	Project: Design By: Date: 22/1/2026

Horizontal Alignment
Road string road1
Chainage (0 - 793.906)

Curve Type	Circular
Curve	IP1
N	209.586
E	247.094
Central Angle of Circular Curve	0°20'34"
Radius (R_c)	30 m
Design Speed	30 kph
Super Elevation (SE)	0.06 %

Reference	Calculation	Output
	Total tangent distance (IP to TS or ST), Ts = (R_c + P) Tan (△ /2) + K = (Radius of circular curve + Offset from intial tangent to PC of shifted circle) Tan (△ /2) + Tangent distance from TS to PC of shifted circle = (30 + 0.000) Tan ((4.789-5.132)/2) + 0.000 = 5.197 m	5.197m
	External distance, Es = R_c x ((Sec (△ /2)) - 1) = Radius of circular curve x ((Sec (△ /2)) - 1) = 30 x ((Sec ((4.789-5.132)/2)) - 1) = 0.447 m	0.447m
	Degree of Curvature, Dc = 100 / R_c = 100 / Radius of circular curve = 100 /30 = 190°59'9"	190°59'9"
	Length of Circular curve, Lc = R_c x △ where △ c is in radians = 30 × 0.343 = 10.293m	10.293 m

Curve Type	Spiral
Curve	IP2
N	222.210
E	83.034
Central Angle of Circular Curve	0°56'32"
Radius (R_c)	30 m
Design Speed	30 kph
Super Elevation (SE)	0.06 %

Reference	Calculation	Output
	Total tangent distance (IP to TS or ST), Ts = (R_c + P) Tan (Δ /2) + K = (Radius of circular curve + Offset from intial tangent to PC of shifted circle) Tan (Δ /2) + Tangent distance from TS to PC of shifted circle = (30 + 1.239) Tan ((0.449-4.789)/2) + 14.876 = 60.583 m	60.583 m
	External distance, Es = (R_c + P) Sec (Δ /2) - R_c = (Radius of circular curve + Offset from intial tangent to PC of shifted circle) Sec (Δ /2) - Radius of circular curve = (30 + 1.239) Sec ((0.449-4.789)/2) - 30 = 25.362 m	25.362 m
	Degree of Curvature, Dc = 100 / R_c = 100 / Radius of circular curve = 100 /30 = 190°59'9"	190°59'9"
	Length of Circular curve, Lc = R_c x Δ where Δ c is in radians = 30 × 0.943 = 28.275m	28.275 m
	Spiral length from TS to SC or ST to CS, Ls For spiral curve, Spiral Length is equivalent to Runoff length Spiral Run off calculation type = Fixed Mode with Adjustment Factor = 30.000	30.000 m
	Central angle of Spiral arc Ls (Spiral angle), θs = Ls × Dc / 200 (in degrees) = Spiral length from TS to SC or ST to CS × Degree of circular curve / 200 = 30.000 × 3.333/ 200 = 28°38'51"	28°38'51"
	Deflection angle at TS from initial tangent to SC, θc = $\tan^{-1}(Y_s / X_s)$ = $\tan^{-1}$(Tangent offset from initial tanget of any point on Spiral / Tangent distance along initial tangent of any point on Spiral with reference to TS or ST) = $\tan^{-1}$(4.911 / 29.259) = 9°31'43"	9°31'43"
	Tangent distance along initial tangent of any point on Spiral with reference to TS or ST, Xs = L (1 - θ^2/10 + θ^4/216 - θ^6/9360 + θ^8/685440) where θ is in radians = 29.259 m	29.259 m
	Tangent offset from initial tangent of any point on Spiral, Ys = L (θ/3 - θ^3/42 + θ^5/1320 - θ^7/75600 + θ^9/6894720) where θ is in radians = 4.911 m	4.911m
	Long Chord (TS to SC or CS to ST),LC = $\sqrt{(X_S^2 + Y_S^2)}$	29.668 m

	$= \sqrt{(29.259^2 + 4.911^2)}$ $= 29.668$ m	
	Long Tangent of Spiral, LT $= X_S - Y_S \text{ Cot } \theta_S$ $= 29.259 - 4.911 \text{ Cot } 0.500$ $= 20.268$ m	20.268 m
	Short Tangent of Spiral, ST $= Y_S / \text{Sin } \theta_S$ $= 4.911 / \text{Sin } 0.500$ $= 10.244$ m	10.244 m
	Offset from initial tangent to PC of shifted circle, P $= Y_S - R_C(1 - \text{Cos } \theta_S)$ $= 4.911 - 30\ (1 - \text{Cos } 0.500)$ $= 1.239$ m	1.239m
	Tangent distance from TS to PC of shifted circle, k $= X_S - R_C \text{Sin } \theta_S$ $= 29.259 - 30\ (\text{Sin } 0.500)$ $= 14.876$ m	14.876 m

Vertical Alignment
Road string road1
Chainage (299.219 - 608.556)

VIP. No.	VIP1
VIP. CH.	300
VIP. Elevation	32.28
Grade In	1.547 %
Grade Out	1.235 %
Design Speed	30 kph

Reference	Calculation	Output
	Delta Grade, ▵ G (%) = |Outgoing Grade - Incoming Grade| = 1.235 - 1.547 = -0.312	-0.312
	Vertical Curve Length (m) = K value x ▵ G = K value x Grade Difference = 5.000 x |1.235 - 1.547| = 1.562	1.562m
	Required Length (m) = Min. K x ▵ G = Minimum K x Grade Difference = 5 x |1.235 - 1.547| = 1.562	1.562m
	Middle Ordinate, Mo = (▵ G x VCL) / 800 = (Grade Difference x Vertical Curve Length) / 800 = |1.235 - 1.547| x 1.562 / 800 = 0.001	0.001
	K = VCL / ▵ G = Vertical Curve Length / Grade Difference = 1.562 / |1.235 - 1.547| = 5.000	5.000

VIP. No.	VIP2
VIP. CH.	600
VIP. Elevation	35.91
Grade In	1.235 %
Grade Out	-2.187 %
Design Speed	30 kph

Reference	Calculation	Output
	Delta Grade, ▵ G (%) = |Outgoing Grade - Incoming Grade| = -2.187 - 1.235 = -3.423	-3.423
	Vertical Curve Length (m) = K value x ▵ G = K value x Grade Difference = 5.000 x |-2.187 - 1.235| = 17.113	17.113 m
	Required Length (m) = Min. K x ▵ G = Minimum K x Grade Difference = 5 x |-2.187 - 1.235| = 17.113	17.113 m
	Middle Ordinate, Mo = (▵ G x VCL) / 800 = (Grade Difference x Vertical Curve Length) / 800 = |-2.187 - 1.235| x 17.113 / 800 = 0.073	0.073
	K = VCL / ▵ G = Vertical Curve Length / Grade Difference = 17.113 / |-2.187 - 1.235| = 5.000	5.000