	95	65	60	1120.0
158+600.00	-0.10%	-0.78%	0.68%	Crest	95	65	80	730.0
159+400.00	-0.78%	-0.24%	-0.54%	Sag	95	65	60	730.0
160+233.67	-0.24%	0.56%	-0.80%	Sag	95	65	110	748.7
161+384.30	0.56%	-0.28%	0.84%	Crest	95	65	100	1045.6
162+621.97	-0.28%	0.90%	-1.18%	Sag	95	65	130	1122.7
163+434.51	0.90%	0.15%	0.75%	Crest	95	65	90	702.5
164+264.08	0.15%	0.84%	-0.69%	Sag	95	65	80	744.6
165+300.00	0.84%	-0.36%	1.20%	Crest	95	65	130	930.9
167+600.00	-0.36%	0.64%	-1.00%	Sag	95	65	110	2180.0
168+859.60	0.64%	-0.34%	0.98%	Crest	95	65	110	1149.6
169+790.00	-0.34%	0.83%	-1.16%	Sag	95	65	130	810.4
171+590.58	0.83%	0.17%	0.66%	Crest	95	65	80	1695.6
172+751.09	0.17%	1.27%	-1.10%	Sag	95	65	120	1060.5
173+600.00	1.27%	0.00%	1.27%	Crest	95	65	140	718.9
174+920.00	0.00%	-1.21%	1.21%	Crest	95	65	140	1180.0
176+275.33	-1.21%	-0.20%	-1.01%	Sag	95	65	110	1230.3
177+819.66	-0.20%	0.20%	-0.41%	Sag	95	65	800	1089.3
179+874.00	0.20%	0.66%	-0.45%	Sag	95	65	70	1619.3
181+622.91	0.66%	-0.63%	1.29%	Crest	95	65	600	1413.9
182+900.00	-0.63%	-0.35%	-0.28%	Sag	95	65	60	947.1
184+757.33	-0.35%	0.41%	-0.77%	Sag	95	65	100	1777.3
186+309.47	0.41%	0.77%	-0.36%	Sag	95	65	60	1472.1
187+165.70	0.77%	0.99%	-0.22%	Sag	95	65	60	796.2
188+492.23	0.99%	-0.45%	1.44%	Crest	95	65	170	1211.5
189+901.91	-0.45%	-1.11%	0.65%	Crest	95	65	80	1284.7
191+156.50	-1.11%	0.90%	-2.01%	Sag	95	65	400	1014.6
192+217.32	0.90%	0.08%	0.82%	Crest	95	65	90	815.8
193+118.14	0.08%	-0.36%	0.44%	Crest	95	65	60	825.8
195+196.00	-0.36%	0.50%	-0.86%	Sag	95	65	100	1997.9
196+198.85	0.50%	-0.60%	1.10%	Crest	95	65	120	892.9
196+988.74	-0.60%	-0.20%	-0.41%	Sag	95	65	60	699.9
197+795.74	-0.20%	0.30%	-0.50%	Sag	95	65	60	747.0
200+015.82	0.30%	-0.15%	0.45%	Crest	95	65	60	2160.1
201+075.94	-0.15%	0.64%	-0.79%	Sag	95	65	200	930.1
202+400.00	0.64%	0.00%	0.64%	Crest	95	65	70	1189.1
202+800.00	0.00%	-1.08%	1.08%	Crest	95	65	120	305.0
203+621.02	-1.08%	-0.58%	-0.50%	Sag	95	65	80	721.0
204+500.00	-0.58%	0.00%	-0.58%	Sag	95	65	200	739.0
205+300.00	0.00%	0.86%	-0.86%	Sag	95	65	100	650.0
206+000.00	0.86%	-0.36%	1.22%	Crest	95	65	140	580.0
207+330.71	-0.36%	0.34%	-0.70%	Sag	95	65	80	1220.7
210+200.00	0.34%	0.00%	0.34%	Crest	95	65	60	2799.3
213+400.00	0.00%	1.04%	-1.04%	Sag	95	65	120	3110.0

216+200.00	1.04%	-0.83%	1.87%	Crest	95	65	200	2640.0
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PVI Station	Slope In	Slope Out	$\Delta$	Crest or Sag	Passenger speed (km/h)	Freight speed (km/h)	Longueur de la courbe choisie (m)	Distance between vertical curves (m)
217+400.00	-0.83%	0.40%	-1.23%	Sag	95	65	150	1025.0
218+400.00	0.40%	0.00%	0.40%	Crest	95	65	60	895.0
220+900.00	0.00%	0.93%	-0.93%	Sag	95	65	110	2415.0
222+838.40	0.93%	-0.89%	1.82%	Crest	95	65	200	1783.4
224+300.00	-0.89%	-0.13%	-0.75%	Sag	95	65	90	1316.6
225+336.37	-0.13%	0.35%	-0.48%	Sag	95	65	70	956.4
226+600.00	0.35%	0.00%	0.35%	Crest	95	65	60	1198.6
229+600.00	0.00%	0.64%	-0.64%	Sag	95	65	80	2930.0
231+000.00	0.64%	0.00%	0.64%	Crest	95	65	100	1310.0
231+800.00	0.00%	-0.63%	0.63%	Crest	95	65	70	715.0
232+600.00	-0.63%	0.00%	-0.63%	Sag	95	65	90	720.0
233+460.00	0.00%	0.54%	-0.54%	Sag	95	65	60	785.0
234+200.00	0.54%	-0.30%	0.84%	Crest	95	65	100	660.0
235+200.00	-0.30%	0.83%	-1.13%	Sag	95	65	130	885.0
235+800.00	0.83%	-0.67%	1.50%	Crest	95	65	170	450.0
236+700.00	-0.67%	0.64%	-1.31%	Sag	95	65	150	740.0
238+100.00	0.64%	-1.00%	1.64%	Crest	95	65	200	1225.0
238+901.18	-1.00%	0.00%	-1.00%	Sag	95	65	110	646.2
240+200.00	0.00%	0.15%	-0.15%	Sag	95	65	60	1213.8
242+800.00	0.15%	-0.72%	0.87%	Crest	95	65	100	2520.0
243+410.30	-0.72%	-0.16%	-0.55%	Sag	95	65	60	530.3
244+400.00	-0.16%	-0.10%	-0.07%	Sag	95	65	120	899.7
247+500.00	-0.10%	0.81%	-0.90%	Sag	95	65	100	2990.0
249+110.00	0.81%	-1.32%	2.13%	Crest	95	65	230	1445.0
250+400.00	-1.32%	0.76%	-2.08%	Sag	95	65	400	975.0
251+450.00	0.76%	0.00%	0.76%	Crest	95	65	100	800.0
257+200.00	0.00%	0.23%	-0.23%	Sag	95	65	60	5670.0
259+800.00	0.23%	-0.19%	0.42%	Crest	95	65	60	2540.0
261+400.00	-0.19%	0.38%	-0.56%	Sag	95	65	70	1535.0
262+200.00	0.38%	0.00%	0.38%	Crest	95	65	60	1350.0
268+370.42	0.00%	1.26%	-1.26%	Sag	95	65	140	6070.4
270+221.83	1.26%	-0.48%	1.74%	Crest	95	65	200	1681.4
272+725.23	-0.48%	0.00%	-0.48%	Sag	95	65	200	2303.4
273+526.46	0.00%	0.71%	-0.71%	Sag	95	65	200	601.2
277+000.00	0.71%	0.00%	0.71%	Crest	95	65	80	3333.5
280+650.00	0.00%	0.48%	-0.48%	Sag	95	65	60	3580.0
281+700.00	0.48%	-1.00%	1.48%	Crest	95	65	160	940.0
282+600.00	-1.00%	-0.31%	-0.69%	Sag	95	65	150	745.0
283+900.00	-0.31%	-1.11%	0.80%	Crest	95	65	90	1180.0
284+800.00	-1.11%	0.00%	-1.11%	Sag	95	65	120	795.0
286+200.00	0.00%	1.02%	-1.02%	Sag	95	65	120	1280.0
287+535.43	1.02%		1.02%		95	65		1275.4