

Generative Component - Stub Abutment

Note, the following guidance may change as technology developments occur with the CADD modeling software and its use affecting workflows for project development.

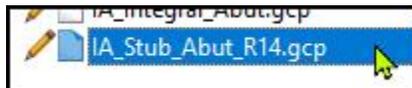
These instructions are used when an OpenBridge Modeler file is opened with the Generative Component (GC) “Computational Design” Workflow enabled. **See the additional document, “General Guidance for Generative Components in OBM”** outlining this process.

This current version of the GC Stub abutment may display/place at a sub-zero elevation at some point during placement or modifications. Changing the required setting of the **LTWidth** or **RTWidth** values by an additional amount of 0.001 should allow the GC abutment to vertically position correctly. This will need to be corrected in a future update.

In **OpenBridge Modeler workflow**, select the **Utilities tab**, select **Import GCP File** in the **GC group**.

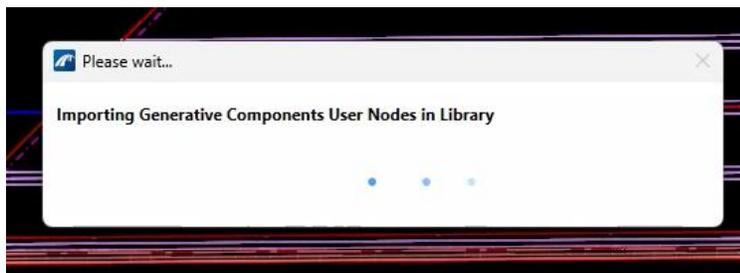


Locate the **IA_Stub_Abut_R14.gcp** file to work with the **IA_BT_Stub** abutment.

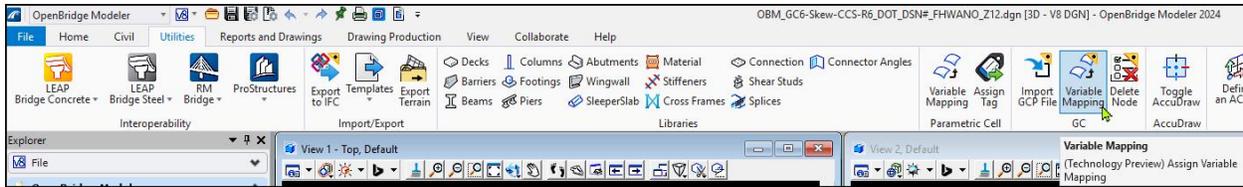


The **IA_Stub_Abut.gcp** file is located on ProjectWise in the following area
pw:\\NTPwint1.dot.int.lan:PWMMain\Documents\Resources\ClientWorkspaces\lowaDOT\lowaDOTProduction\Organization-Civil\lowaDOT_Standards\Bridge Templates\GC\IA_Stub_Abut_R14.gcp

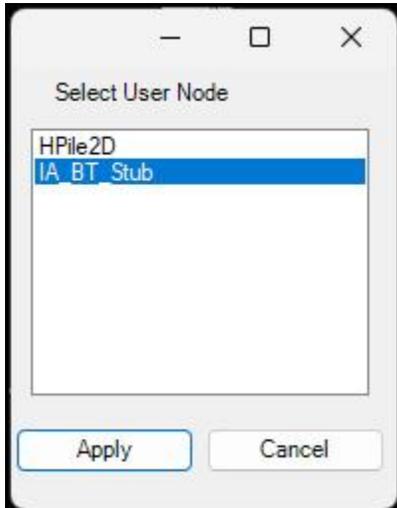
The following dialog box will appear.



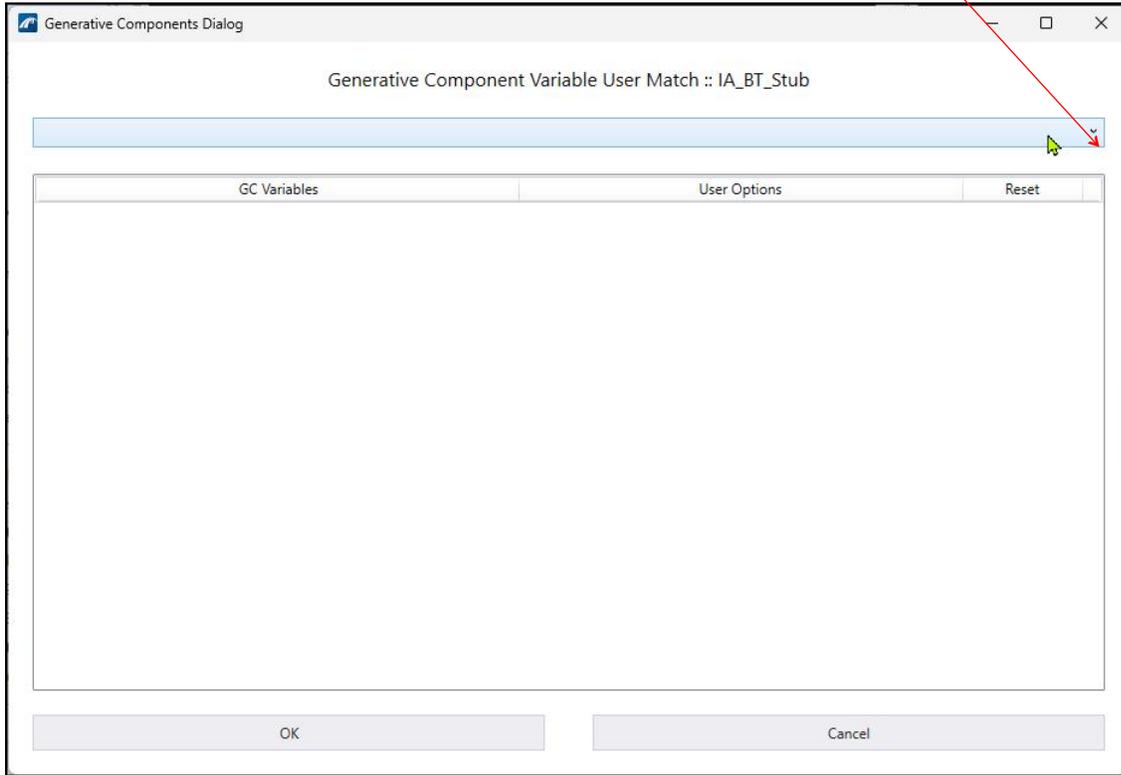
In **OpenBridge Modeler workflow**, select the **Utilities tab**, select **Variable Mapping** in the **GC group**.



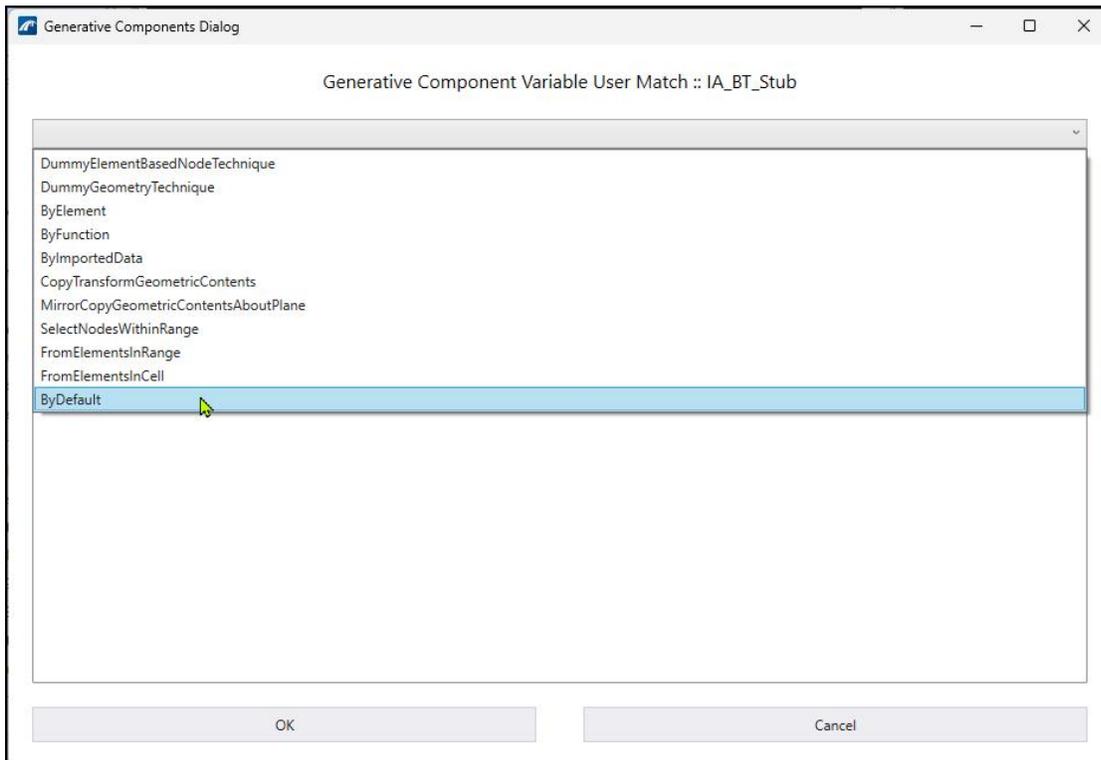
Using the **IA_Stub_Abut_R14.gcp** file **UPDATED VERSION (08-06-2025)**, the following dialog box will appear. Select **IA_BT_Stub** and “Apply”. Even though the name has “BT” in it, this abutment can be used for BT (Bulb Tee beam) and non-BT beam bridges.



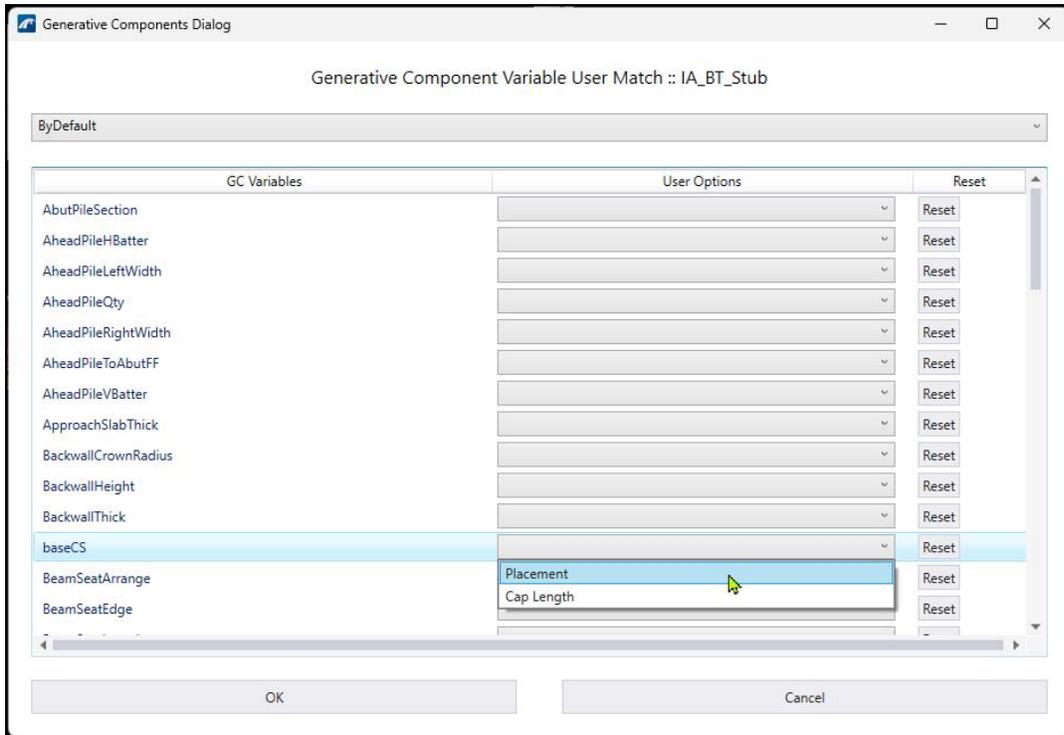
The following dialog box will appear. Select the pull-down arrow in the top gray bar that appears empty, shown below.



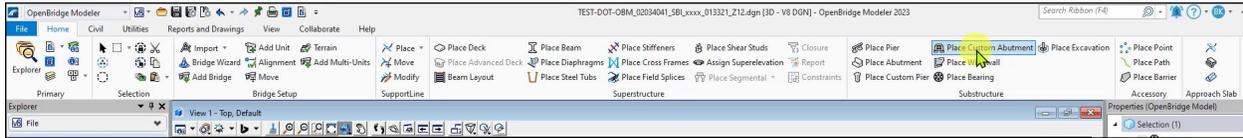
From the pull-down selection, select **ByDefault**



From the GC Variables column choose “**baseCS**” and under the User Options column select “**Placement**”. Then select “OK”.

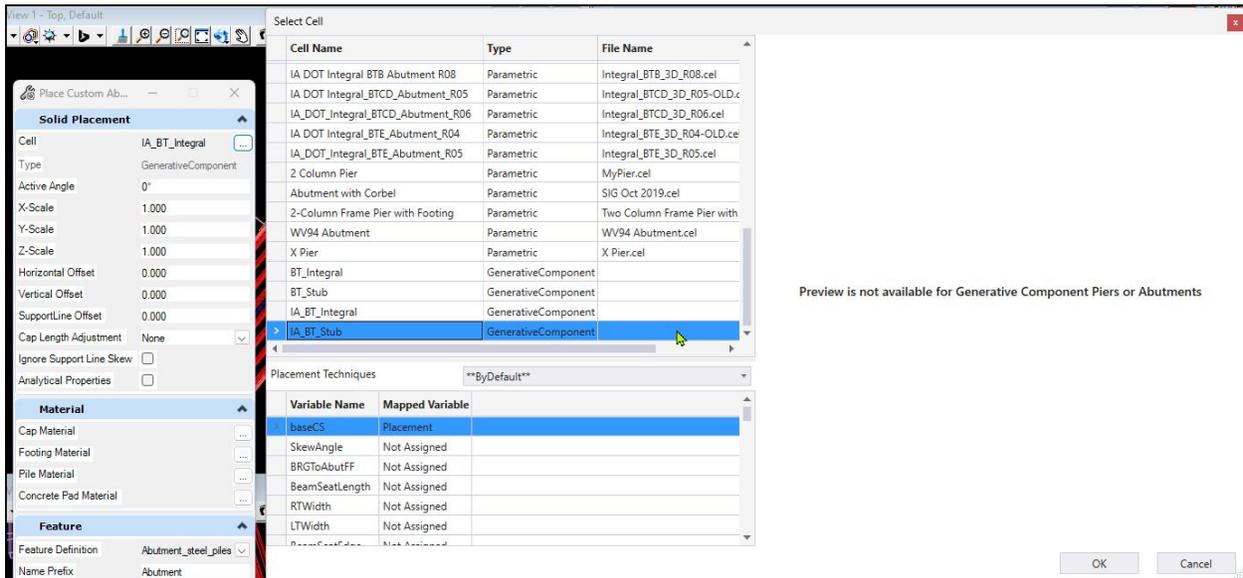


In the ribbon under the **OpenBridge Modeler workflow**, under the **Home tab**, select **Place Custom Abutment**.

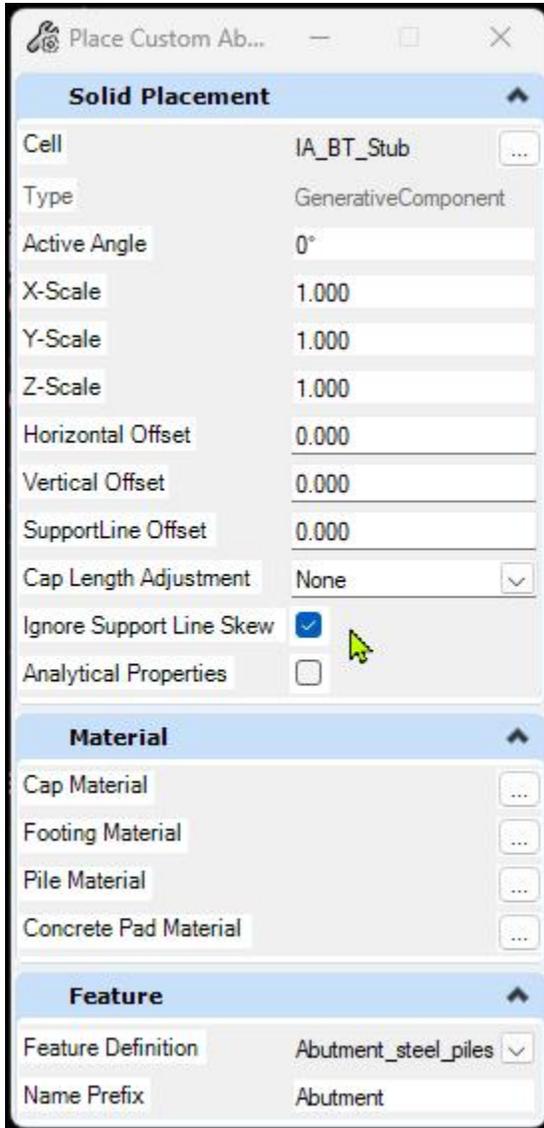


Using the **IA_Stub_Abut_R14.gcp** file **UPDATED VERSION (08-06-2025)**, select the **“IA_BT_Stub”** from the cell library.

Note, in the image below the **“Cell Type”** is **“GenerativeComponent”** and **“Preview is not available for Generative Component Piers or Abutments”**. Parametric cell types typically will provide a preview of the cell.



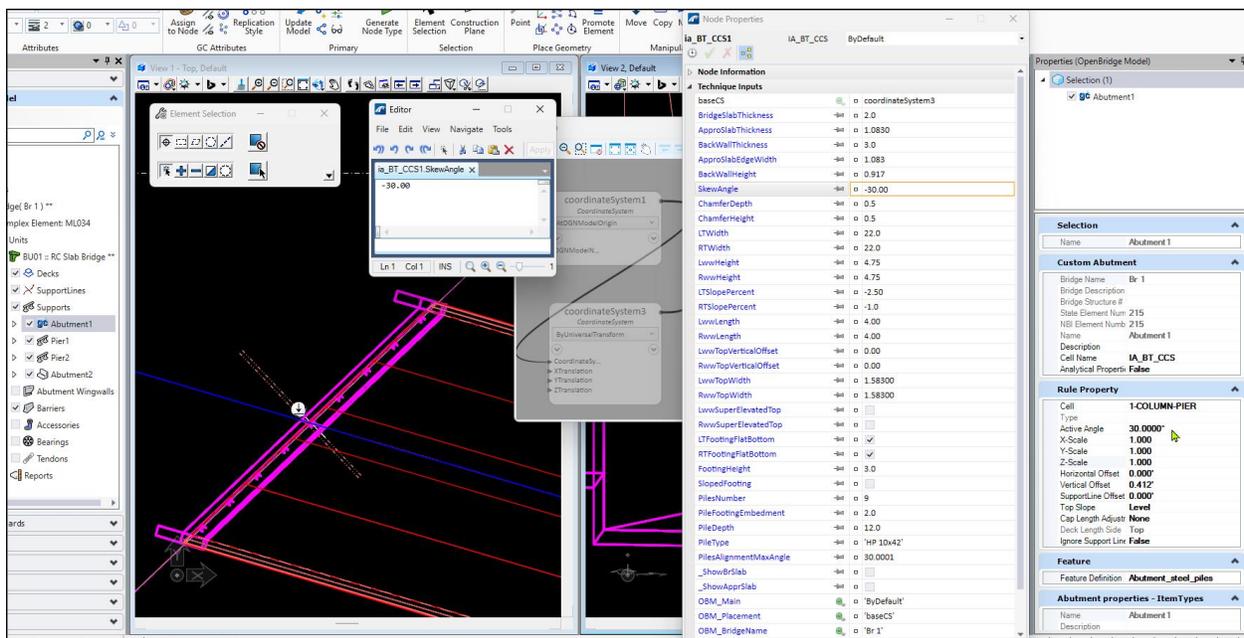
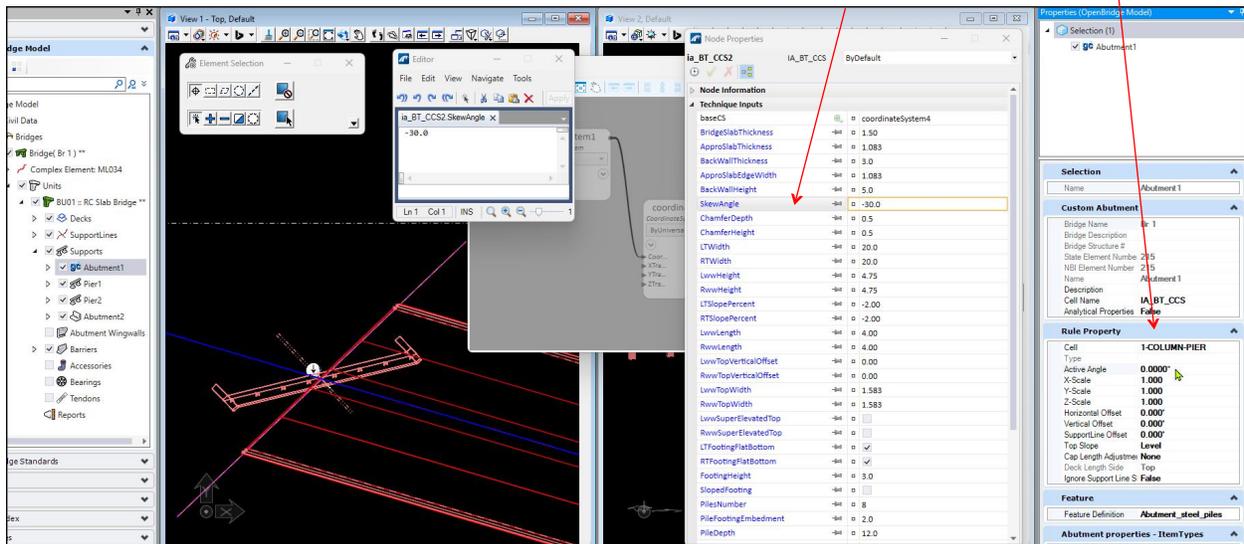
Select the "Support Line" to place the GC abutment on. **Set "Ignore Support Line Skew"-checked On.** For the near abutment (down station) the Active Angle is set at zero (0). For the opposite far abutment (up station), the Active Angle is set to 180. The GC abutment skews are applied in the Technique Inputs of the Node Properties. If failing to set this upon placement, the Active Angle may also be changed after the abutment is placed, by selecting the abutment and in the **Properties** under **Rule Property**.



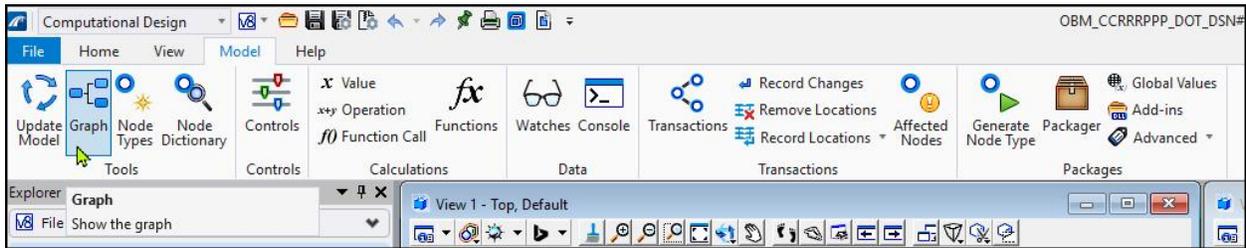
If not setting **"Ignore Support Line Skew"** as checked **On** when placing the custom abutment, the skew may need to be set in two locations, the **Rule Property** and the individual **Skew** variable in the **Node Properties** of the GC "Technique Inputs". The image below is showing the variables to change for a skewed GC abutment, **Rule Property "Active Angle"** and possibly **"Vertical Offset"**.

The **Rule Property "Vertical Offset"** may need to be changed depending on beam bearing and seat adjustments made during the modelling process in the OBM file.

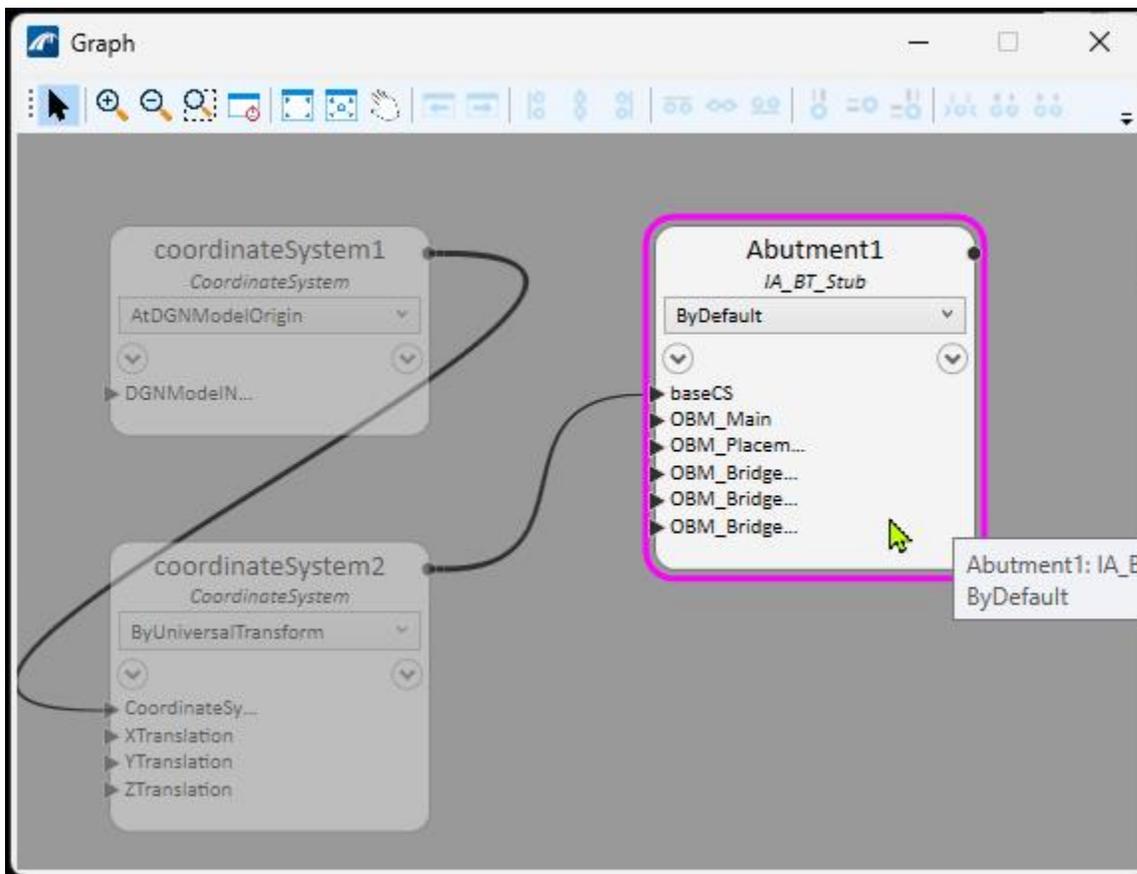
(The example images below are showing the name of the CCS GC Stub Abutment.)



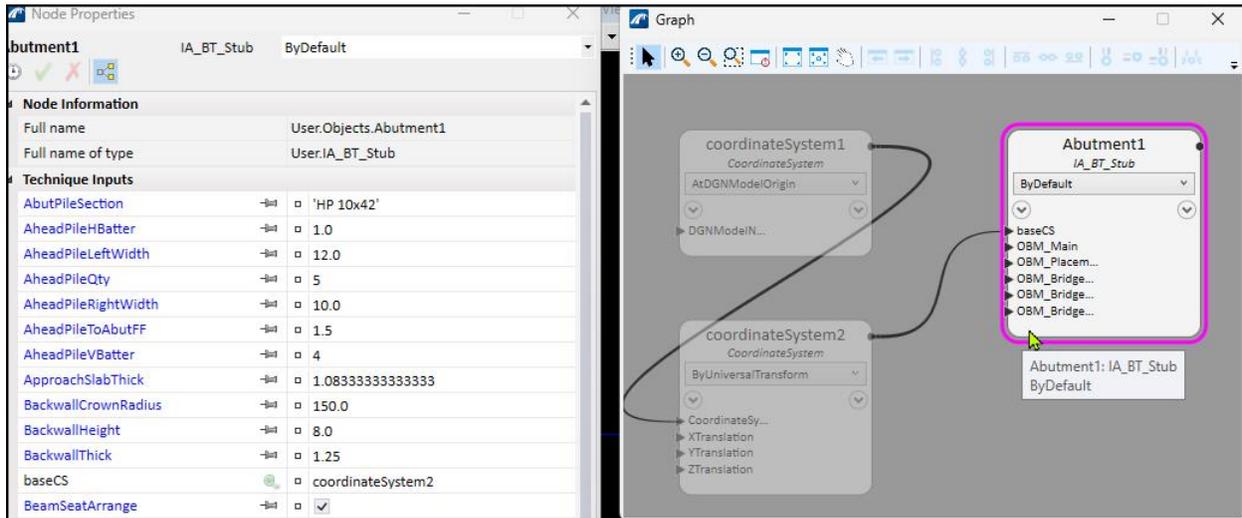
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry. These tools are also located under the **Home tab**.



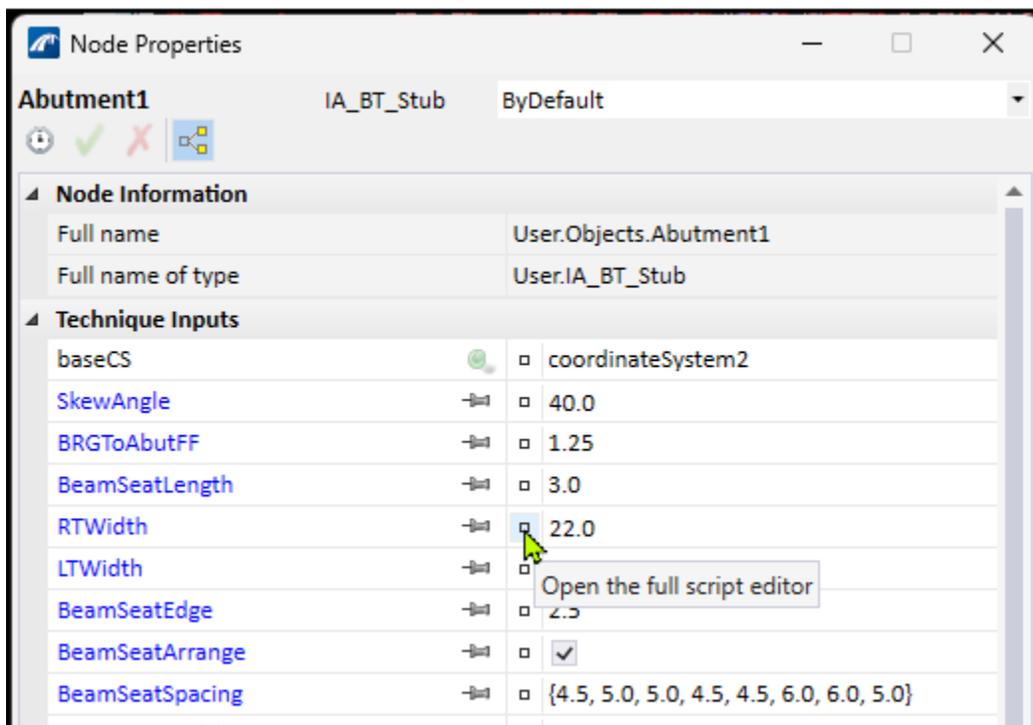
The Graph dialog box will appear, the “Abutment1” box in this example was auto-labeled “Abutment1” *IA_BT_Stub* in the OBM model. Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry.



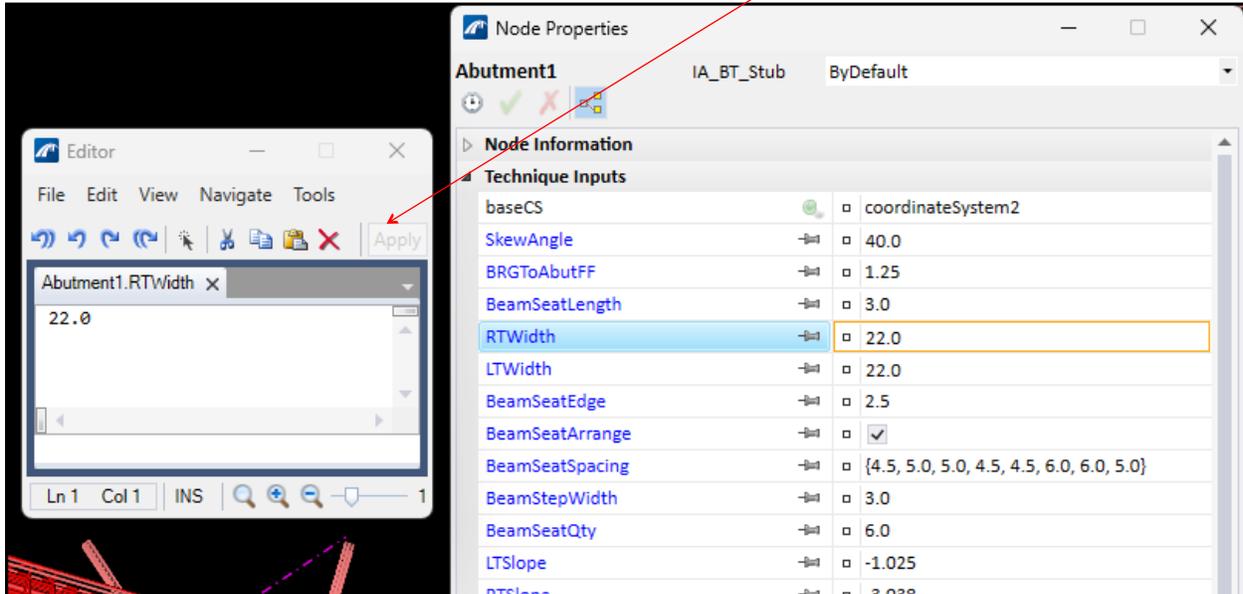
By double-clicking the “Abutment1” Graph box, *IA_BT_Stub*, this will open the Node Properties dialog box.



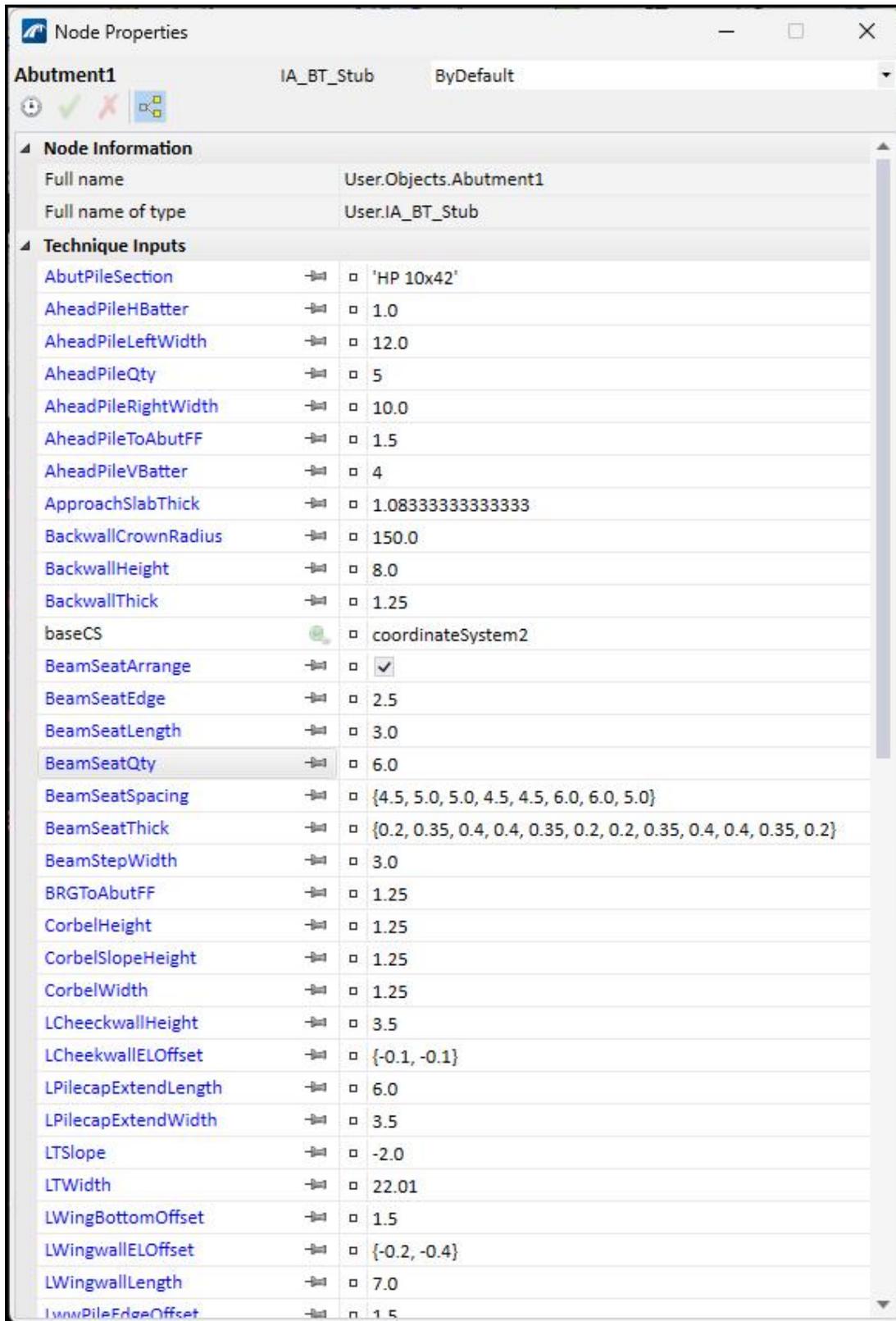
The adjustments of the GC abutment geometry will be made through editing the Technique Inputs in the Node Properties. Edits are done one at a time by either selecting the “box □” to open the full script “Editor” or by selecting the values in each line to directly edit them. It is recommended to use the box □ selection to edit the Inputs, especially for Inputs with multiple values. Opening the full script “Editor” may be more convenient to make edits and prevent any inadvertent entries by providing a preview of what is keyed-in to ensure the proper value is set before “Apply” is selected.



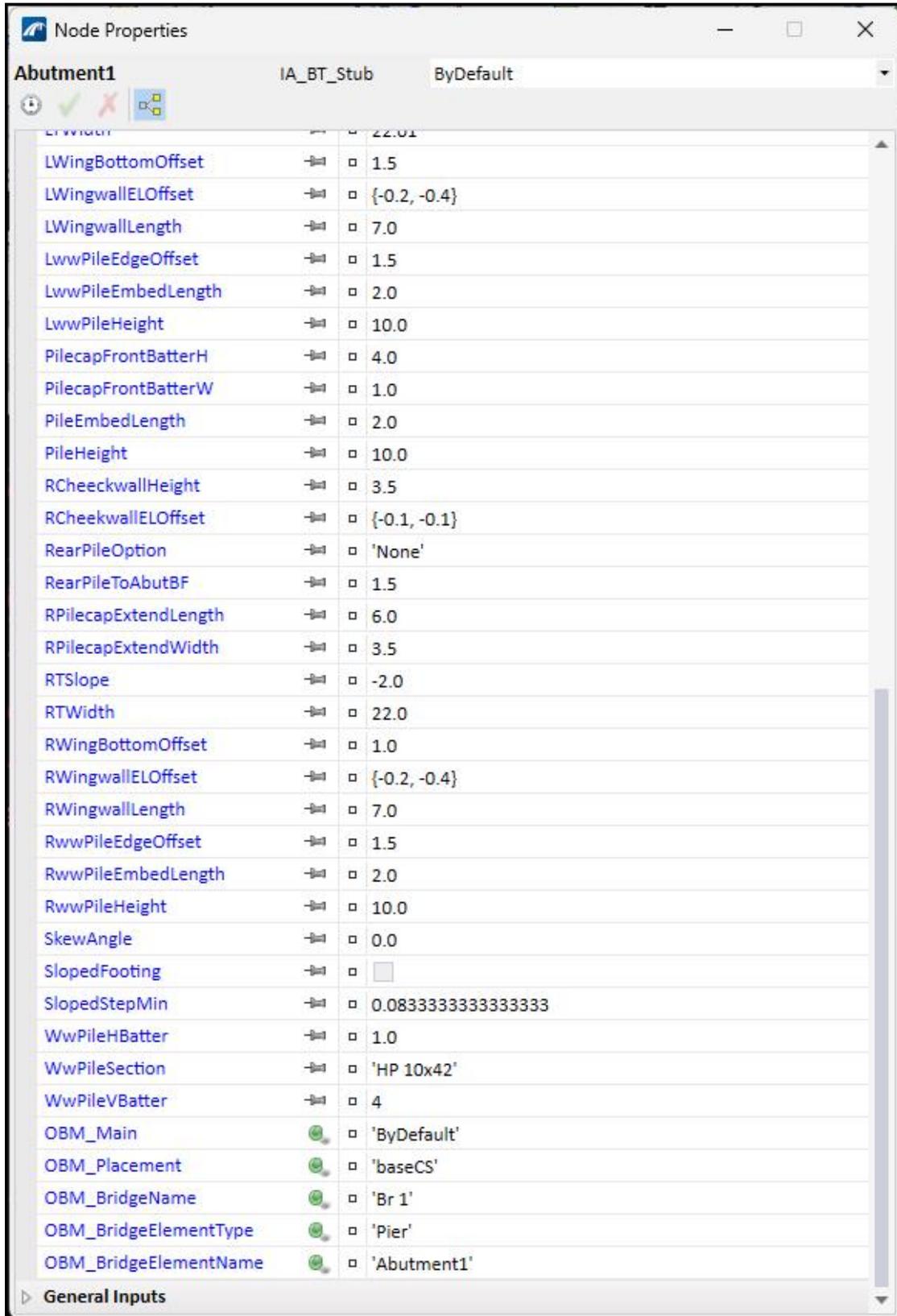
The example image below is showing the full script “Editor” that is used when the box is selected for changes to Technique Input values. Using the full script “Editor” may be more convenient to make edits and prevent any inadvertent entries. Once the value is entered the “Apply” button will become active, select “Apply” to accept the entered values.



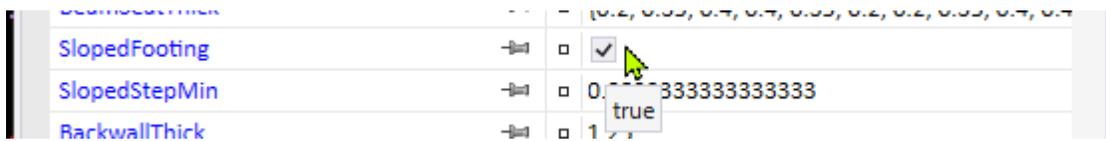
The image below shows a partial list of the “Technique Inputs” available.



The image below shows a continuation of the partial list of the “Technique Inputs” available.

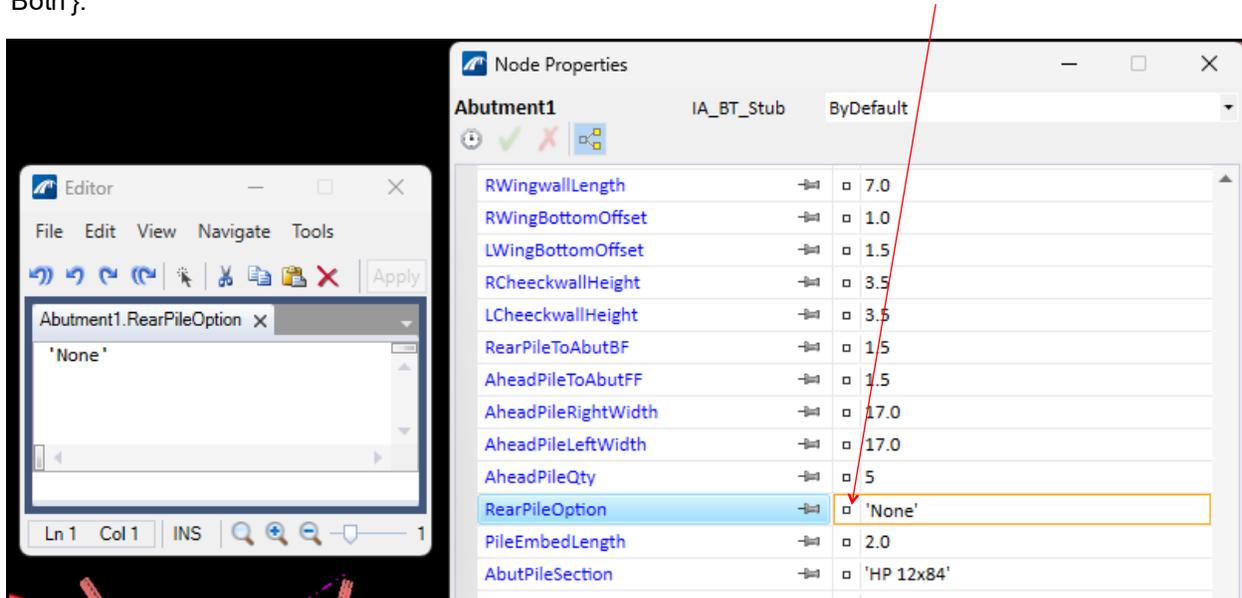


Checking the box of the **SlopedFootings** “On (true)” will enable the abutment to be used for a superelevation design. The **LTSlope** and **RTSlope** inputs will behave accordingly.

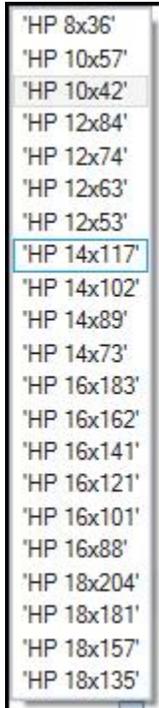


The **AbutPileSection** and **WwPileSection** inputs are set by entering the size accordingly through the full script “Editor” by checking the box. Enter piling input using one of the options exactly as shown, *Example* **'HP 10x57'** {'HP 8x36', 'HP 10x57', 'HP 10x42', 'HP 12x84', 'HP 12x74', 'HP 12x63', 'HP 12x53', 'HP 14x117', 'HP 14x102', 'HP 14x89', 'HP 14x73', 'HP 16x183', 'HP 16x162', 'HP 16x141', 'HP 16x121', 'HP 16x101', 'HP 16x88', 'HP 18x204', 'HP 18x181', 'HP 18x157', 'HP 18x135'}

RearPileOption input one of the options exactly as shown, *Example shown* **'None'** {'None', 'Left', 'Right', 'Both'}.



The image below is shown for information only; this example shows the list of **...PileSection** sizes for entering in Technique Inputs in the Node Properties. This pull-down list is only visible in the GC cell file itself where the development of the abutment shape is done. The pull-down list is not available when the GC is placed in OBM with the **.gcp** file. The required pile sizes need keyed-in as listed in the **...PileSection** node shown in this document.

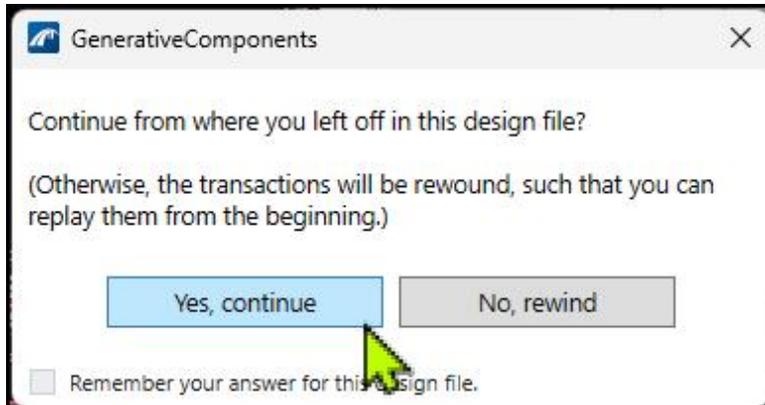


Checking the box of the **BeamSeatArrange** “On” will auto space the beam seats equally. When the box is unchecked “Off” then the **BeamSeatSpacing** inputs control the spacing.

BKG LOADOUT	<input type="checkbox"/>	1.25
BeamSeatLength	<input type="checkbox"/>	3.0
BeamSeatEdge	<input type="checkbox"/>	2.5
BeamSeatSpacing	<input type="checkbox"/>	{4.5, 5.0, 5.0, 4.5, 4.5, 6.0, 6.0, 5.0}
BeamSeatArrange	<input checked="" type="checkbox"/>	
BeamStepWidth	<input type="checkbox"/>	3.0
BeamSeatQty	<input type="checkbox"/>	5.
BeamSeatThick	<input type="checkbox"/>	{0.2, 0.35, 0.4, 0.4, 0.35, 0.2, 0.2, 0.35, 0.4, 0.4}
SlopedFooting	<input checked="" type="checkbox"/>	

When done with edits to the GC abutment and bridge model, “Exit” and “Check In” the OBM file as would be done normally.

When reopening an OBM file with an existing GC abutment that is already placed in the model, the following dialog box will appear. **Select “Yes, continue”.**



List of the Technique Inputs in the Node Properties are as follows; most are showing the Minimum and Maximum values. These are the inputs that are edited after the GC is placed in the OBM file.

The terms left and right are based off the perspective of viewing the abutment from the back-face of back wall elevation orientation. The Node Properties below are listed in the same sequence as they are displayed in the Node Properties dialog entry in OBM, this is not alphabetical. **This sequence is based in the “IA Stub Abut R14.gcp” file.**

AbutPileSection = H-Pile size options, **input one of the following options exactly as shown.** Example ‘HP 10x57’

```
{ 'HP 8x36', 'HP 10x57', 'HP 10x42', 'HP 12x84', 'HP 12x74', 'HP 12x63', 'HP 12x53',  
'HP 14x117', 'HP 14x102', 'HP 14x89', 'HP 14x73', 'HP 16x183', 'HP 16x162', 'HP 16x141',  
'HP 16x121', 'HP 16x101', 'HP 16x88', 'HP 18x204', 'HP 18x181', 'HP 18x157', 'HP 18x135' }
```

AheadPileHBatter = Horizontal batter of pile in main abutment footing (default value = 1) (*min. value=0, max. value=7*).

AheadPileLeftWidth = Distance measured along centerline of abutment footing from abutment cell origin (working point) to vertical center of front row outermost end H-pile on left side. This is not measured to abutment wing piling (*min. value=5, max. value=50*).

AheadPileQty = Quantity of H-pile in the front face row of abutment footing. This also creates the back face row H-pile quantity, and spacing is automatically set equal distance and staggered between the front row H-piles (*min. value=2, max. value=30*).

AheadPileRightWidth = Distance measured along top vertical center of H-pile in the front row of abutment footing, from abutment cell origin (working point) to front row outermost pile on right side. The value is based on a zero-degree skew. This is not measured to abutment wing piling (*min. value=1, max. value=55*).

AheadPileToAbutFF = Horizontal distance measured from the bottom from the bottom edge of the front face slope of the abutment footing, to the vertical centerline of the front row H-pile at top of pile, battered ahead H-pile (default value is 1.5) (*min. value=1, max. value=5*).

AheadPileVBatter = Vertical batter of pile in main abutment footing (default value = 4) (*min. value=1, max. value=10*).

ApproachSlabThick = Paving notch vertical distance at centerline of approach slab (*min. value=0.5, max. value=3*).

BackwallCrownRadius = This is the parabolic crown at top of deck, typically no need to change this. (*min. value=50.0, max. value=350, default value is 150.0*)

BackwallHeight = Vertical distance at centerline of abutment between top of abutment footing to top of deck (*min. value=2, max. value=12*).

BackWallThickness = Abutment backwall thickness horizontal distance from front to back faces of backwall (default value is 1.25) (*min. value=1, max. value=3*).

BeamSeatArrange = (Unchecked = false, Checked On = true) When Checked On (true), this will enable the Beam Seats/steps to be equally spaced per abutment footing length. When Unchecked (false), the values in the BeamSeatSpacing input will determine the spacing of the Beam Seats.

BeamSeatEdge = Horizontal distance from centerline outer beams to inside vertical face of abutment wing wall, measured along centerline of abutment bearings. At zero-skew for Bulb Tee (BTC, BTD, BTE) beams, this value would be set at 1.917. At zero-skew for C & D beams, this value would be set at 1.500 (*min. value=0.5, max. value=10*).

BeamSeatLength = Beam seat/step length is horizontal distance front face of backwall to the top edge of front face abutment footing. For Bulb Tee (BTC, BTD, BTE) beams set at 3.000. For C & D beams set at 2.417. (*min. value=0.5, max. value=5*).

BeamSeatQty = Number of beams (*min. value=4, max. value=15*).

BeamSeatSpacing input will determine the spacing of the Beam Seats/steps. This only applies when the BeamSeatArrange input is Unchecked (false). Default values are {4.5, 5.0, 5.0, 4.5, 4.5, 6.0, 6.0, 5.0} change these per design, the quantity of beams will determine what values are used/read from left to right in the list.

BeamSeatThick = Height of beam seats/steps, change these per design, the quantity of beams will determine what values are used/read from left to right in the list (*default values = 0.2, 0.35, 0.4, 0.4, 0.35, 0.2, 0.2, 0.35, 0.4, 0.4, 0.35, 0.2*).

BeamStepWidth = Beam step/seat width is horizontal distance left and right from centerline beam. For Bulb Tee (BTC, BTD, BTE) beams set at 3.500. For C & D beams set at 3.000. (*min. value=1, max. value=5*).

BRGToAbutFF = Horizontal distance from abutment bearing centerline to top the edge of front face abutment footing (default value is 1.25) (*min. value=0.5, max. value=3.5*).

CorbelHeight = Distance of outer vertical face of paving notch (*min. value=0.5, max. value=3*).

CorbelSlopeHeight = Vertical distance of sloped bottom outer face of paving notch (*min. value=0.5, max. value=3*).

CorbelWidth = (paving notch horizontal) Distance of top horizontal face of paving notch, perpendicular to abutment backwall (*min. value=0.5, max. value=3*).

LCheekwallHeight = Vertical distance of left cheek wall height from top of abutment footing (*min. value=0.5, max. value=15*).

LCheekwallELOffset = (default values -0.2, -0.4) Left-side Cheek Wall vertical distance offset (elevation change) at end of cheek wall on the top inside and outside corners. The first value changes the inside face top outer corner elevation. The second value changes the outside face top outer corner elevation. A positive value moves the top corner ends of the cheek wall vertically up. A negative value moves the top corner ends of the cheek wall vertically down. This input does not move the top of the cheek wall at the back wall of abutment, this end remains the same as the LCheekwallHeight value.

LPilecapExtendLength = Left side abutment footing wing extension horizontal length. Measured from front face of abutment backwall to end of footing wing extension (*min. value=3, max. value=15*).

LPilecapExtendWidth = Left side abutment footing wing extension horizontal width (*min. value=3, max. value=7*).

LSlope = Left Lane Slope in Percent from centerline (crown) of bridge slab to left gutter line (*min. value=-8, max. value=8*).

LTWidth = Left Lane Width from centerline (crown) of bridge slab to left gutter line (*min. value=0, max. value=60*).

LWingBottomOffset = Vertical distance from bottom of left-side abutment wingwall to bottom of abutment footing (*min. value=0, max. value=5*).

LWingwallELOffset = (default values -0.2, -0.4) Left-side Wing Wall vertical distance offset (elevation change) at end of wing extension and abutment wing. This changes the top of wing elevations at construction joints based from the top of backwall, at the front face. A positive value moves the top of wing wall ends, vertically up. A negative value moves the top of wing wall ends, vertically down. This Input does not move the bottom of the wing wall, it remains fixed (*min. value=-10, max. value=10*).

LWingwallLength = Left-side abutment wingwall horizontal length (*min. value=3, max. value=10*).

LwwPileEdgeOffset = Left abutment wing, end piling distance along length of wing from vertical center of end H-pile to end of abutment wing (*min. value=1, max. value=5*).

LwwPileEmbedLength = Vertical distance of H-pile embedment in left-side abutment wing footing, measured from bottom of abutment wing wall footing to top of pile (*min. value=0.5, max. value=5*).

LwwPileHeight = Vertical distance of H-pile in left-side abutment wing footing, measured from bottom of abutment wing wall footing to bottom of pile (*min. value=1, max. value=200*).

PilecapFrontBatterH = Abutment footing height at the sloped front face, vertical distance. Measured from top of footing at horizontal intersection along sloped front face, to bottom of footing. This measurement is below the standard 1" Wash on top of abutment footing (default value is 4.0) (*min. value=2, max. value=5*).

PilecapFrontBatterW = Abutment footing front face slope, horizontal distance. This moves the bottom of abutment footing, at the front face, horizontally from a vertical point at the top of abutment footing front face (default value is 1.0) (*min. value=0.5, max. value=3*).

PileEmbedLength = Vertical distance of H-pile embedment in main abutment footing, measured from bottom of abutment footing to top of pile (*min. value=0.5, max. value=5*).

PileHeight = Vertical distance of H-pile in main abutment footing, measured from bottom of abutment footing to bottom of pile (*min. value=1, max. value=200*).

RCheekwallHeight = Vertical distance of right cheek wall height from top of abutment footing (*min. value=0.5, max. value=15*).

RCheekwallELOffset = (default values -0.2, -0.4) Right-side Cheek Wall vertical distance offset (elevation change) at end of cheek wall on the top inside and outside corners. The first value changes the inside face top outer corner elevation. The second value changes the outside face top outer corner elevation. A positive value moves the top corner ends of the cheek wall vertically up. A negative value moves the top corner ends of the cheek wall vertically down. This input does not move the top of the cheek wall at the back wall of abutment, this end remains the same as the RCheekwallHeight value.

RearPileOption = H-Pile placement options, **input one of the options exactly as shown**. Example 'Left' { 'None', 'Left', 'Right', 'Both' }. This enables the option to add an outer pile to the back row of piling in the abutment footing that is sometimes needed per design.



RearPileToAbutBF = Horizontal distance from the back face of abutment footing to the back row H-pile vertical centerline, vertical rear H-pile (default value is 1.5) (*min. value=1, max. value=5*).

RPilecapExtendLength = Right side abutment footing wing extension horizontal length. Measured from front face of abutment backwall to end of footing wing extension (*min. value=3, max. value=15*).

RPilecapExtendWidth = Right side abutment footing wing extension horizontal width (*min. value=3, max. value=7*).

RTSlope = Right Lane Slope in Percent from centerline (crown) of bridge slab to right gutter line (*min. value= -8, max. value=8*).

RTWidth = Right Lane Width from centerline (crown) of bridge slab to right gutter line (*min. value=0, max. value=60*).

RWingBottomOffset = Vertical distance from bottom of right-side abutment wingwall to bottom of abutment footing (*min. value=0, max. value=5*).

RWingwallELOffset = (default values -0.2, -0.4) Right-side Wing Wall vertical distance offset (elevation change) at end of wing extension and abutment wing. This changes the top of wing elevations at construction joints based from the top of backwall, at the front face. A positive value moves the top of wing wall ends, vertically up. A negative value moves the top of wing wall ends, vertically down. This Input does not move the bottom of the wing wall, it remains fixed (*min. value= -10, max. value=10*).

RWingwallLength = Right-side abutment wingwall horizontal length (*min. value=3, max. value=10*).

RwwPileEdgeOffset = Right abutment wing, end piling distance along length of wing from vertical center of end H-pile to end of abutment wing (*min. value=1, max. value=5*).

RwwPileEmbedLength = Vertical distance of H-pile embedment in right-side abutment wing footing, measured from bottom of abutment wing wall footing to top of pile (*min. value=0.5, max. value=5*).

RwwPileHeight = Vertical distance of H-pile in right-side abutment wing footing, measured from bottom of abutment wing wall footing to bottom of pile (*min. value=1, max. value=200*).

SkewAngle = Angle of skew along centerline of abutment. A positive value is Left Ahead, a negative value is Right Ahead (*min. value= -45, max. value=45*).

SlopedFooting = (Unchecked = false, Checked On = true) When Checked On (true), this will enable the abutment footing to be sloped. This would be used for a superelevated design. When Unchecked (false), this will maintain a level abutment footing. The slope will be determined by what the most sloped input is set at, based on the LTSlope or RTSlope values.

SlopedStepMin = This is the 1" Wash at top of abutment footing between beam seats 1/12 (0.08333) to 1.0 (default value is 0.0833). Typically, this does not need changed. (*min. value=33333, max. value=1*).

WwPileHBatter = Horizontal batter of pile in abutment wing footings (default value = 1) (*min. value=0, max. value=7*).

WwPileSection = H-Pile size options, **input one of the following options exactly as shown. Example 'HP 10x57'**

{ 'HP 8x36', 'HP 10x57', 'HP 10x42', 'HP 12x84', 'HP 12x74', 'HP 12x63', 'HP 12x53',
 'HP 14x117', 'HP 14x102', 'HP 14x89', 'HP 14x73', 'HP 16x183', 'HP 16x162', 'HP 16x141',
 'HP 16x121', 'HP 16x101', 'HP 16x88', 'HP 18x204', 'HP 18x181', 'HP 18x157', 'HP 18x135' }

WwPileVBatter = Vertical batter of pile in abutment wing footings (default value = 4) (*min. value=1, max. value=10*).

UPDATED VERSION (08-06-2025) "BT Stub Abutment 3D GC R14.dgn"

This is for information only.

The images below are showing the "BT Stub Abutment 3D_GC_R14.dgn" GC cell file. This is what appears where the development of the abutment shape is worked on.

