

Ts: 160.189

PI 12+396.426 3069571.164 619738.895
Length: 158.659 Course: S 59-44-18 W
Delta: 79-26-07

Spiral Curve Data: CLOTHOID

TS 12+305.729 3069485.775 619769.464
SPI 3069507.841 619761.564
SC 12+340.729 3069517.308 619754.583
Length: 35.000 L Tan: 23.438
Radius: 60.000 S Tan: 11.762
Theta: 16-42-41 P: 0.848
X: 34.703 K: 17.450
Y: 3.382 A: 45.826
Chord: 34.868 Course: N 25-15-48 W
Ts: 90.697

Circular Curve Data

SC 12+340.729 3069517.308 619754.583
RP 3069481.696 619706.294
SC 12+411.040 3069540.026 619692.236
Delta: 67-08-32 Type: LEFT
Radius: 60.000 DOC: 95-29-35
Length: 70.311 Tangent: 39.820
Mid-Ord: 10.008 External: 12.011
Chord: 66.357 Course: N 69-58-45 W
Es: 35.223

Spiral Curve Data: CLOTHOID

SC 12+411.040 3069540.026 619692.236
SPI 3069537.270 619680.802
PC 12+446.040 3069525.458 619660.557
Length: 35.000 L Tan: 23.438
Radius: 60.000 S Tan: 11.762
Theta: 16-42-41 P: 0.848
X: 34.703 K: 17.450
Y: 3.382 A: 45.826
Chord: 34.868 Course: S 65-18-17 W
Ts: 90.697

PI 12+514.003 3069491.208 619601.856
Length: 122.056 Course: N 40-52-02 W
Delta: 79-23-40

Spiral Curve Data: CLOTHOID

TS 12+446.040 3069525.458 619660.557
SPI 3069513.646 619640.313
SC 12+481.040 3069510.891 619628.878
Length: 35.000 L Tan: 23.438
Radius: 60.000 S Tan: 11.762
Theta: 16-42-41 P: 0.848
X: 34.703 K: 17.450
Y: 3.382 A: 45.826
Chord: 34.868 Course: S 65-18-17 W
Ts: 67.963

Circular Curve Data

Mid-Ord: 0.250 External: 0.251
Chord: 13.406 Course: S 69-46-23 E
Es: 3.945

Spiral Curve Data: CLOTHOID

SC 11+956.799 3069601.276 619760.848
SPI 3069596.420 619771.503
PC 11+991.799 3069582.798 619790.504
Length: 35.000 L Tan: 23.380
Radius: 90.000 S Tan: 11.709
Theta: 11-08-27 P: 0.566
X: 34.868 K: 17.478
Y: 2.262 A: 56.125
Chord: 34.941 Course: S 58-04-25 E
Ts: 42.444

PI 11+899.477 3069636.591 619715.473
Length: 69.493 Course: S 19-41-49 E
Delta: 145-20-08

Tangent Data

11+991.799 3069582.798 619790.504
12+059.666 3069543.253 619845.660
Length: 67.867 Course: S 54-21-40 E

Spiral Curve Data: CLOTHOID

TS 12+059.666 3069543.253 619845.660
SPI 3069527.606 619867.484
SC 12+099.666 3069516.349 619874.942
Length: 40.000 L Tan: 26.854
Radius: 55.000 S Tan: 13.504
Theta: 20-50-05 P: 1.206
X: 39.474 K: 19.912
Y: 4.803 A: 46.904
Chord: 39.765 Course: S 47-25-27 E
Ts: 160.189

Circular Curve Data

SC 12+099.666 3069516.349 619874.942
RP 3069485.972 619829.093
SC 12+265.729 3069450.229 619787.290
Delta: 172-59-41 Type: RIGHT
Radius: 55.000 DOC: 104-10-27
Length: 166.063 Tangent: 898.561
Mid-Ord: 51.640 External: 845.243
Chord: 109.795 Course: S 52-58-15 W
Es: 133.668

Spiral Curve Data: CLOTHOID

SC 12+265.729 3069450.229 619787.290
SPI 3069460.492 619778.515
PC 12+305.729 3069485.775 619769.464
Length: 40.000 L Tan: 26.854
Radius: 55.000 S Tan: 13.504
Theta: 20-50-05 P: 1.206
X: 39.474 K: 19.912
Y: 4.803 A: 46.904
Chord: 39.765 Course: N 26-38-02 W

Spiral Curve Data: CLOTHOID
 SC 12+772.280 3069615.086 619387.448
 SPI 3069606.520 619375.024
 PC 12+817.280 3069583.836 619355.242
 Length: 45.000 L Tan: 30.099
 Radius: 90.000 S Tan: 15.090
 Theta: 14-19-26 P: 0.935
 X: 44.720 K: 22.453
 Y: 3.733 A: 63.640
 Chord: 44.875 Course: S 45-51-46 W
 Ts: 127.140

PI 12+912.099 3069512.373 619292.922
 Length: 482.918 Course: N 61-53-03 W
 Delta: 77-01-31

Spiral Curve Data: CLOTHOID
 TS 12+817.280 3069583.836 619355.242
 SPI 3069561.151 619335.459
 SC 12+862.280 3069552.586 619323.036
 Length: 45.000 L Tan: 30.099
 Radius: 90.000 S Tan: 15.090
 Theta: 14-19-26 P: 0.935
 X: 44.720 K: 22.453
 Y: 3.733 A: 63.640
 Chord: 44.875 Course: S 45-51-46 W
 Ts: 94.819

Circular Curve Data
 SC 12+862.280 3069552.586 619323.036
 RP 3069626.681 619271.949
 SC 12+938.270 3069539.276 619250.493
 Delta: 48-22-38 Type: RIGHT
 Radius: 90.000 DOC: 63-39-43
 Length: 75.991 Tangent: 40.426
 Mid-Ord: 7.902 External: 8.662
 Chord: 73.754 Course: S 79-36-12 W
 Es: 26.216

Spiral Curve Data: CLOTHOID
 SC 12+938.270 3069539.276 619250.493
 SPI 3069542.873 619235.839
 PC 12+983.270 3069557.057 619209.292
 Length: 45.000 L Tan: 30.099
 Radius: 90.000 S Tan: 15.090
 Theta: 14-19-26 P: 0.935
 X: 44.720 K: 22.453
 Y: 3.733 A: 63.640
 Chord: 44.875 Course: N 66-39-23 W
 Ts: 94.819

PI 13+371.370 3069739.951 618866.989
 Length: 172.887 Course: S 42-39-27 W
 Delta: 75-27-30

Tangent Data
 12+983.270 3069557.057 619209.292

SC 12+481.040 3069510.891 619628.878
 RP 3069569.220 619614.820
 SC 12+529.182 3069518.573 619582.652
 Delta: 45-58-19 Type: RIGHT
 Radius: 60.000 DOC: 95-29-35
 Length: 48.142 Tangent: 25.451
 Mid-Ord: 4.764 External: 5.175
 Chord: 46.861 Course: N 80-33-52 W
 Es: 19.082

Spiral Curve Data: CLOTHOID
 SC 12+529.182 3069518.573 619582.652
 SPI 3069524.879 619572.723
 PC 12+564.182 3069542.604 619557.387
 Length: 35.000 L Tan: 23.438
 Radius: 60.000 S Tan: 11.762
 Theta: 16-42-41 P: 0.848
 X: 34.703 K: 17.450
 Y: 3.382 A: 45.826
 Chord: 34.868 Course: N 46-26-01 W
 Ts: 67.963

PI 12+618.275 3069583.510 619521.994
 Length: 127.140 Course: N 40-52-02 W
 Delta: 0-00-00

Tangent Data
 12+564.182 3069542.604 619557.387
 12+618.275 3069583.510 619521.994
 Length: 54.093 Course: N 40-52-02 W

PI 12+745.415 3069679.658 619438.805
 Length: 221.960 Course: S 41-05-26 W
 Delta: 98-02-32

Spiral Curve Data: CLOTHOID
 TS 12+618.275 3069583.510 619521.994
 SPI 3069606.272 619502.300
 SC 12+663.275 3069614.886 619489.910
 Length: 45.000 L Tan: 30.099
 Radius: 90.000 S Tan: 15.090
 Theta: 14-19-26 P: 0.935
 X: 44.720 K: 22.453
 Y: 3.733 A: 63.640
 Chord: 44.875 Course: N 45-38-21 W
 Ts: 127.140

Circular Curve Data
 SC 12+663.275 3069614.886 619489.910
 RP 3069540.991 619438.535
 SC 12+772.280 3069615.086 619387.448
 Delta: 69-23-40 Type: LEFT
 Radius: 90.000 DOC: 63-39-43
 Length: 109.004 Tangent: 62.312
 Mid-Ord: 16.005 External: 19.466
 Chord: 102.463 Course: N 89-53-18 W
 Es: 48.667

Delta: 23-03-09 Type: RIGHT
 Radius: 120.000 DOC: 47-44-47
 Length: 48.281 Tangent: 24.472
 Mid-Ord: 2.420 External: 2.470
 Chord: 47.956 Course: S 66-07-13 W
 Es: 11.761

Spiral Curve Data: CLOTHOID

SC 13+542.718 3069616.068 618722.172
 SPI 3069612.487 618705.824
 PC 13+592.718 3069612.244 618672.416
 Length: 50.000 L Tan: 33.409
 Radius: 120.000 S Tan: 16.736
 Theta: 11-56-12 P: 0.867
 X: 49.783 K: 24.964
 Y: 3.461 A: 77.460
 Chord: 49.904 Course: S 85-36-21 W
 Ts: 77.425

PI 13+868.412 3069610.239 618396.730
 Length: 275.380 Course: S 55-37-37 W
 Delta: 33-57-22

Tangent Data

13+592.718 3069612.244 618672.416
 13+806.045 3069610.693 618459.094
 Length: 213.327 Course: S 89-35-00 W

Spiral Curve Data: CLOTHOID

TS 13+806.045 3069610.693 618459.094
 SPI 3069610.474 618429.048
 SC 13+851.045 3069607.776 618414.249
 Length: 45.000 L Tan: 30.047
 Radius: 130.000 S Tan: 15.043
 Theta: 9-55-00 P: 0.648
 X: 44.865 K: 22.478
 Y: 2.591 A: 76.485
 Chord: 44.940 Course: S 86-16-43 W
 Ts: 62.366

Circular Curve Data

SC 13+851.045 3069607.776 618414.249
 RP 3069479.884 618437.567
 SC 13+883.090 3069598.220 618383.747
 Delta: 14-07-23 Type: LEFT
 Radius: 130.000 DOC: 44-04-25
 Length: 32.044 Tangent: 16.104
 Mid-Ord: 0.986 External: 0.994
 Chord: 31.963 Course: S 72-36-19 W
 Es: 6.602

Spiral Curve Data: CLOTHOID

SC 13+883.090 3069598.220 618383.747
 SPI 3069591.993 618370.054
 PC 13+928.090 3069575.029 618345.254
 Length: 45.000 L Tan: 30.047
 Radius: 130.000 S Tan: 15.043
 Theta: 9-55-00 P: 0.648

13+275.908 3069694.964 618951.187
 Length: 292.637 Course: N 61-53-03 W

Spiral Curve Data: CLOTHOID

TS 13+275.908 3069694.964 618951.187
 SPI 3069710.737 618921.667
 SC 13+325.908 3069714.285 618905.256
 Length: 50.000 L Tan: 33.469
 Radius: 90.000 S Tan: 16.790
 Theta: 15-54-56 P: 1.154
 X: 49.616 K: 24.936
 Y: 4.604 A: 67.082
 Chord: 49.829 Course: N 67-11-09 W
 Ts: 95.462

Circular Curve Data

SC 13+325.908 3069714.285 618905.256
 RP 3069626.318 618886.236
 SC 13+394.437 3069703.115 618839.309
 Delta: 43-37-38 Type: LEFT
 Radius: 90.000 DOC: 63-39-43
 Length: 68.530 Tangent: 36.022
 Mid-Ord: 6.444 External: 6.941
 Chord: 66.886 Course: S 80-23-12 W
 Es: 25.252

Spiral Curve Data: CLOTHOID

SC 13+394.437 3069703.115 618839.309
 SPI 3069694.361 618824.982
 PC 13+444.437 3069669.747 618802.303
 Length: 50.000 L Tan: 33.469
 Radius: 90.000 S Tan: 16.790
 Theta: 15-54-56 P: 1.154
 X: 49.616 K: 24.936
 Y: 4.604 A: 67.082
 Chord: 49.829 Course: S 47-57-33 W
 Ts: 95.462

PI 13+521.862 3069612.807 618749.839
 Length: 353.118 Course: S 89-35-00 W
 Delta: 46-55-33

Spiral Curve Data: CLOTHOID

TS 13+444.437 3069669.747 618802.303
 SPI 3069645.177 618779.664
 SC 13+494.437 3069635.481 618766.023
 Length: 50.000 L Tan: 33.409
 Radius: 120.000 S Tan: 16.736
 Theta: 11-56-12 P: 0.867
 X: 49.783 K: 24.964
 Y: 3.461 A: 77.460
 Chord: 49.904 Course: S 46-38-06 W
 Ts: 77.425

Circular Curve Data

SC 13+494.437 3069635.481 618766.023
 RP 3069733.289 618696.500
 SC 13+542.718 3069616.068 618722.172

Radius: 120.000 S Tan: 13.369
 Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981
 Y: 2.218 A: 69.282
 Chord: 39.951 Course: N 39-37-15 W
 Ts: 82.150

Circular Curve Data

SC 14+296.722 3069630.300 618037.082
 RP 3069543.997 617953.705
 SC 14+370.990 3069662.662 617971.550
 Delta: 35-27-37 Type: LEFT
 Radius: 120.000 DOC: 47-44-47
 Length: 74.268 Tangent: 38.366
 Mid-Ord: 5.700 External: 5.984
 Chord: 73.088 Course: N 63-43-05 W
 Es: 15.641

Spiral Curve Data: CLOTHOID

SC 14+370.990 3069662.662 617971.550
 SPI 3069664.650 617958.329
 PC 14+410.990 3069664.186 617931.628
 Length: 40.000 L Tan: 26.706
 Radius: 120.000 S Tan: 13.369
 Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981
 Y: 2.218 A: 69.282
 Chord: 39.951 Course: N 87-48-54 W
 Ts: 82.150

PI 14+713.736 3069658.916 617628.928
 Length: 260.706 Course: S 29-00-46 W
 Delta: 59-59-23

Tangent Data

14+410.990 3069664.186 617931.628
 14+606.907 3069660.775 617735.741
 Length: 195.917 Course: S 89-00-09 W

Spiral Curve Data: CLOTHOID

TS 14+606.907 3069660.775 617735.741
 SPI 3069660.311 617709.053
 SC 14+646.907 3069653.305 617695.849
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 86-27-23 W
 Ts: 106.829

Circular Curve Data

SC 14+646.907 3069658.305 617695.849
 RP 3069510.006 617718.374
 SC 14+763.960 3069599.550 617598.033
 Delta: 44-42-39 Type: LEFT
 Radius: 150.000 DOC: 38-11-50
 Length: 117.053 Tangent: 61.689

X: 44.865 K: 22.478
 Y: 2.591 A: 76.485
 Chord: 44.940 Course: S 58-55-54 W
 Ts: 62.366

PI 14+141.103 3069454.766 618169.436
 Length: 262.090 Course: N 36-26-19 W
 Delta: 87-56-04

Tangent Data

13+928.090 3069575.029 618345.254
 13+961.163 3069556.356 618317.955
 Length: 33.074 Course: S 55-37-37 W

Spiral Curve Data: CLOTHOID

TS 13+961.163 3069556.356 618317.955
 SPI 3069537.513 618290.408
 SC 14+011.163 3069530.342 618275.319
 Length: 50.000 L Tan: 33.376
 Radius: 160.000 S Tan: 16.706
 Theta: 8-57-09 P: 0.650
 X: 49.878 K: 24.980
 Y: 2.600 A: 89.443
 Chord: 49.946 Course: S 58-36-38 W
 Ts: 179.940

Circular Curve Data

SC 14+011.163 3069530.342 618275.319
 RP 3069674.851 618206.638
 SC 14+206.722 3069560.944 618094.276
 Delta: 70-01-46 Type: RIGHT
 Radius: 160.000 DOC: 35-48-36
 Length: 195.559 Tangent: 112.094
 Mid-Ord: 28.959 External: 35.359
 Chord: 183.612 Course: N 80-24-21 W
 Es: 63.207

Spiral Curve Data: CLOTHOID

SC 14+206.722 3069560.944 618094.276
 SPI 3069572.676 618082.383
 PC 14+256.722 3069599.527 618062.559
 Length: 50.000 L Tan: 33.376
 Radius: 160.000 S Tan: 16.706
 Theta: 8-57-09 P: 0.650
 X: 49.878 K: 24.980
 Y: 2.600 A: 89.443
 Chord: 49.946 Course: N 39-25-20 W
 Ts: 179.940

PI 14+338.872 3069665.616 618013.765
 Length: 384.896 Course: S 89-00-09 W
 Delta: 54-33-32

Spiral Curve Data: CLOTHOID

TS 14+256.722 3069599.527 618062.559
 SPI 3069621.011 618046.697
 SC 14+296.722 3069630.300 618037.082
 Length: 40.000 L Tan: 26.706

Ts: 78.965

PI 15+234.902 3069342.679 617233.685
Length: 386.109 Course: S 52-26-00 W
Delta: 19-23-30

Tangent Data

15+030.954 3069406.294 617427.458
15+153.570 3069368.048 617310.960
Length: 122.616 Course: S 71-49-30 W

Spiral Curve Data: CLOTHOID

TS 15+153.570 3069368.048 617310.960
SPI 3069355.565 617272.936
SC 15+213.570 3069347.453 617254.634
Length: 60.000 L Tan: 40.021
Radius: 300.000 S Tan: 20.019
Theta: 5-43-46 P: 0.500
X: 59.940 K: 29.990
Y: 1.999 A: 134.164
Chord: 59.973 Course: S 69-54-55 W
Ts: 81.333

Circular Curve Data

SC 15+213.570 3069347.453 617254.634
RP 3069073.186 617376.198
SC 15+255.103 3069328.052 617217.947
Delta: 07-55-57 Type: LEFT
Radius: 300.000 DOC: 19-05-55
Length: 41.534 Tangent: 20.800
Mid-Ord: 0.718 External: 0.720
Chord: 41.501 Course: S 62-07-45 W
Es: 4.854

Spiral Curve Data: CLOTHOID

SC 15+255.103 3069328.052 617217.947
SPI 3069317.492 617200.940
PC 15+315.103 3069293.092 617169.218
Length: 60.000 L Tan: 40.021
Radius: 300.000 S Tan: 20.019
Theta: 5-43-46 P: 0.500
X: 59.940 K: 29.990
Y: 1.999 A: 134.164
Chord: 59.973 Course: S 54-20-35 W
Ts: 81.333

PI 15+619.880 3069107.275 616927.638
Length: 241.520 Course: N 83-54-47 W
Delta: 43-39-12

Tangent Data

15+315.103 3069293.092 617169.218
15+539.637 3069156.197 616991.242
Length: 224.534 Course: S 52-26-00 W

Spiral Curve Data: CLOTHOID

TS 15+539.637 3069156.197 616991.242
SPI 3069139.924 616970.085

Mid-Ord: 11.274 External: 12.190
Chord: 114.105 Course: S 59-00-28 W
Es: 23.709

Spiral Curve Data: CLOTHOID

SC 14+763.960 3069599.550 617598.033
SPI 3069588.834 617590.060
PC 14+803.960 3069565.492 617577.115
Length: 40.000 L Tan: 26.692
Radius: 150.000 S Tan: 13.356
Theta: 7-38-22 P: 0.444
X: 39.929 K: 19.988
Y: 1.776 A: 77.460
Chord: 39.968 Course: S 31-33-32 W
Ts: 106.829

PI 14+957.837 3069430.925 617502.484
Length: 282.913 Course: S 71-49-30 W
Delta: 42-48-44

Tangent Data

14+803.960 3069565.492 617577.115
14+878.872 3069499.981 617540.782
Length: 74.912 Course: S 29-00-46 W

Spiral Curve Data: CLOTHOID

TS 14+878.872 3069499.981 617540.782
SPI 3069476.639 617527.836
SC 14+918.872 3069465.924 617519.864
Length: 40.000 L Tan: 26.692
Radius: 150.000 S Tan: 13.356
Theta: 7-38-22 P: 0.444
X: 39.929 K: 19.988
Y: 1.776 A: 77.460
Chord: 39.968 Course: S 31-33-32 W
Ts: 78.965

Circular Curve Data

SC 14+918.872 3069465.924 617519.864
RP 3069555.467 617399.523
SC 14+990.954 3069420.436 617464.841
Delta: 27-32-00 Type: RIGHT
Radius: 150.000 DOC: 38-11-50
Length: 72.082 Tangent: 36.751
Mid-Ord: 4.309 External: 4.437
Chord: 71.390 Course: S 50-25-08 W
Es: 11.591

Spiral Curve Data: CLOTHOID

SC 14+990.954 3069420.436 617464.841
SPI 3069414.620 617452.818
PC 15+030.954 3069406.294 617427.458
Length: 40.000 L Tan: 26.692
Radius: 150.000 S Tan: 13.356
Theta: 7-38-22 P: 0.444
X: 39.929 K: 19.988
Y: 1.776 A: 77.460
Chord: 39.968 Course: S 69-16-44 W

Radius: 90.000 DOC: 63-39-43
 Length: 92.852 Tangent: 51.035
 Mid-Ord: 11.711 External: 13.463
 Chord: 88.789 Course: S 53-47-56 W
 Es: 32.659

Spiral Curve Data: CLOTHOID

SC 15+885.552 3069070.860 616677.861
 SPI 3069058.645 616672.360
 PC 15+925.552 3069032.447 616667.025
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 15-45-11 W
 Ts: 102.499

PI 16+206.648 3068757.004 616610.932
 Length: 440.111 Course: N 64-36-28 W
 Delta: 103-52-54

Spiral Curve Data: CLOTHOID

TS 15+925.552 3069032.447 616667.025
 SPI 3068999.757 616660.368
 SC 15+975.552 3068983.944 616655.024
 Length: 50.000 L Tan: 33.361
 Radius: 200.000 S Tan: 16.692
 Theta: 7-09-43 P: 0.521
 X: 49.922 K: 24.987
 Y: 2.081 A: 100.000
 Chord: 49.965 Course: S 13-53-51 W
 Ts: 281.096

Circular Curve Data

SC 15+975.552 3068983.944 616655.024
 RP 3069047.976 616465.551
 SC 16+288.167 3068858.015 616402.984
 Delta: 89-33-28 Type: RIGHT
 Radius: 200.000 DOC: 28-38-52
 Length: 312.615 Tangent: 198.462
 Mid-Ord: 58.034 External: 81.757
 Chord: 281.749 Course: S 63-27-05 W
 Es: 125.270

Spiral Curve Data: CLOTHOID

SC 16+288.167 3068858.015 616402.984
 SPI 3068863.237 616387.130
 PC 16+338.167 3068877.542 616356.992
 Length: 50.000 L Tan: 33.361
 Radius: 200.000 S Tan: 16.692
 Theta: 7-09-43 P: 0.521
 X: 49.922 K: 24.987
 Y: 2.081 A: 100.000
 Chord: 49.965 Course: N 66-59-41 W
 Ts: 281.096

PI 16+497.182 3068945.730 616213.339

SC 15+579.637 3069133.261 616958.510
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 54-58-46 W
 Ts: 80.243

Circular Curve Data

SC 15+579.637 3069133.261 616958.510
 RP 3069263.260 616883.675
 SC 15+653.922 3069113.315 616887.739
 Delta: 28-22-28 Type: RIGHT
 Radius: 150.000 DOC: 38-11-50
 Length: 74.284 Tangent: 37.920
 Mid-Ord: 4.575 External: 4.719
 Chord: 73.528 Course: S 74-15-37 W
 Es: 12.062

Spiral Curve Data: CLOTHOID

SC 15+653.922 3069113.315 616887.739
 SPI 3069112.953 616874.388
 PC 15+693.922 3069115.783 616847.847
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: N 86-27-33 W
 Ts: 80.243

PI 15+855.199 3069132.885 616687.479
 Length: 383.595 Course: S 11-30-38 W
 Delta: 84-34-34

Tangent Data

15+693.922 3069115.783 616847.847
 15+752.700 3069122.016 616789.400
 Length: 58.778 Course: N 83-54-47 W

Spiral Curve Data: CLOTHOID

TS 15+752.700 3069122.016 616789.400
 SPI 3069124.851 616762.815
 SC 15+792.700 3069123.301 616749.509
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: N 88-09-20 W
 Ts: 102.499

Circular Curve Data

SC 15+792.700 3069123.301 616749.509
 RP 3069033.905 616759.924
 SC 15+885.552 3069070.860 616677.861
 Delta: 59-06-41 Type: LEFT

Spiral Curve Data: CLOTHOID
 SC 16+638.320 3068978.831 616076.769
 SPI 3068986.086 616065.552
 PC 16+678.320 3069003.628 616045.429
 Length: 40.000 L Tan: 26.695
 Radius: 140.000 S Tan: 13.359
 Theta: 8-11-06 P: 0.476
 X: 39.918 K: 19.986
 Y: 1.902 A: 74.833
 Chord: 39.964 Course: N 51-38-55 W
 Ts: 61.432

PI 16+805.082 3069086.924 615949.875
 Length: 171.743 Course: S 56-46-22 W
 Delta: 74-18-24

Tangent Data
 16+678.320 3069003.628 616045.429
 16+716.356 3069028.622 616016.757
 Length: 38.037 Course: N 48-55-14 W

Spiral Curve Data: CLOTHOID
 TS 16+716.356 3069028.622 616016.757
 SPI 3069046.190 615996.603
 SC 16+756.356 3069052.551 615984.813
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: N 53-09-47 W
 Ts: 88.726

Circular Curve Data
 SC 16+756.356 3069052.551 615984.813
 RP 3068973.343 615942.080
 SC 16+833.077 3069057.647 615910.569
 Delta: 48-50-31 Type: LEFT
 Radius: 90.000 DOC: 63-39-43
 Length: 76.721 Tangent: 40.866
 Mid-Ord: 8.052 External: 8.843
 Chord: 74.419 Course: N 86-04-26 W
 Es: 23.848

Spiral Curve Data: CLOTHOID
 SC 16+833.077 3069057.647 615910.569
 SPI 3069052.956 615898.020
 PC 16+873.077 3069038.306 615875.656
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 61-00-54 W
 Ts: 88.726

PI 16+956.094 3068992.816 615806.212
 Length: 147.483 Course: N 53-38-27 W

Length: 122.861 Course: N 81-47-47 W
 Delta: 17-11-19

Tangent Data
 16+338.167 3068877.542 616356.992
 16+457.989 3068928.923 616248.746
 Length: 119.822 Course: N 64-36-28 W

Circular Curve Data
 PC 16+457.989 3068928.923 616248.746
 RP 3068703.075 616141.543
 SC 16+507.989 3068945.719 616201.740
 Delta: 11-27-33 Type: LEFT
 Radius: 250.000 DOC: 22-55-06
 Length: 50.000 Tangent: 25.084
 Mid-Ord: 1.249 External: 1.255
 Chord: 49.917 Course: N 70-20-14 W
 Es: 3.054

Spiral Curve Data: CLOTHOID
 SC 16+507.989 3068945.719 616201.740
 SPI 3068949.736 616185.549
 PC 16+557.989 3068954.495 616152.539
 Length: 50.000 L Tan: 33.351
 Radius: 250.000 S Tan: 16.683
 Theta: 5-43-46 P: 0.417
 X: 49.950 K: 24.992
 Y: 1.665 A: 111.803
 Chord: 49.978 Course: N 79-53-12 W
 Ts: 61.429

PI 16+619.421 3068963.261 616091.736
 Length: 188.194 Course: N 48-55-14 W
 Delta: 32-52-33

Spiral Curve Data: CLOTHOID
 TS 16+557.989 3068954.495 616152.539
 SPI 3068958.304 616126.117
 SC 16+597.989 3068962.074 616113.300
 Length: 40.000 L Tan: 26.695
 Radius: 140.000 S Tan: 13.359
 Theta: 8-11-06 P: 0.476
 X: 39.918 K: 19.986
 Y: 1.902 A: 74.833
 Chord: 39.964 Course: N 79-04-07 W
 Ts: 61.432

Circular Curve Data
 SC 16+597.989 3068962.074 616113.300
 RP 3069096.385 616152.802
 SC 16+638.320 3068978.831 616076.769
 Delta: 16-30-20 Type: RIGHT
 Radius: 140.000 DOC: 40-55-32
 Length: 40.331 Tangent: 20.306
 Mid-Ord: 1.450 External: 1.465
 Chord: 40.191 Course: N 65-21-31 W
 Es: 6.462

Radius: 90.000 DOC: 63-39-43
 Length: 42.069 Tangent: 21.426
 Mid-Ord: 2.447 External: 2.515
 Chord: 41.687 Course: N 79-45-51 W
 Es: 11.063

Spiral Curve Data: CLOTHOID
 SC 17+104.452 3069070.659 615664.529
 SPI 3069069.922 615651.153
 PC 17+144.452 3069062.603 615625.438
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 78-21-17 W
 Ts: 64.466

PI 17+305.204 3069018.597 615470.827
 Length: 184.070 Course: N 48-58-50 W
 Delta: 56-54-25

Tangent Data
 17+144.452 3069062.603 615625.438
 17+219.893 3069041.951 615552.880
 Length: 75.441 Course: S 74-06-45 W

Spiral Curve Data: CLOTHOID
 TS 17+219.893 3069041.951 615552.880
 SPI 3069034.640 615527.194
 SC 17+259.893 3069033.164 615513.907
 Length: 40.000 L Tan: 26.706
 Radius: 120.000 S Tan: 13.369
 Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981
 Y: 2.218 A: 69.282
 Chord: 39.951 Course: S 77-17-41 W
 Ts: 85.311

Circular Curve Data
 SC 17+259.893 3069033.164 615513.907
 RP 3069162.431 615500.659
 SC 17+339.079 3069050.081 615438.013
 Delta: 37-48-30 Type: RIGHT
 Radius: 120.000 DOC: 47-44-47
 Length: 79.186 Tangent: 41.095
 Mid-Ord: 6.473 External: 6.842
 Chord: 77.757 Course: N 77-26-02 W
 Es: 17.118

Spiral Curve Data: CLOTHOID
 SC 17+339.079 3069050.081 615438.013
 SPI 3069057.061 615426.611
 PC 17+379.079 3069074.588 615406.462
 Length: 40.000 L Tan: 26.706
 Radius: 120.000 S Tan: 13.369
 Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981

Delta: 69-35-12

Spiral Curve Data: CLOTHOID
 TS 16+873.077 3069038.306 615875.656
 SPI 3069023.656 615853.291
 SC 16+913.077 3069018.965 615840.743
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 61-00-54 W
 Ts: 83.017

Circular Curve Data
 SC 16+913.077 3069018.965 615840.743
 RP 3069103.268 615809.231
 SC 16+982.384 3069020.813 615773.161
 Delta: 44-07-18 Type: RIGHT
 Radius: 90.000 DOC: 63-39-43
 Length: 69.306 Tangent: 36.474
 Mid-Ord: 6.589 External: 7.110
 Chord: 67.606 Course: N 88-26-03 W
 Es: 20.494

Spiral Curve Data: CLOTHOID
 SC 16+982.384 3069020.813 615773.161
 SPI 3069026.182 615760.888
 PC 17+022.384 3069042.032 615739.357
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: N 57-52-59 W
 Ts: 83.017

PI 17+086.849 3069080.250 615687.442
 Length: 225.217 Course: S 74-06-45 W
 Delta: 52-14-48

Spiral Curve Data: CLOTHOID
 TS 17+022.384 3069042.032 615739.357
 SPI 3069057.882 615717.826
 SC 17+062.384 3069063.251 615705.553
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: N 57-52-59 W
 Ts: 64.466

Circular Curve Data
 SC 17+062.384 3069063.251 615705.553
 RP 3068980.795 615669.483
 SC 17+104.452 3069070.659 615664.529
 Delta: 26-46-55 Type: LEFT

Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981
 Y: 2.218 A: 69.282
 Chord: 39.951 Course: S 52-15-50 W
 Ts: 90.078

Circular Curve Data

SC 17+591.866 3069047.597 615222.645
 RP 3069150.056 615160.179
 SC 17+678.266 3069031.837 615139.581
 Delta: 41-15-10 Type: RIGHT
 Radius: 120.000 DOC: 47-44-47
 Length: 86.400 Tangent: 45.168
 Mid-Ord: 7.692 External: 8.219
 Chord: 84.545 Course: S 79-15-26 W
 Es: 19.452

Spiral Curve Data: CLOTHOID

SC 17+678.266 3069031.837 615139.581
 SPI 3069034.132 615126.411
 PC 17+718.266 3069043.017 615101.227
 Length: 40.000 L Tan: 26.706
 Radius: 120.000 S Tan: 13.369
 Theta: 9-32-57 P: 0.555
 X: 39.889 K: 19.981
 Y: 2.218 A: 69.282
 Chord: 39.951 Course: N 73-44-58 W
 Ts: 90.078

PI 17+943.717 3069118.026 614888.619
 Length: 236.837 Course: S 44-13-45 W
 Delta: 65-12-13

Tangent Data

17+718.266 3069043.017 615101.227
 17+790.483 3069067.044 615033.124
 Length: 72.217 Course: N 70-34-01 W

Spiral Curve Data: CLOTHOID

TS 17+790.483 3069067.044 615033.124
 SPI 3069078.143 615001.664
 SC 17+840.483 3069081.691 614985.353
 Length: 50.000 L Tan: 33.361
 Radius: 200.000 S Tan: 16.692
 Theta: 7-09-43 P: 0.521
 X: 49.922 K: 24.987
 Y: 2.081 A: 100.000
 Chord: 49.965 Course: N 72-57-15 W
 Ts: 153.234

Circular Curve Data

SC 17+840.483 3069081.691 614985.353
 RP 3068886.260 614942.846
 SC 18+018.087 3069042.545 614818.046
 Delta: 50-52-47 Type: LEFT
 Radius: 200.000 DOC: 28-38-52
 Length: 177.604 Tangent: 95.138
 Mid-Ord: 19.393 External: 21.475

Y: 2.218 A: 69.282
 Chord: 39.951 Course: N 52-09-46 W
 Ts: 85.311

PI 17+477.838 3069139.405 615331.949
 Length: 192.917 Course: S 49-04-54 W
 Delta: 81-56-17

Spiral Curve Data: CLOTHOID

TS 17+379.079 3069074.588 615406.462
 SPI 3069092.135 615386.290
 SC 17+419.079 3069098.484 615374.493
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: N 53-13-22 W
 Ts: 98.760

Circular Curve Data

SC 17+419.079 3069098.484 615374.493
 RP 3069019.231 615331.843
 SC 17+507.787 3069098.559 615289.333
 Delta: 56-28-23 Type: LEFT
 Radius: 90.000 DOC: 63-39-43
 Length: 88.708 Tangent: 48.332
 Mid-Ord: 10.710 External: 12.156
 Chord: 85.160 Course: N 89-56-58 W
 Es: 30.174

Spiral Curve Data: CLOTHOID

SC 17+507.787 3069098.559 615289.333
 SPI 3069092.231 615277.525
 PC 17+547.787 3069074.719 615257.322
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 53-19-26 W
 Ts: 98.760

PI 17+641.944 3069013.048 615186.173
 Length: 315.529 Course: N 70-34-01 W
 Delta: 60-21-05

Tangent Data

17+547.787 3069074.719 615257.322
 17+551.866 3069072.048 615254.239
 Length: 4.079 Course: S 49-04-54 W

Spiral Curve Data: CLOTHOID

TS 17+551.866 3069072.048 615254.239
 SPI 3069054.556 615234.060
 SC 17+591.866 3069047.597 615222.645
 Length: 40.000 L Tan: 26.706
 Radius: 120.000 S Tan: 13.369

Tangent Data
 18+228.100 3068948.422 614639.815
 18+852.010 3068949.193 614015.906
 Length: 623.910 Course: N 89-55-45 W

Spiral Curve Data: CLOTHOID
 TS 18+852.010 3068949.193 614015.906
 SPI 3068949.226 613989.214
 SC 18+892.010 3068951.017 613975.979
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: N 87-22-59 W
 Ts: 234.634

Circular Curve Data
 SC 18+892.010 3068951.017 613975.979
 RP 3069099.661 613996.104
 SC 19+139.851 3069131.817 613849.591
 Delta: 94-40-06 Type: RIGHT
 Radius: 150.000 DOC: 38-11-50
 Length: 247.841 Tangent: 162.748
 Mid-Ord: 48.342 External: 71.330
 Chord: 220.596 Course: N 34-57-20 W
 Es: 112.119

Spiral Curve Data: CLOTHOID
 SC 19+139.851 3069131.817 613849.591
 SPI 3069144.862 613852.454
 PC 19+179.851 3069169.941 613861.591
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: N 17-28-18 E
 Ts: 234.634

PI 19+375.946 3069353.343 613928.409
 Length: 428.072 Course: S 82-16-39 W
 Delta: 117-44-25

Tangent Data
 19+179.851 3069169.941 613861.591
 19+204.835 3069193.416 613870.143
 Length: 24.984 Course: N 20-01-04 E

Spiral Curve Data: CLOTHOID
 TS 19+204.835 3069193.416 613870.143
 SPI 3069218.537 613879.295
 SC 19+244.835 3069231.825 613880.994
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.398
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000

Chord: 171.826 Course: S 76-49-52 W
 Es: 38.025

Spiral Curve Data: CLOTHOID
 SC 18+018.087 3069042.545 614818.046
 SPI 3069032.129 614805.003
 PC 18+068.087 3069008.225 614781.733
 Length: 50.000 L Tan: 33.361
 Radius: 200.000 S Tan: 16.692
 Theta: 7-09-43 P: 0.521
 X: 49.922 K: 24.987
 Y: 2.081 A: 100.000
 Chord: 49.965 Course: S 46-36-58 W
 Ts: 153.234

PI 18+151.689 3068948.319 614723.418
 Length: 942.146 Course: N 89-55-45 W
 Delta: 45-50-30

Spiral Curve Data: CLOTHOID
 TS 18+068.087 3069008.225 614781.733
 SPI 3068989.099 614763.115
 SC 18+108.087 3068980.852 614752.609
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 46-46-31 W
 Ts: 83.603

Circular Curve Data
 SC 18+108.087 3068980.852 614752.609
 RP 3069098.841 614659.989
 SC 18+188.100 3068950.148 614679.746
 Delta: 30-33-46 Type: RIGHT
 Radius: 150.000 DOC: 38-11-50
 Length: 80.013 Tangent: 40.983
 Mid-Ord: 5.304 External: 5.498
 Chord: 79.068 Course: S 67-09-00 W
 Es: 13.341

Spiral Curve Data: CLOTHOID
 SC 18+188.100 3068950.148 614679.746
 SPI 3068948.389 614666.507
 PC 18+228.100 3068948.422 614639.815
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 87-31-29 W
 Ts: 83.603

PI 19+086.643 3068949.482 613781.272
 Length: 429.829 Course: N 20-01-04 E
 Delta: 109-56-50

Spiral Curve Data: CLOTHOID
 SC 19+713.355 3069311.419 613479.282
 SPI 3069316.189 613466.807
 PC 19+753.355 3069328.952 613443.365
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: N 63-58-52 W
 Ts: 69.288

PI 19+882.956 3069390.921 613329.539
 Length: 620.215 Course: S 46-24-40 W
 Delta: 72-09-14

Spiral Curve Data: CLOTHOID
 TS 19+753.355 3069328.952 613443.365
 SPI 3069341.714 613419.922
 SC 19+793.355 3069346.484 613407.447
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: N 63-58-52 W
 Ts: 129.601

Circular Curve Data
 SC 19+793.355 3069346.484 613407.447
 RP 3069206.377 613353.874
 SC 19+942.253 3069327.808 613265.813
 Delta: 56-52-30 Type: LEFT
 Radius: 150.000 DOC: 38-11-50
 Length: 148.898 Tangent: 81.232
 Mid-Ord: 18.099 External: 20.583
 Chord: 142.860 Course: S 82-29-17 W
 Es: 36.141

Spiral Curve Data: CLOTHOID
 SC 19+942.253 3069327.808 613265.813
 SPI 3069319.967 613255.001
 PC 19+982.253 3069301.563 613235.668
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 48-57-26 W
 Ts: 129.601

PI 20+472.867 3068963.295 612880.314
 Length: 316.734 Course: N 83-32-01 W
 Delta: 50-03-19

Tangent Data
 19+982.253 3069301.563 613235.668
 20+325.878 3069064.641 612986.779

Chord: 39.912 Course: N 15-46-32 E
 Ts: 170.211

Circular Curve Data
 SC 19+244.835 3069231.825 613880.994
 RP 3069243.238 613791.721
 SC 19+389.781 3069332.894 613799.580
 Delta: 92-16-32 Type: LEFT
 Radius: 90.000 DOC: 63-39-43
 Length: 144.946 Tangent: 93.647
 Mid-Ord: 27.637 External: 39.884
 Chord: 129.781 Course: N 38-51-08 W
 Es: 85.519

Spiral Curve Data: CLOTHOID
 SC 19+389.781 3069332.894 613799.580
 SPI 3069334.064 613786.235
 PC 19+429.781 3069330.471 613759.742
 Length: 40.000 L Tan: 26.736
 Radius: 90.000 S Tan: 13.396
 Theta: 12-43-57 P: 0.739
 X: 39.803 K: 19.967
 Y: 2.953 A: 60.000
 Chord: 39.912 Course: S 86-31-12 W
 Ts: 170.211

PI 19+687.643 3069295.821 613504.218
 Length: 198.889 Course: N 61-26-07 W
 Delta: 36-17-14

Tangent Data
 19+429.781 3069330.471 613759.742
 19+618.355 3069305.132 613572.878
 Length: 188.574 Course: S 82-16-39 W

Spiral Curve Data: CLOTHOID
 TS 19+618.355 3069305.132 613572.878
 SPI 3069301.545 613546.428
 SC 19+658.355 3069301.526 613533.072
 Length: 40.000 L Tan: 26.692
 Radius: 150.000 S Tan: 13.356
 Theta: 7-38-22 P: 0.444
 X: 39.929 K: 19.988
 Y: 1.776 A: 77.460
 Chord: 39.968 Course: S 84-49-25 W
 Ts: 69.288

Circular Curve Data
 SC 19+658.355 3069301.526 613533.072
 RP 3069451.526 613532.855
 SC 19+713.355 3069311.419 613479.282
 Delta: 21-00-30 Type: RIGHT
 Radius: 150.000 DOC: 38-11-50
 Length: 55.000 Tangent: 27.812
 Mid-Ord: 2.514 External: 2.557
 Chord: 54.692 Course: N 79-34-44 W
 Es: 8.316

Circular Curve Data

SC 20+745.037 3068997.462 612594.639
 RP 3069587.819 612701.776
 SC 20+802.329 3069010.366 612538.841
 Delta: 05-28-16 Type: RIGHT
 Radius: 600.000 DOC: 09-32-57
 Length: 57.292 Tangent: 28.668
 Mid-Ord: 0.684 External: 0.684
 Chord: 57.270 Course: N 76-58-43 W
 Es: 4.396

Spiral Curve Data: CLOTHOID

SC 20+802.329 3069010.366 612538.841
 SPI 3069017.610 612513.166
 PC 20+882.329 3069035.485 612462.904
 Length: 80.000 L Tan: 53.346
 Radius: 600.000 S Tan: 26.678
 Theta: 3-49-11 P: 0.444
 X: 79.964 K: 39.994
 Y: 1.777 A: 219.089
 Chord: 79.984 Course: N 71-41-47 W
 Ts: 108.992

PI 21+087.005 3069104.065 612270.059
 Length: 274.206 Course: S 60-44-58 W
 Delta: 48-49-38

Tangent Data

20+882.329 3069035.485 612462.904
 21+041.615 3069088.856 612312.826
 Length: 159.285 Course: N 70-25-24 W

Circular Curve Data

PC 21+041.615 3069088.856 612312.826
 RP 3068994.637 612279.319
 PT 21+126.834 3069081.886 612230.456
 Delta: 48-49-38 Type: LEFT
 Radius: 100.000 DOC: 57-17-45
 Length: 85.220 Tangent: 45.391
 Mid-Ord: 8.941 External: 9.819
 Chord: 82.664 Course: S 85-09-47 W
 Es: 9.819

PI 21+355.649 3068970.080 612030.817

Tangent Data

21+126.834 3069081.886 612230.456
 21+355.649 3068970.080 612030.817
 Length: 228.815 Course: S 60-44-58 W

Length: 343.625 Course: S 46-24-40 W

Spiral Curve Data: CLOTHOID

TS 20+325.878 3069064.641 612986.779
 SPI 3069037.041 612957.785
 SC 20+385.878 3069025.068 612941.730
 Length: 60.000 L Tan: 40.030
 Radius: 250.000 S Tan: 20.027
 Theta: 6-52-32 P: 0.600
 X: 59.914 K: 29.986
 Y: 2.398 A: 122.474
 Chord: 59.962 Course: S 48-42-09 W
 Ts: 146.989

Circular Curve Data

SC 20+385.878 3069025.068 612941.730
 RP 3069225.477 612792.277
 SC 20+544.285 3068975.483 612794.062
 Delta: 36-18-15 Type: RIGHT
 Radius: 250.000 DOC: 22-55-06
 Length: 158.407 Tangent: 81.964
 Mid-Ord: 12.442 External: 13.093
 Chord: 155.771 Course: S 71-26-19 W
 Es: 26.568

Spiral Curve Data: CLOTHOID

SC 20+544.285 3068975.483 612794.062
 SPI 3068975.340 612774.035
 PC 20+604.285 3068979.848 612734.260
 Length: 60.000 L Tan: 40.030
 Radius: 250.000 S Tan: 20.027
 Theta: 6-52-32 P: 0.600
 X: 59.914 K: 29.986
 Y: 2.398 A: 122.474
 Chord: 59.962 Course: N 85-49-31 W
 Ts: 146.989

PI 20+774.030 3068998.965 612565.595
 Length: 313.668 Course: N 70-25-24 W
 Delta: 13-06-38

Tangent Data

20+604.285 3068979.848 612734.260
 20+665.037 3068986.690 612673.894
 Length: 60.752 Course: N 83-32-01 W

Spiral Curve Data: CLOTHOID

TS 20+665.037 3068986.690 612673.894
 SPI 3068992.698 612620.888
 SC 20+745.037 3068997.462 612594.639
 Length: 80.000 L Tan: 53.346
 Radius: 600.000 S Tan: 26.678
 Theta: 3-49-11 P: 0.444
 X: 79.964 K: 39.994
 Y: 1.777 A: 219.089
 Chord: 79.984 Course: N 82-15-38 W
 Ts: 108.992

B-8 Scoping Report and TOR of EIA

According to the Minutes of Meeting of the Inception Report, the Scoping Report and TOR of EIA was prepared in cooperation with DOR, JICA Study team, and other related organizations. DOR submitted the Scoping Report and TOR to MOPE through MPPW on 25th May 2000. MOPE held the EIA Report Recommendation Committee on 8th and 9th of June 2000 to examine the TOR, and notified DOR of its approval on 24th of June 2000.

In the delimitation stage of EIA scope, DOR published out a 15 days public notice on 16th April 2000 in the daily newspaper for informing the concerned VDCs and other stakeholders about the Project. The public notice called on the various stakeholders to state their opinions and suggestions on the environmental aspects. Two VDCs (Ramkot and Bhimdhunga) offered their written concerns to the proponent in response to the public notice. The concerns raised by local people were duly considered in the scope delimitation and TOR spelling.

The followings are the TOR of EIA approved by MOPE, and the official letter from MOPE to notify DOR of the TOR approval.

Terms of Reference for Environmental Impact Assessment Study

(Pursuant to Rule 5 of the Environment Protection Rules, 1997)

1. Name of the Proponent and Address

Kathmandu - Naubise Alternative Road Feasibility Study Project
Department of Roads
Ministry of Physical Planning and Works
Thapathali, Kathmandu

2. Brief Description of the Proposal

2.1 Introduction

Kathmandu, the Capital of Nepal, is connected with the southern parts of the country by two national highways (trunk roads) - the Tribhuvan Highway and the Prithivi Highway. The Tribhuvan and Prithivi Highways diverge from Naubise, Dhading and the road condition in between Kathmandu and Naubise is vulnerable in view of traffic congestion, steepness and geological erodibility. Any disturbance in this section of the road affects the Capital.

HMG has accorded high priority to the construction of a new alternate road linking Kathmandu and Naubise in the road development Master Plan in 1997 and has planned to construct it to minimize the traffic problem in this section of the road. HMG also carried out a study on Alternative Kathmandu Valley Access Road (Ring Road - Bhimdhunga - Dharke) as a component of the Fourth Road Improvement Project with the assistance of the Asian Development Bank to explore possibilities for the alternative routes. Kathmandu Valley is also linked with Naubise via Bhimdhunga by the "green road" which was constructed in the mid-1980s with the assistance of the GTZ. Light and heavy vehicles can pass through this single lane hill terrain road to Dharke.

HMG requested the Government of Japan (GOJ) to assist in the construction of this alternative road and entered into an agreement on 17 December 1999 to conduct a feasibility study on the construction of Kathmandu-Naubise Alternate Road. The GOJ through its official agency the Japan International Cooperation Agency (JICA) for the implementation of the technical cooperation programs has recently prepared the Inception Report. The Team is expected to conduct survey, forecast traffic, analyze alternative routes, prepare design and cost estimates, evaluate the project in terms of costs and benefits and prepare implementation program. The study team has planned to investigate the environmental conditions of the different alternative routes considering the environmental parameters set out in this TOR and prepare Initial Environmental Examination report. The finding of IEE could be useful in carrying out EIA Study. Based on this study best alternative alignment will be selected by August, 2000 and EIA study shall be carried out from September 2000.

The proposed road shall start at Sitapaila, Ring Road and terminate at Dharke which is located at about 30 km. far from Kathmandu on Prithivi Highway. The road passes through the forest, irrigated and non-irrigated area in the Middle Mountain, ascends through a steep ridge at Bhimdhunga and descends to Dharke. The total road length will be around 24 km. with a bridge at Mahesh Khola near Dharke to connect with Prithvi Highway. The road passes from various settlements and six Village Development Committees namely Sitapaila, Ramkot and Bhimdhunga VDCs in the Kathmandu district and Chhatre Deurali and Jeevanpur and Naubise VDCs in the Dhading district. It is likely to construct a tunnel in the Bhimdhunga section.

The *Proponent*, the Kathmandu - Naubise Alternative Road Feasibility Study Project of the Department of Roads, Ministry of Physical Planning and Works, will prepare the Feasibility Study EIA report in accordance with the environmental legislation [Environment Protection Act (EPA), 1997 and Environment Protection Rules (EPR), 1997 (amendment 1999)]. This Terms of Reference (TOR) is issued to the Proponent with due consideration on the Scoping Report and Schedule 4 of the EPR, 1997.

2.2 Objectives

The main objective of the EIA study is to assess the likely impacts of the Kathmandu-Naubise Alternative Road on the environment and facilitate to make the road environmentally sound and sustainable. The specific objectives are to:

1. Assess and predict the impacts of project activities on physical, biological, socio-economic and cultural resources;
2. Examine the significance of the environmental implications;
3. Recommend preventive and curative measures, including benefits augmentation measures and environmental management plan; and
4. Provide information for decision-makers about the environmental implications of the proposed project and associate costs.

2.3 Study Coverage

The physical coverage of this study will be the right-of-way and about 1 km surface distance on both sides of the road as an immediate influence area (IIA) along the road alignment.

3. Necessary Information and Data Collection Methods

The proponent shall collect and analyze necessary data and statistics in the field of physical, biological, socio-economic and cultural aspects. Necessary information shall be processed and evaluated to identify and predict environmental impacts. The Proponent shall collect and document information in the final EIA report on aspects of physiography, climatic, geology, soil, air and water quality, and noise level, as major elements of physical environment. The proponent shall collect detail level of information on likely loss of trees as a part of site clearance in each type of legally categorized forest. The EIA study shall also include adequate information on wild animals, birds and fishes and likely impacts on these biological resources. Furthermore, the EIA report shall document socio-economic characteristics such as population, major economic activities, loss of farm land, and social services facilities within its physical coverage mentioned above. The report shall include impacts on land system with focus on land acquisition, compensation and rehabilitation issues. Likely impacts of the project activities on cultural resources, costumes and religious sites shall be assessed and interpreted narratively and graphically as appropriate, and shall be included in the EIA report.

In order to meet the above objectives and assess the impacts of the project activities on the environment, the Proponent may use different methods as mentioned in the EIA training manual for Professionals and Managers, 1996. The Proponent may also review secondary information contained in the published and unpublished reports, and interpret maps and photographs. The Proponent shall employ, but not limited to, questionnaire, checklists, observation, interact with the local people, district level officials, community groups and representatives of the local bodies to collect field level information. The Proponent shall also use Participatory Rural Appraisal (PRA) and Focus Group Discussion (FGD), as applicable. Appropriate data sheets should be used to collect the field level information.

Physical environmental parameters can be collected through map interpretation, observation and trekking along the road alignment. The biological information can be collected through measurement and jungle trek. Loss of forest area should be calculated and volume of timber to be extracted during the site clearance should be estimated by using quarter-girth formula as mentioned in the Forest Rules, 1995. Wildlife information can be collected through discussion with the local people, and pug marks of the wild mammals, jungle trek and observation method. Fishery information can be generated through discussion with the fisherman, if any. Intensive household survey shall be done to generate information on land acquisition and compensation issues. Environmental impacts identification and prediction methods included in the National EIA guidelines, 1993, and EIA guidelines for Forestry Sector, 1995 and the draft EIA guidelines for Road Sector, 1996 and other guidelines can also be used to collect information, predict and evaluate the environmental impacts.

4. Policy, Legislation and Guidelines

The Proponent shall review, but not limited to, the following policies, legislation and guidelines. Major highlights of this review should be included in the EIA report and suggest for amendment, if any, for the smooth implementation of the project.

- . Ninth Plan policies and strategies with emphasis on environment and road sector
- . Environment Protection Act, 1996 and its Rules, 1997 (amendment 1999)
- . Public Road Act, 1974
- . Forest Act, 1992 and its Rules 1995
- . Land Acquisition Act, 1978
- . Local Self Governance Act, 1999;
- . National EIA Guidelines, 1993
- . EIA Guidelines for Forestry Sector, 1995
- . Draft EIA Guidelines for Road Sector, 1996
- . Environmental Management Guidelines (of the DOR), 1997
- . Policy Document of DOR on Environmental Assessment in the Strategic Road Network, 2000,
- . State of Environmental of Nepal, 2000.

5. Required Time, Budget and Study Team

5.1 Time

Although the Proponent is free to prepare and submit the EIA report, MOPE advises the Proponent to complete the EIA report within the following time frame in the spirit of the Scoping Report. MOPE will make every effort to approve the EIA report to meet the deadline as included in the Inception Report of this Project.

Activities	Tentative Date	Remarks
EIA Study		
Team mobilization	September 2000	
Literature Review	September 2000	
Field Study	Sept. and Oct. 2000	Three weeks (intensive field study)
Data compilation	October 2000	
Draft Report Preparation	Nov. and Dec. 2000	
Preparation of materials and Public Hearing	December, 2000	
Draft Report Submission	First Week of January 2001	
Comment and Suggestion collection	Third Week of January 2001	Two weeks
Final Report Preparation and Submission	Last Week of January 2001	
Receipt of the Final EIA Report by MOPE	Last Week of January 2001	
Public Notice by MOPE	First Week of February 2001	Public Notice for 30 days
Meetings of the EIA Report Suggestion Committee	First Week of March 2001	
Approval of the EIA Report	By 15 March 2001	

5.2 Estimated Budget

A total of about Rs. 3,000,000 has been estimated to complete the EIA study for this Alternative Road.

5.3 Study Team

The Proponent shall mobilize the following multi-disciplinary team of Environmental Specialist / Experts to complete this EIA study.

- . Environmental Specialist (Team Leader)
- . Highway Engineer
- . Forester/Biologist
- . Socio-Economist and/or Agri-Economist
- . Sociologist
- . Geologist
- . Bio-Engineering Specialist
- . Legal Expert
- . Land Surveyor

Adequate number of enumerators and field assistants may be mobilized to collect and process the field data.

6. Scope of Work

The Proponent shall assess and evaluate the likely impacts of the proposed road on physical, biological, socio-economic and cultural aspects for both construction, operation and maintenance periods in the following areas:

6.1 Physical Issues

6.1.1 Construction Stage

- . Change in land use and likely loss of farm and forest lands;
- . Landscape disturbance;
- . Land stability, landslide, soil erosion and downstream sedimentation, including geological hazard;
- . Tunneling including blasting and vibration;
- . Change in air quality due to dust and exhaust emission, change in water quality due to sedimentation, and noise level;
- . Disposal of large volume of spoil due to tunnel construction and hill slope cutting;
- . Management of solid wastes disposal generated by the construction workers
- . Stocking piling of construction materials;
- . Operation of quarries and borrowpits;
- . Possibility of congestion at the Ring Road;
- . Drainage alteration and associated erosion and sediment
- . Road safety measures.

6.1.2 Operation and Maintenance Stage

- . Road slope stability and management;
- . Human health associated with the change in air quality and noise level along the road alignment.

6.2 Biological Issues

6.2.1 Construction Stage

- Loss of forest area as a part of site clearance along the road alignment and right-of-way;
- Pressure on legally categorized forests for firewood and timber;
- Possible impact on flora, fauna (biodiversity);
- Disturbance to wildlife movement, and possible hunting and poaching;
- Use of forest product by the construction workers and construction activities including bitumen heating.
- Community forest and associated issues.

6.2.2 Operation and Maintenance Stage

- Impact on and growth of natural forest near the Bhimdhunga ridge;
- Possible extraction of firewood and timber;
- Disturbance to wildlife movement.

6.3 Socio-economic and Cultural Issues

6.3.1 Construction Stage

- Loss of agriculture products;
- Population displacement, if any;
- Loss of assets due to land acquisition;
- Land acquisition and compensation at market price;
- Resettlement, relocation and/or rehabilitation;
- Effect or pressure on social service facilities such as drinking water, school, health post etc.;
- Effect on irrigation schemes;
- Effect on health, sanitation and safety;
- Availability of local construction workers, employment opportunities and mobilization of local people;
- Impact on cultural, religious and historical sites;
- Protection of public important places; and
- Mobilization of local people for road construction.

6.3.2 Operation and Maintenance Stage

- Employment generation to local people;
- Possible increase in vegetable production, and enhancement of other economic activities; and
- Possible township development and likely environmental impacts along the road alignment.

6.4 Management Issues

After detail analysis of likely impacts of the project activities on the local environment, a mechanism should be included in the EIA report to augment the beneficial impacts and minimize the adverse ones. The environmental management plan should take into account the mitigation measures for each impact identified, monitoring of impacts and environmental auditing components, including environmental management responsibilities. Furthermore, the EIA study should take into account the project execution issues, as appropriate, strict management of contractor's work and use of appropriate technologies for road construction.

7. Environmental Impacts

The EIA study should identify, assess and evaluate environmental impacts on physical, chemical, biological, socio-economic and cultural aspects employing standard analytical methods. Impact assessment matrix should be included in the EIA report.

8. Alternative Analysis

Alternative analysis should be an integral part of the EIA report. The Proponent shall analyze the likely environmental impacts of project activities in each possible alternatives with due consideration on.

- . design
- . project site
- . technology management methods, schedule, required raw materials
- . environment management methods
- . acceptability or otherwise of the risks likely to emerge while implementing the proposal
- . other relevant points

Each alternative should be compared in terms of environmental impacts and benefits, and the best alternative should be recommended for project construction and mitigation measures should be proposed.

9. Mitigation Measures

In order to avoid and/or minimize adverse environmental impacts, cost effective and locally implementable mitigation measures should be included in the EIA report. The EIA report should also include compensatory, corrective and preventive measures as applicable. The report may also include benefit augmentation measures. Furthermore, mitigation measures should be included for both construction and operational stages, particularly to address bio-physical, socio-economic and cultural impacts as applicable. Mitigation measures can be included as a part of the environmental management action plan (EMAP).

10. Costs and Benefits of the Project

The EIA study should assess the costs and benefits of the project and include them in the main EIA report. It should also include cost-effectiveness of the mitigation measures.

11. Monitoring Requirements

Important monitoring parameters, schedule of monitoring and responsible agency(ies) for monitoring should be included in the EIA report. The report should specify clearly the monitoring parameters for both construction and operational stages with implementation mechanism(s) for identified impacts and associated mitigation measures. The monitoring issues can be presented in the matrix form as a part of the Environmental Management Plan.

The EIA report should also indicate the environmental auditing requirements, auditing indicators, type of, and methods for, auditing.

12. Other Information

The EIA report should also include relevant information, references, annexes, map, photo, tables, charts, graphs and questionnaires, as applicable. Relevant information should be concisely presented in the main report and detail information can be given in annexes.

13. The EIA Report Format

Although, the EIA report format has been included in Schedule 6 of the Environment Protection Rules, 1997, the Proponent may prepare and submit the EIA report in the following format by accommodating all issues of Schedule 6 of the EPR, 1997. In any case, the EIA report should not omit any components as mentioned in this TOR and Schedule 6 of the EPR, 1997.

- . Executive Summary (If the report is prepared in English, the executive summary should also be included in the Nepali language and vice versa)
- . Table of Contents
- . Acronyms
- . Introduction
- . Project Description
- . Policy, Legislation, Guidelines and Institutions
- . Existing Environmental Conditions
- . Alternative Analysis
- . Impacts Identification
- . Mitigation Measures
- . Environmental Management Plan (The Plan may include cost for mitigation measures, monitoring requirements, framework for environmental auditing, and institutional arrangement for the implementation of EMP)
- . Conclusion and Recommendation
- . References
- . Appendices
- . Maps
- . Tables

Note : The final EIA report should include the information on public hearing, a recommendation letter of the VDC(s) or a Municipality(ies) where the proposal will be implemented, and the approved Scoping Report and the Terms of Reference in the annexes.

14. Deliverables

The Proponent should submit fifteen copies of the final EIA report of this Project including recommendation from concerned VDCs to the Ministry of Population and Environment via the concerned agency in accordance with Rules 10 of the Environment Protection Rules, 1997.



श्री ५ को सरकार

जनसंख्या तथा वातावरण मन्त्रालय



सिंहदरवार, काठमाडौं

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फोन नं. :

फ्याक्स २०५७-१२२२२३३८

पत्र संख्या :-

च.नं. :- १८४६

श्री भौतिक योजना तथा निर्माण मन्त्रालय,
सिंहदरवार ।

मिति:

बिषय: नौविसे-थानकोट वैकल्पिक सडक सम्भाव्यता अध्ययन आयोजनाको Scoping र Terms of Reference स्वीकृत गरिएको बारे ।

उपर्युक्त बिषयको त्यहाँको च.नं. यो.प्र. १८४/०५६/५७/१०३६ को पत्र साथ प्राप्त Scoping र Terms of Reference देहायका कुराहरू समावेश गर्ने गरी वातावरण संरक्षण नियमावली २०५४ वमोजिम स्वीकृत गरिएको व्यहोरा निर्णयानुसार अनुरोध छ ।

१. पेज १-१, Chapter 1, Introduction को तेस्रो प्याराग्राफको अन्तिम हरफमा निम्न शब्दहरू थप गर्ने - "This scoping report and issues identified are based upon the alignment corridor between Sitapaila-Dharke (fig. 1). A number of alternative alignments in this corridor will be studied and EIA report shall be prepared for the best alternative only. However, all the issues identified in this scoping report will be examined during EIA study".
२. वातावरण संरक्षण नियमावली २०५४ को अनुसूची ४ वमोजिमको ढांचामा TOR तयार गर्ने ।

(जितक राज भट्ट)

शाखा अधिकृत

शाखा अधिकृत

Letter from MOPE on the scoping and TOR of EIA (Unofficial Translation)

**His Majesty's Government of Nepal
Ministry of Population and Environment**

Dispatch No. 1897

To Ministry of Physical Planning and Works
Singh Durbar, Kathmandu

Date 32/2/2057 (14 June, 2000)

**Subject: Approval of Scoping and Terms of Reference of Kathmandu – Naubise
Alternate Road F/S Project**

1. With reference to your letter Cha No. 184/056/57/1036 the Scoping and Terms of Reference has been approved as per the Environmental Protection Regulations 2054 by including the following in the submitted document.

The following words should be added in the page 1-1, chapter 1 third paragraph of last line: -“This scoping report and issues identified are based upon the alignment corridor between Sitapaila - Dharke (fig 1). A number of alternative alignments in this corridor will be studied and EIA report shall be prepared for the best alternative only. However, all the issues identified in this scoping report will be examined during EIA study.”

2. TOR should be prepared as specified in the Appendix 4 of Environmental Protection Regulations 2054.

Signed

Janak Raj Bhatta
Section Officer

JICA

