

Applying parametric variation for deck width to bridge object with skewed abutments

Program: CSiBridge
Version: 17.2.0
Date: 6/25/2015
Author: ok

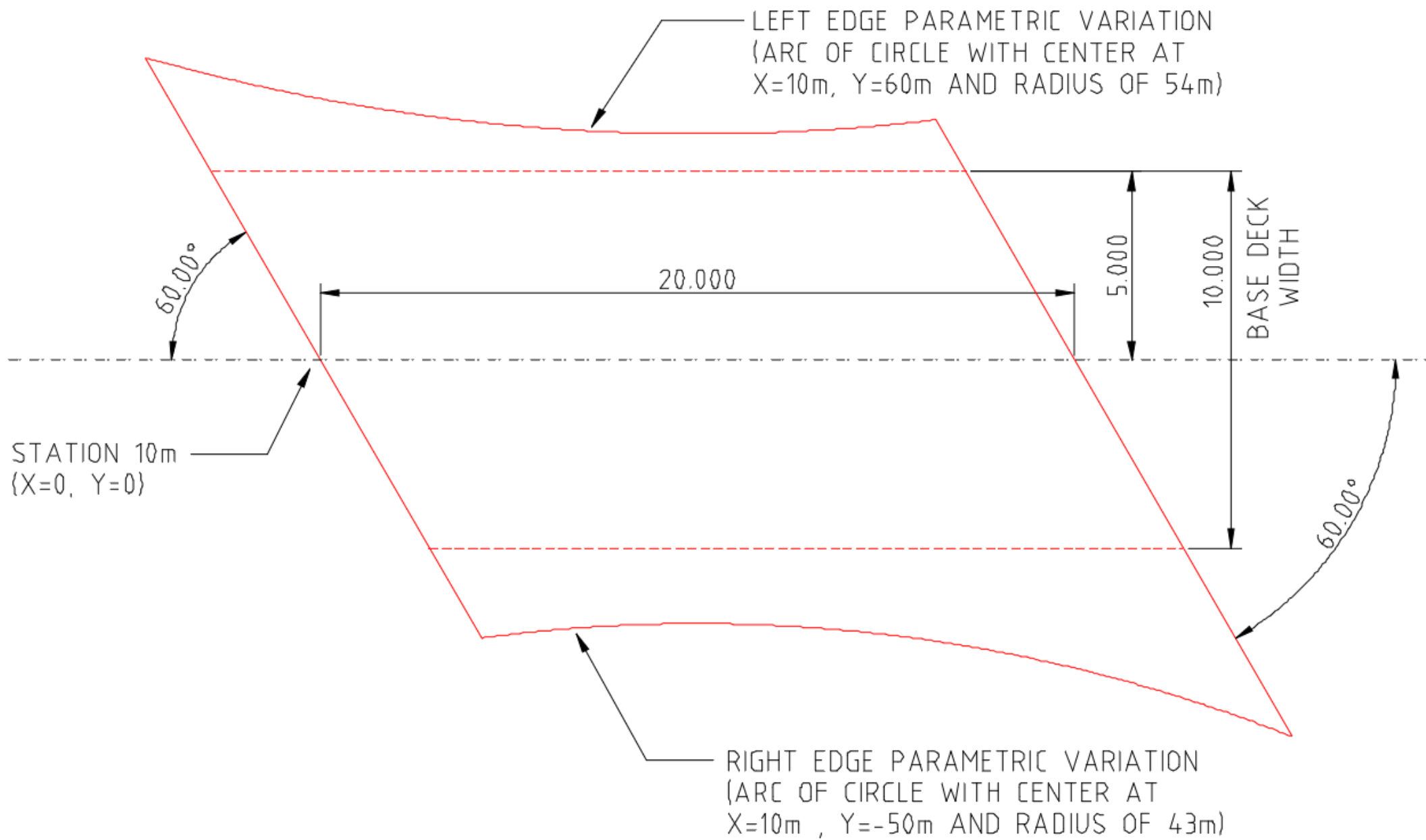
Model version: run1

Purpose

- Develop CSiBridge model that will illustrate how to apply parameteric variation to deck width to bridge object with skewed abutments (based on the wiki article "Bridge parametric variation at <https://wiki.csiamerica.com/x/yog4>)

Model Description

- The model geometry was created in CAD (see the next page) the goal is to replicate it exactly in CSiBridge.



Coordinates of the points on the deck edges and determination of parametric variation for deck width and offset

X coordinate	Station	Left Distance (measured from CAD) a	Right Distance (measured from CAD) b	Parametric Variation Distance	Deck width Parametric Variation $ a + b - 10$	Offset Parametric Variation $(a+b) / 2$	Comments
-4.630	5.376	8.019630	-9.565370	0.000	7.58500	-0.772870	Start of arc
-4.000	6.000	7.846380	-9.342900	0.624	7.18928	-0.748260	
-2.000	8.000	7.350210	-8.708350	2.624	6.05856	-0.679070	
0.000	10.000	6.934000	-8.178950	4.624	5.11295	-0.622475	
2.000	12.000	6.595880	-7.750740	6.624	4.34662	-0.577430	
4.000	14.000	6.334370	-7.420660	8.624	3.75503	-0.543145	
6.000	16.000	6.148350	-7.186450	10.624	3.33480	-0.519050	
8.000	18.000	6.037050	-7.046540	12.624	3.08359	-0.504745	
10.000	20.000	6.000000	-7.000000	14.624	3.00000	-0.500000	Midpoint of arc
12.000	22.000	6.037050	-7.046540	16.624	3.08359	-0.504745	
14.000	24.000	6.148350	-7.186450	18.624	3.33480	-0.519050	
16.000	26.000	6.334370	-7.420660	20.624	3.75503	-0.543145	
18.000	28.000	6.595880	-7.750740	22.624	4.34662	-0.577430	
20.000	30.000	6.934000	-8.178950	24.624	5.11295	-0.622475	
22.000	32.000	7.350210	-8.708350	26.624	6.05856	-0.679070	
24.000	34.000	7.846380	-9.342900	28.624	7.18928	-0.748260	
25.772	35.772	8.354530	-9.996820	30.396	8.35135	-0.821145	End of arc

Modeling Details

Bridge Object Data
⌵
✕

Bridge Object Name

BOBJ1

Layout Line Name

BLL1

Coordinate System

GLOBAL

Units

KN, m, C

Define Bridge Spans

Span Label	Start Station m	Length m	End Station m	Start Support	End Support
Span 1	10.	20.	30.	BABT1	BABT1
Span 1	10.	20.	30.	BABT1	BABT1

☒ By Station
☐ By Length

Add

Modify

Delete

Delete All

Note: 1. Bridge object location is based on bridge section insertion point following specified layout line.

Bridge Object Plan View (X-Y Projection)

Show Enlarged Sketch...

Modify/Show Assignments

Spans

User Discretization Points

Abutments

Bents

In-Span Hinges (Expansion Jts)

In-Span Cross Diaphragms

Superelevation

Prestress Tendons

Girder Rebar

Staged Construction Groups

Point Load Assigns

Line Load Assigns

Modify/Show...

☐ Lock to Prevent Updating the Linked Model

OK

Cancel



Variation Definition



Variation Name

Deck Width Circular

Units

KN, m, C

Variation Definition

Point ID	Segment Type and Point Type Segment Is From Point(n - 1) to Point(n)	Distance m	Dim. Change m	Slope m / m
1		-4.63	7.585	
1	Start of Variation	-4.63	7.585	
2	Circular Arc Intermediate Point	10.	3.	
3	Circular Arc End Point	25.772	8.3514	
4	Linear to End of Variation	25.772	8.3514	

Quick Start...

Insert Above

Insert Below

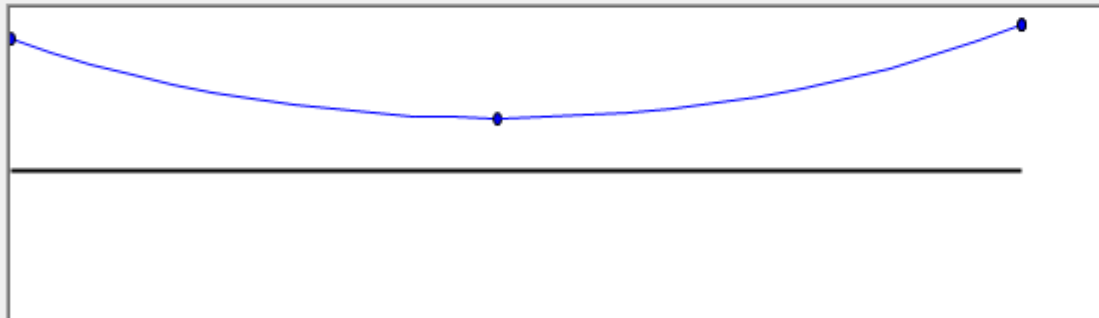
Modify

Delete

Delete All

Variation Sketch

☐ Use Equal Horizontal And Vertical Scales In Sketch



Distance

Dim. Change

Slope

Dimension Change Sign

Switch Sign of All Dim. Change

OK

Cancel



Variation Definition



Variation Name

Offset Circular

Units

KN, m, C

Variation Definition

Point ID	Segment Type and Point Type Segment Is From Point(n - 1) to Point(n)	Distance m	Dim. Change m	Slope m / m
1		-4.63	-0.7729	
1	Start of Variation	-4.63	-0.7729	
2	Circular Arc Intermediate Point	10.	-0.5	
3	Circular Arc End Point	25.772	-0.8211	
4	Linear to End of Variation	25.772	-0.8211	

Quick Start...

Insert Above

Insert Below

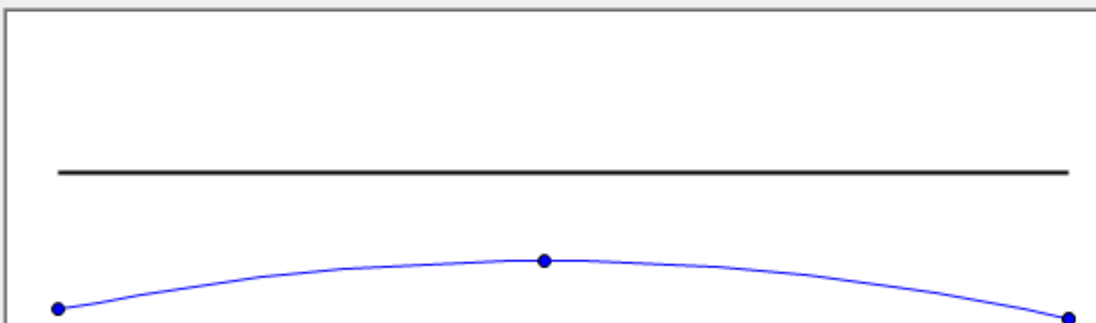
Modify

Delete

Delete All

Variation Sketch

☐ Use Equal Horizontal And Vertical Scales In Sketch



Distance

Dim. Change

Slope

Dimension Change Sign

Switch Sign of All Dim. Change

OK

Cancel

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Bridge Section Variation Definition

✕

Bridge Object Name

BOBJ1

Span Label

Span 1

Base Bridge Section Property

BSEC1

Bridge Section Variation Is Defined By:

☒ User Definition

Define/Show Variations...

☐ Reference to Another Span

Display Section

Show Base Section...

Show Section Variation...

User Defined Variation For Concrete Flat Slab

☐ Distance Measured from Start of Span
☒ Distance Measured from Start Abutment

Parameter	Variation
General Data	
Total Width	Deck Width Circular
Total Depth	Constant
Fillet Horizontal Dimension Data	
f1 Horizontal Dimension	Constant
f2 Horizontal Dimension	Constant
Left Overhang Data	
Left Overhang Length (L1)	Constant
Left Overhang Outer Thickness (t5)	Constant
Right Overhang Data	
Right Overhang Length (L2)	Constant
Right Overhang Outer Thickness (t6)	Constant
Live Load Curb Locations	
Distance To Inside Edge of Left Live Load Curb	Constant
Distance To Inside Edge of Right Live Load Curb	Constant

OK

Cancel

Insertion Point Location	
Offset X From Reference Point To Insertion Point	Offset Circular
Offset Y From Reference Point To Insertion Point	Constant

Final generated geometry
(note that the coordinates of the point in the lower right accute corner exactly match those previously tabulated)

