Steel Composite Bridge Wizard

How to Use the Multi-Curve Option

MIDASoft Technical Support Team

Introduction

Using the Multi-Curve Advanced option, the curvature can also be defined for a combination of straight and curve geometries. The Multi-Curve option can handle plan curve, vertical curve and bank rotation.

An example is used to demonstration the function and the calculation. To review the sample input in the example, follow the below steps.

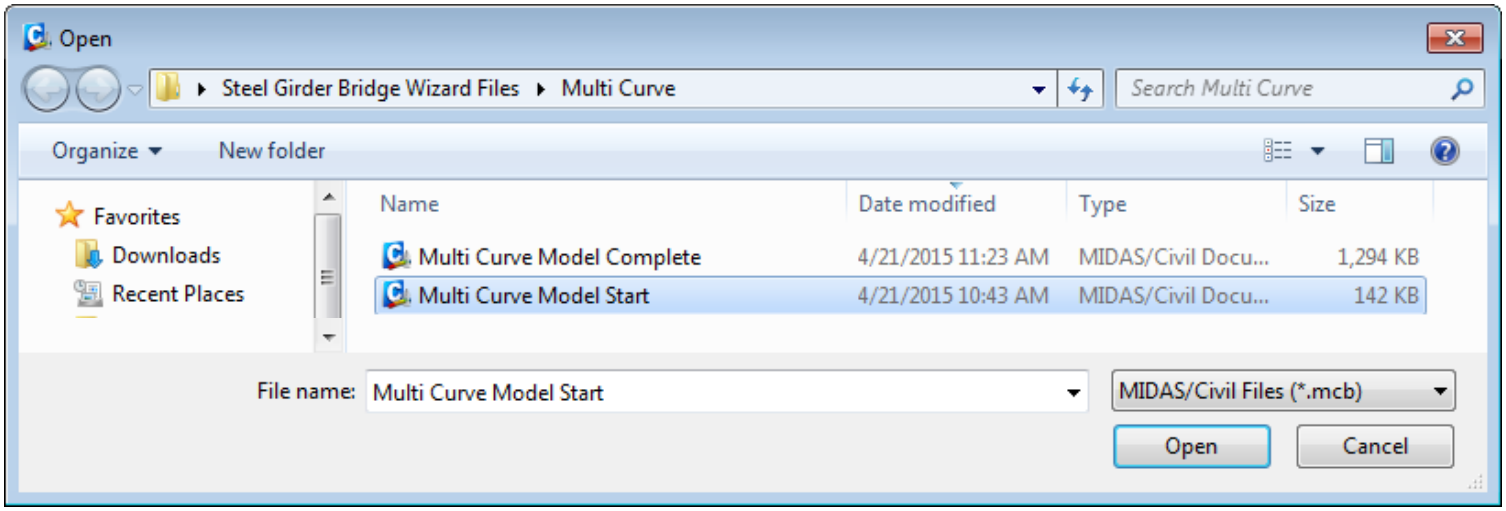
1. Open the “Multi Curve Model Start.mcb”
2. Go to the main menu Structure > Wizard > Steel Composite Bridge Wizard.
3. Click “Open…” at the bottom of the Steel Composite Girder Bridge Wizard window.
4. Open the “Multi Curve Wizard.wzd”.
5. In the Layout tab > Multi-Curve option, click “Advnaced…”
6. Once the input is reviewed, the Advanced Curve window can be closed.
7. Click “OK” to close the wizard and see the bridge model created.
8. The completed model can be also found: “Multi Curve Model Complete.mcb”

Example Model

Using the Multi-Curve Advanced option, the curvature can also be defined for a combination of straight and curve geometries. The Multi-Curve option can handle plan curve, vertical curve and bank rotation.

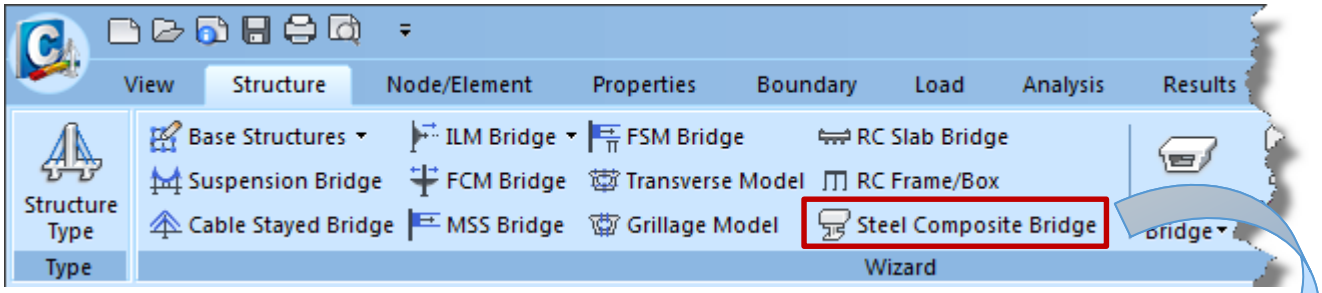
An example is used to demonstration the function and the calculation. To review the sample input in the example, follow the below steps.

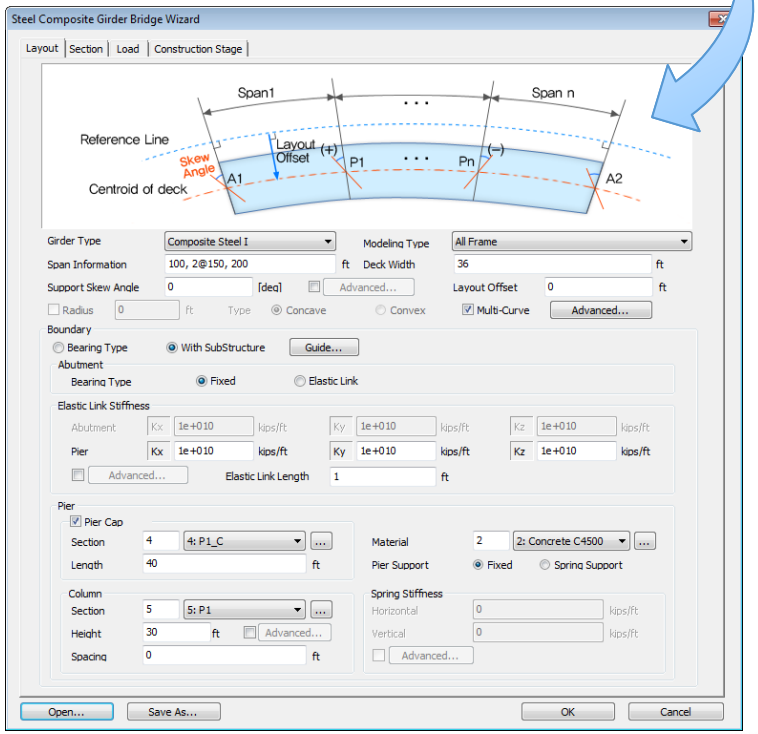
1. Open the “Multi Curve Model Start.mcb”



Example Model

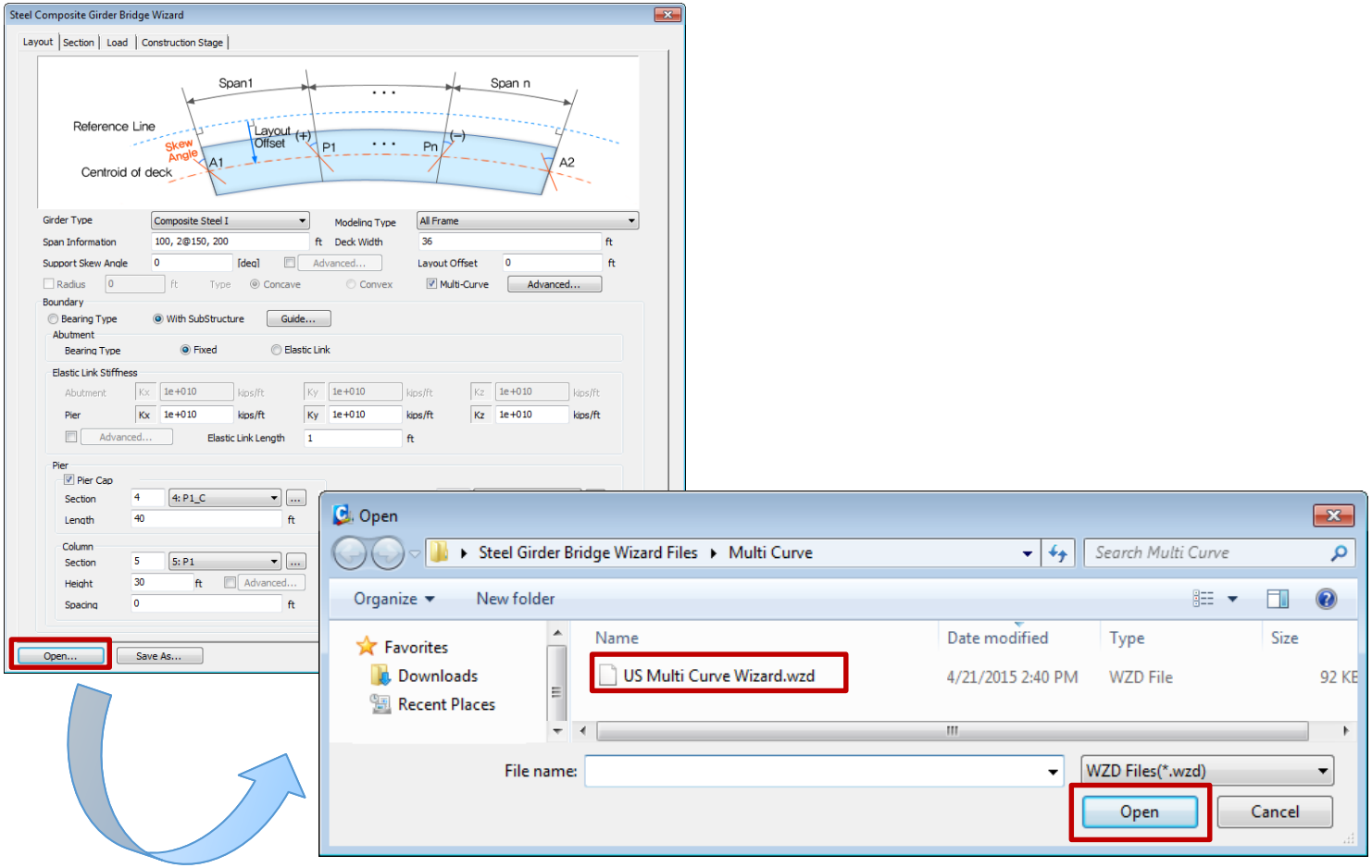
2. Go to the main menu Structure > Wizard > Steel Composite Bridge Wizard.





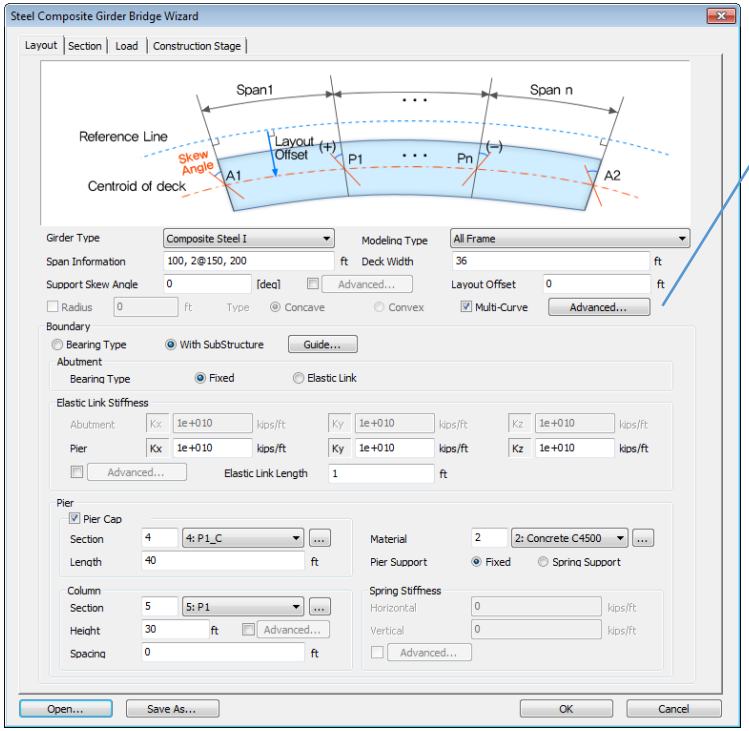
Example Model

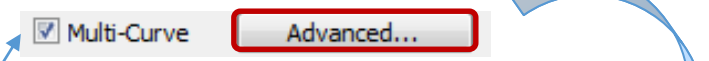
3. Click “Open…” at the bottom of the Steel Composite Girder Bridge Wizard window.
4. Open the “Multi Curve Wizard.wzd”.

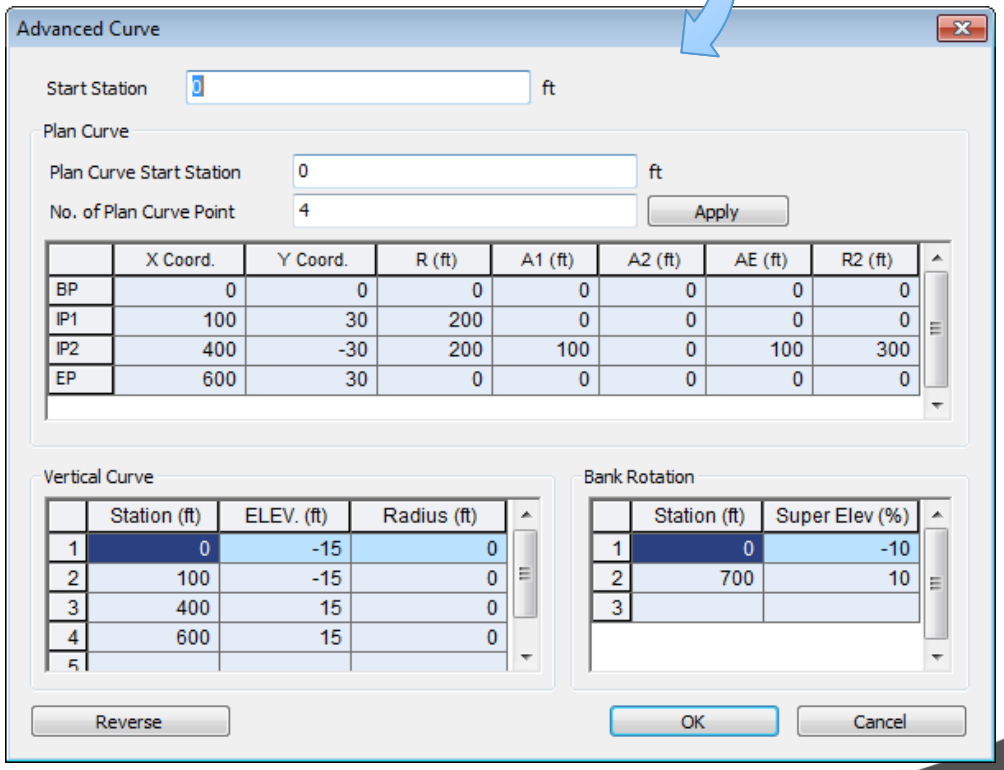


Example Model

5. In the Layout tab > Multi-Curve option, click “Advanced…”
6. Once the input is reviewed, the Advanced Curve window can be closed.

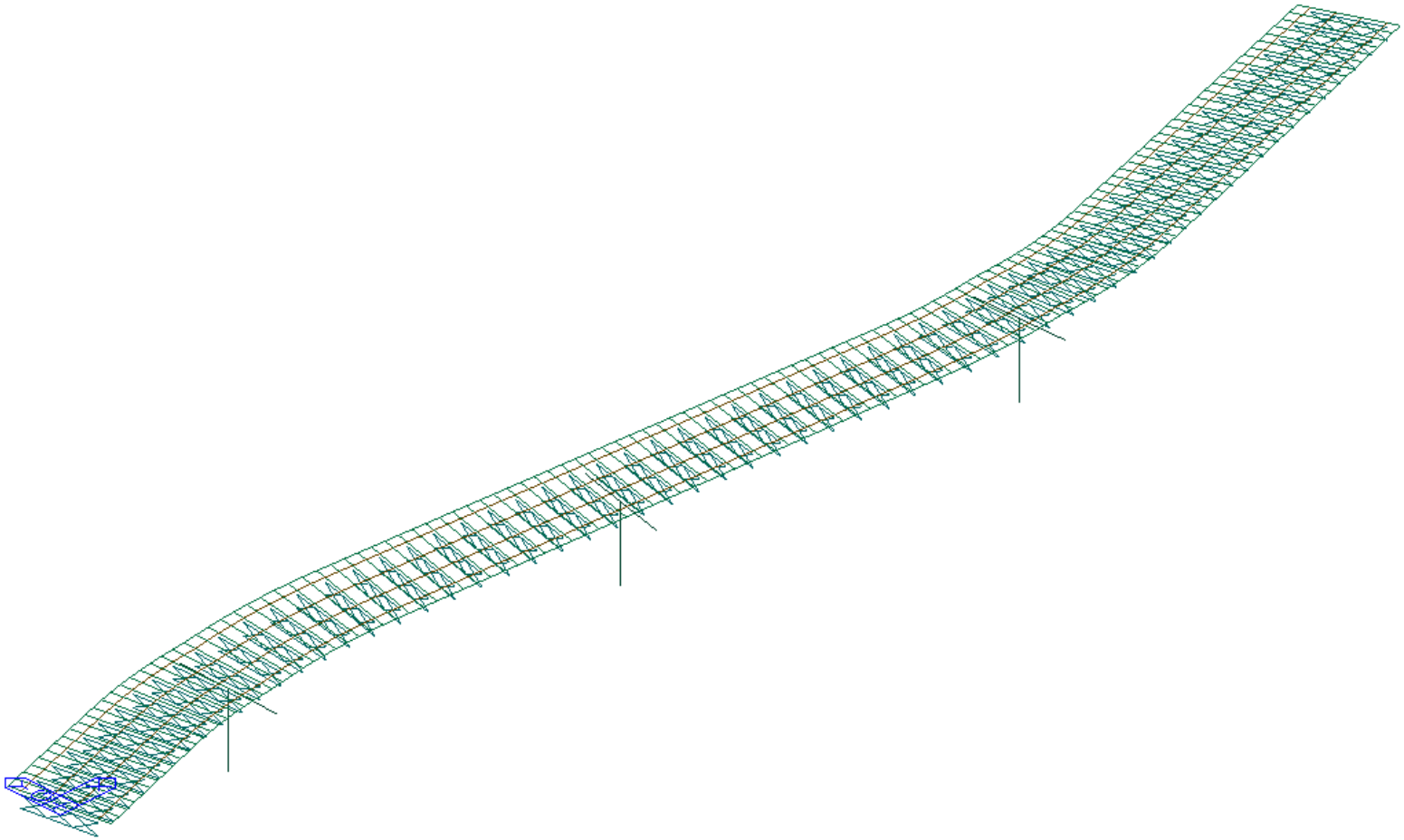






Example Model

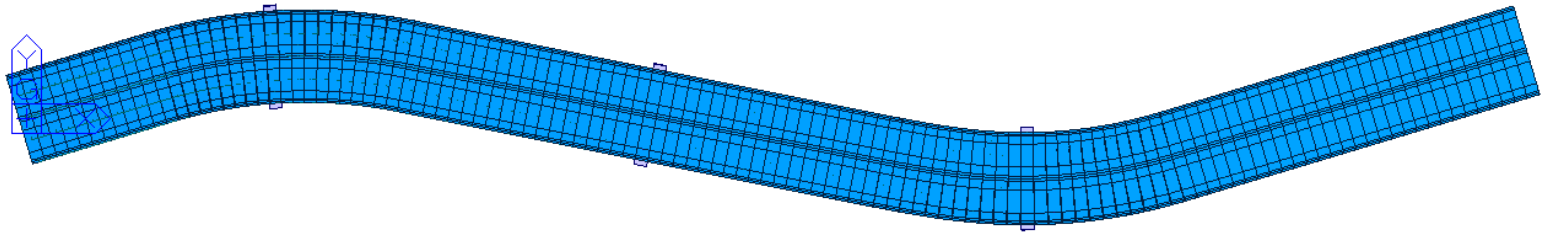
7. Click “OK” to close the wizard and see the bridge model created.
8. The completed model can be also found: “Multi Curve Model Complete.mcb”



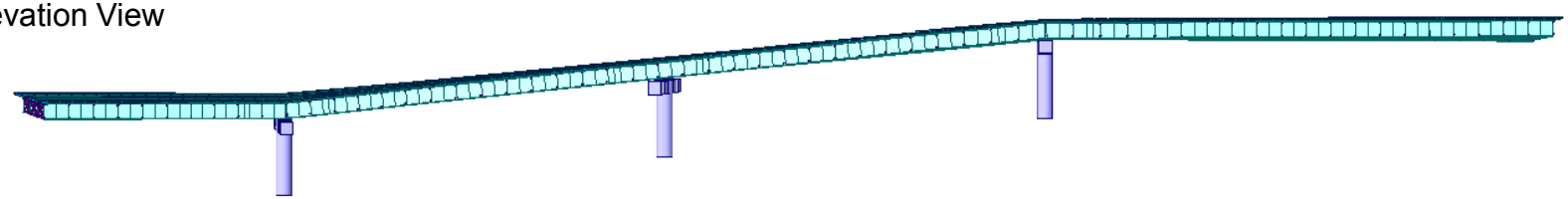
Introduction

Example Model

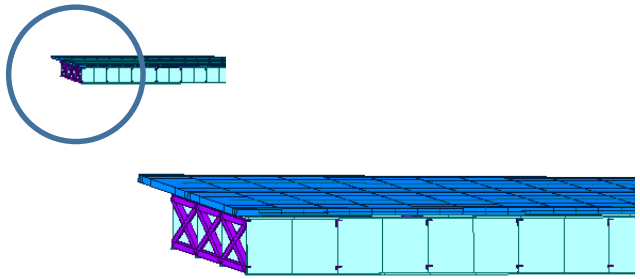
Plan View

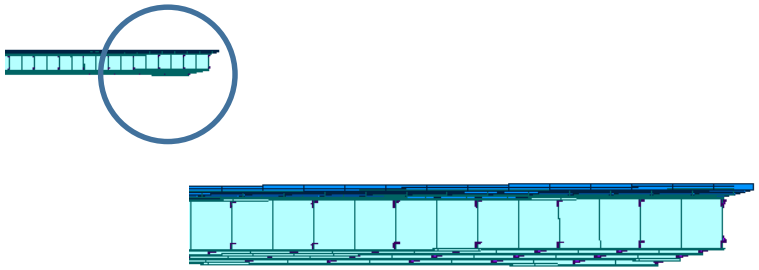


Elevation View



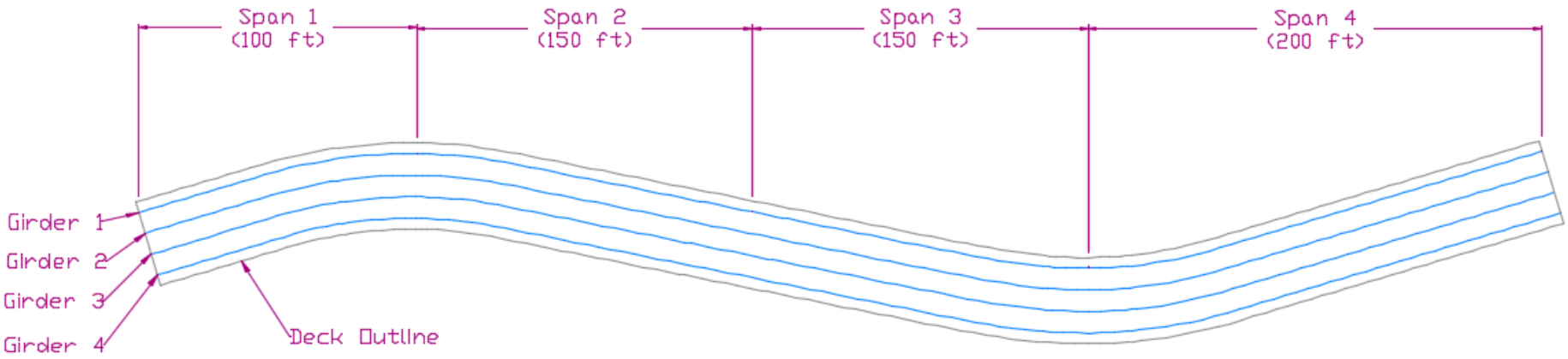
Bank Rotation





Plan Curve

Plan Curve Overview

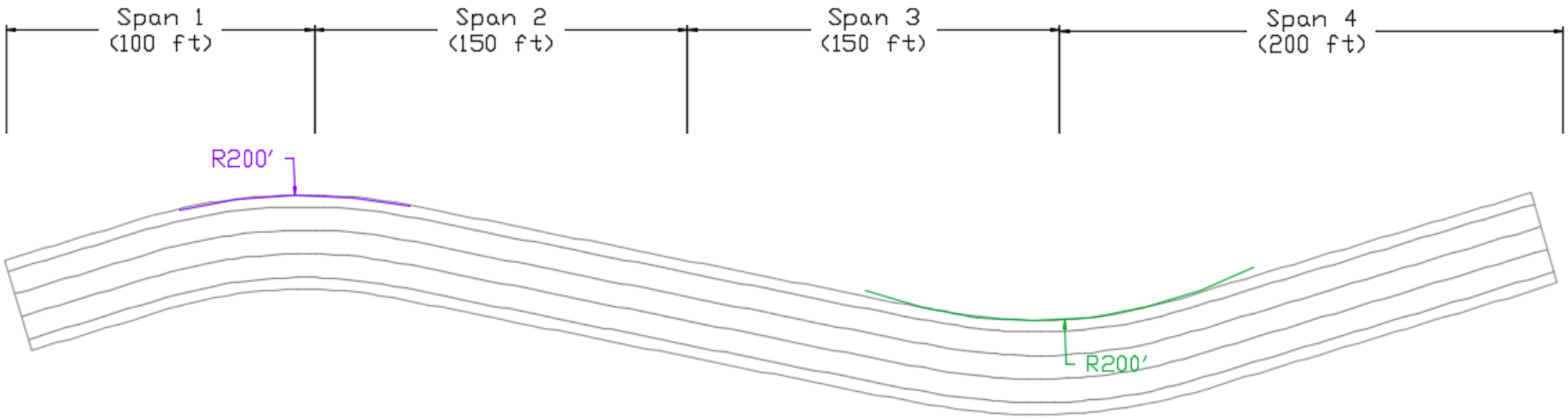


[Note]
The multi-curve information is taken for the Reference Line.
The reference line can be located with the 'Layout Offset' input.

For this example, the reference line is aligned with the North deck outline (above the Girder 1 line)

Plan Curve

Plan Curve Details



Case 1
Transitional Curve does not need to be specified

Only R needs to be defined

(example Intermediate Point 1 (IP1))

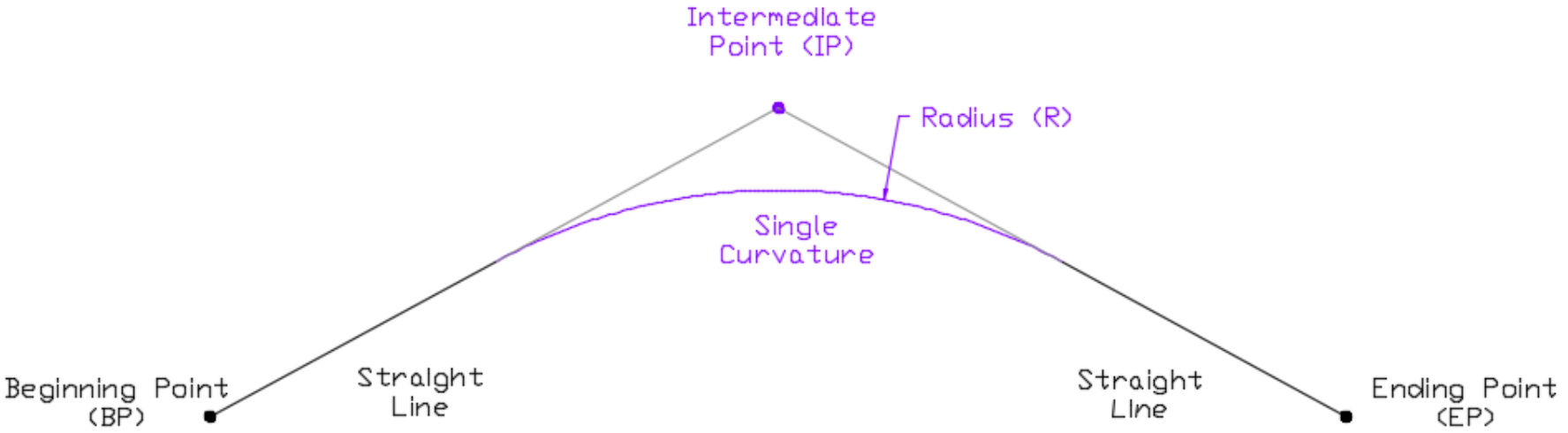
Case 2 & Case 3
Transitional Curve needs to be specified

R needs to be defined.
A1, A2, AE & R2 can be defined to provide additional information for the transitional curve.

(example Intermediate Point 2 (IP2))

Plan Curve

Plan Curve Case 1



[Note]
Case 1: No need to consider transitional curve

Curve Input Required: R

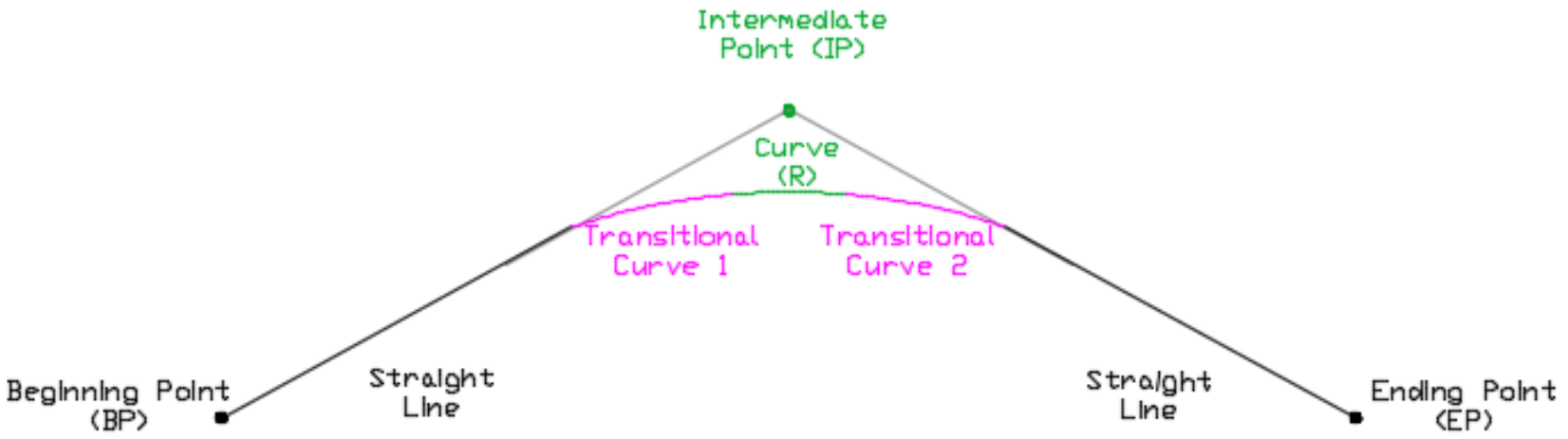
(Coordinate of BP, IP#, & EP must be input as basics regardless of the curve type: Case 1-3)

Plan Curve

	X Coord.	Y Coord.	R (ft)	A1 (ft)	A2 (ft)	AE (ft)	R2 (ft)
BP	0	0	0	0	0	0	0
IP1	100	30	200	0	0	0	0
IP2	400	-30	200	100	0	100	300
EP	600	30	0	0	0	0	0

Plan Curve

Plan Curve Case 2



[Note]
Case 2: Transitional curve is considered.
(Transitional curve has varied curvature radius.)

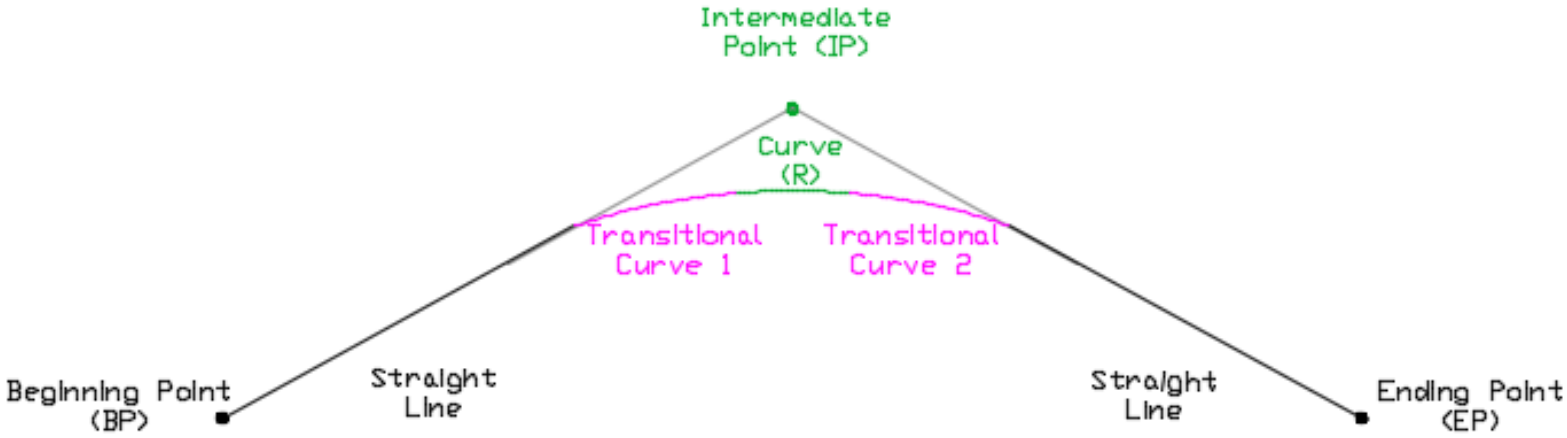
Curve Input Required: R, A1 & A2

A1 and/or A2 are input if there is a transitional curve.
A1: transitional curve parameter for the Transitional Curve 1
A2: transitional curve parameter for the Transitional Curve 2
If only the Transitional Curve 1 occurs, only A1 should be defined.
If only the Transitional Curve 2 occurs, only A2 should be defined..

(For an intermediate point, the transitional curve can be three different types: Case 2 only, Case 3 only or Case 2&3 combined.)

Plan Curve

Plan Curve Case 2



[Note]

How to Calculate A1 & A2

$A^2 = RL$

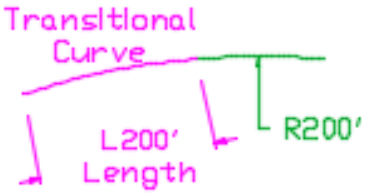
A: transitional curve parameter

R: Radius of the curvature with single radius

L: Length of the transitional curve

Example

If R=200ft & L=50ft, $A=\sqrt{(RL)}$, $A=\sqrt{(200ft \cdot 50ft)}=100ft$

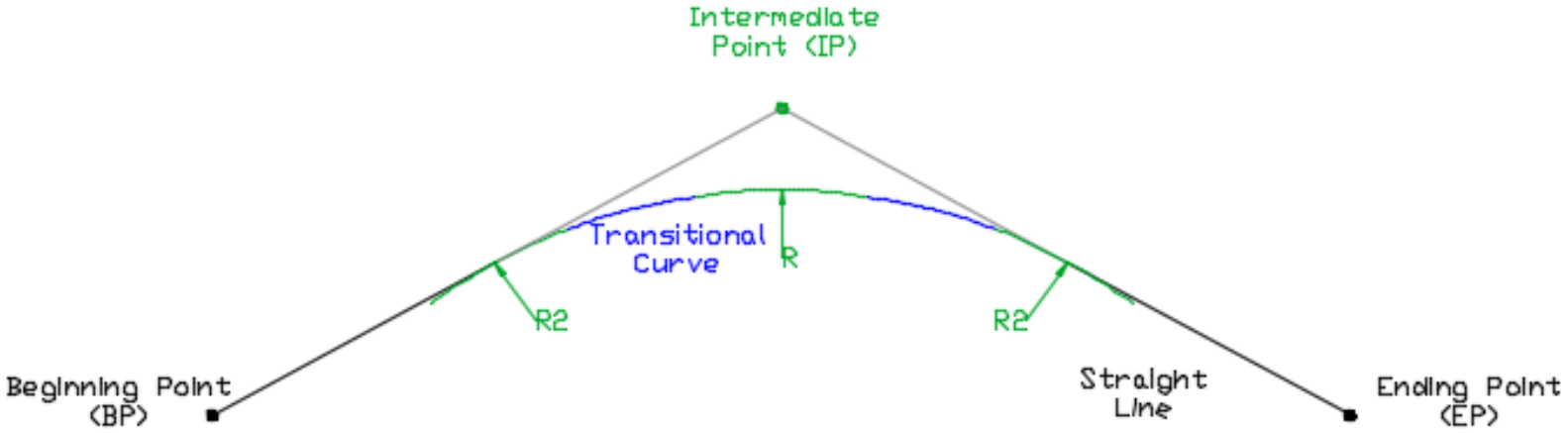


Plan Curve

	X Coord.	Y Coord.	R (ft)	A1 (ft)	A2 (ft)	AE (ft)	R2 (ft)
BP	0	0	0	0	0	0	0
IP1	100	30	200	0	0	0	0
IP2	400	-30	200	100	0	100	300
EP	600	30	0	0	0	0	0

Plan Curve

Plan Curve Case 3



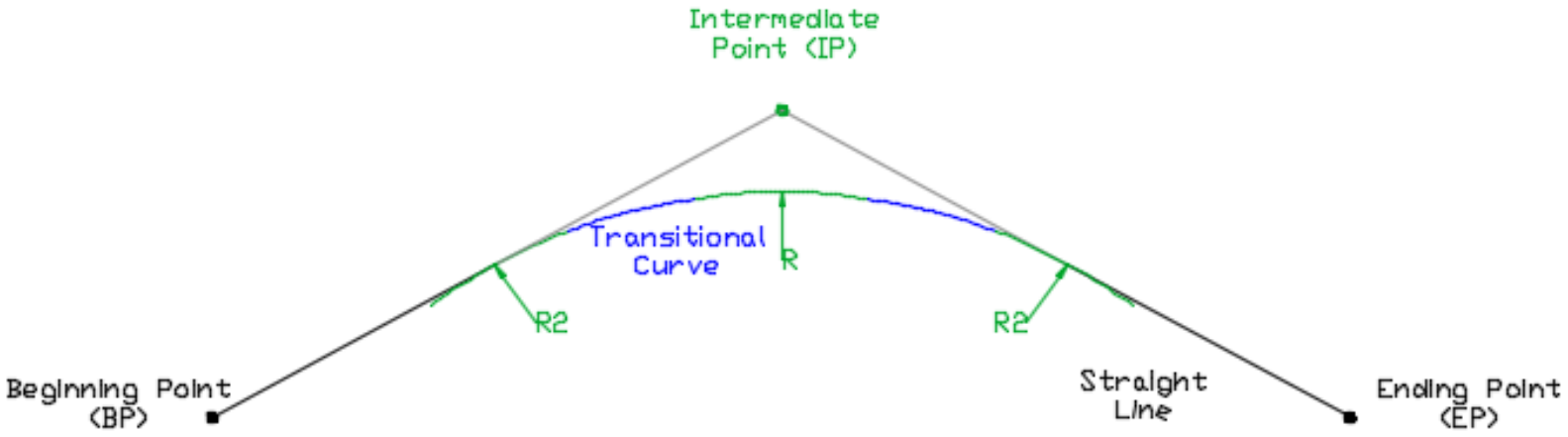
[Note]
Case 3: The curvature of the transitional curve ranges bewteween R and R2. (When the transitional curve section stopps at a certain radius, R2. The curvature ranges between R & R2.

Curve Input Required: R, R2, AE
R: Curvature radius at the IP (center of the transitional curve)
R2: Curvature radius at the end of the transitional curve
AE: transitional curve parameter for Case 3.

(For an intermediate point, the transitional curve can be three different types: Case 2 only, Case 3 only or Case 2&3 combined.)

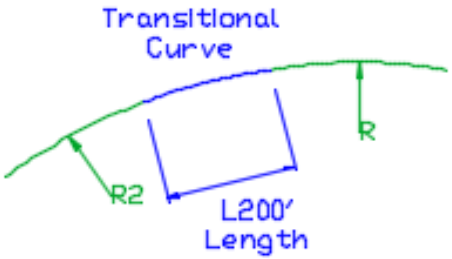
Plan Curve

Plan Curve Case 3



[Note]
How to Calculate AE
$A^2 = RL$
A: transitional curve parameter
R: Curvature radius at IP
L: Length of the transitional curve

Example
If R=200ft & L=50ft, AE=√(RL). A=√(200ft·50ft)=100ft

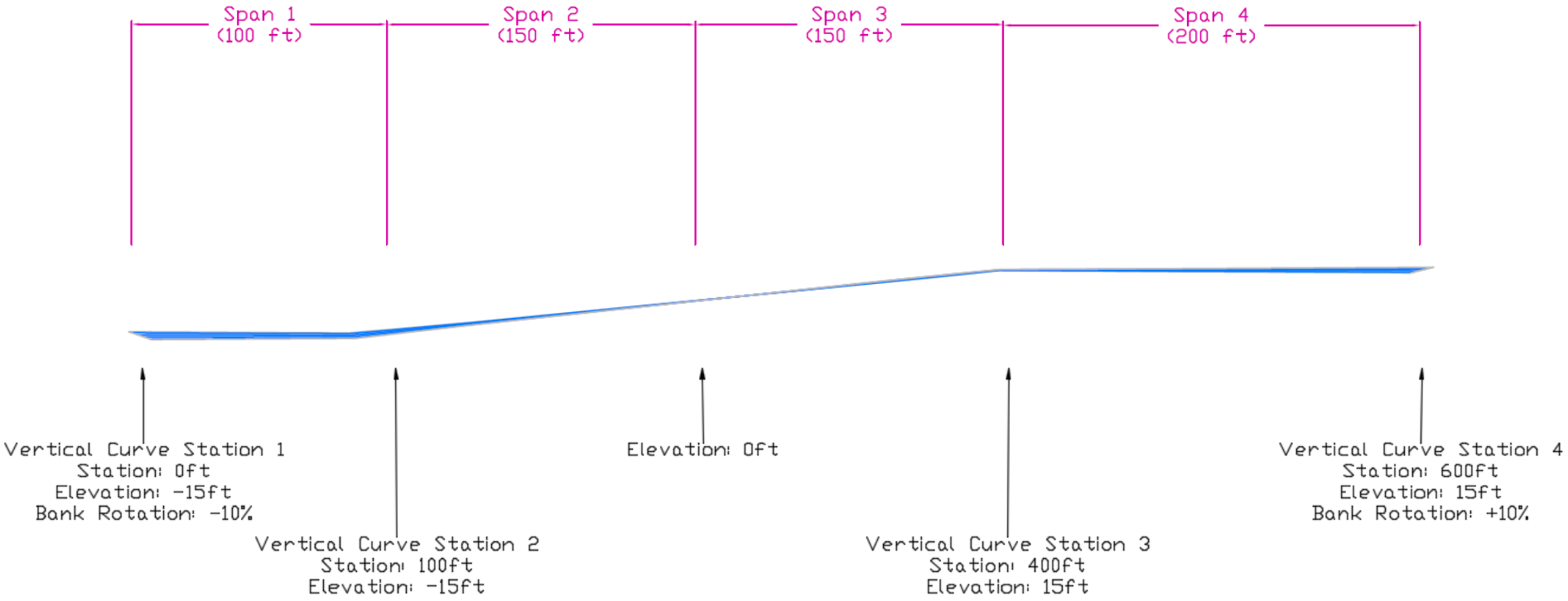


Plan Curve

	X Coord.	Y Coord.	R (ft)	A1 (ft)	A2 (ft)	AE (ft)	R2 (ft)
BP	0	0	0	0	0	0	0
IP1	100	30	200	0	0	0	0
IP2	400	-30	200	100	0	100	300
EP	600	30	0	0	0	0	0

Vertical Curve

Vertical Curve & Bank Rotation



Vertical Curve

	Station (ft)	ELEV. (ft)	Radius (ft)
1	0	-15	0
2	100	-15	0
3	400	15	0
4	600	15	0
5			

Bank Rotation

	Station (ft)	Super Elev (%)
1	0	-10
2	700	10
3		