

General Guidance for Generative Components in OBM

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

This is general guidance that is used for Iowa DOT Custom Abutments when they are placed in OpenBridge Modeler (OBM) using Generative Component (GC) abutments. Previously, Custom Abutments were placed with Functional Component (FC) Abutments that were parametric cells, these are phased out and replaced with Generative Component (GC) Abutments.

Prior to placing a Generative Component (GC) custom abutment into an OBM structure, it is recommended to make as many superstructure entries as possible first, such as deck adjustments, beam haunch and camber, beam bearing and seat height using a basic OBM delivered abutment with the appropriate top of abutment footing settings for the structure. This would aid in providing beam bearing seat (step) thickness values used in GC node inputs. By doing this, it will optimize the GC vertical location upon initial placement in the bridge model. Any vertical and horizontal offsets of the abutments can be made in the "Rule Property" settings after the GC is placed.

This document will provide basic guidance for the following information:

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The additional GC-Inputs Abutment documents to be used along with this document are listed below.

GC-Inputs-CCS-Abutment

GC-Inputs-Integral-Abutment

GC-Inputs-Stub-Abutment

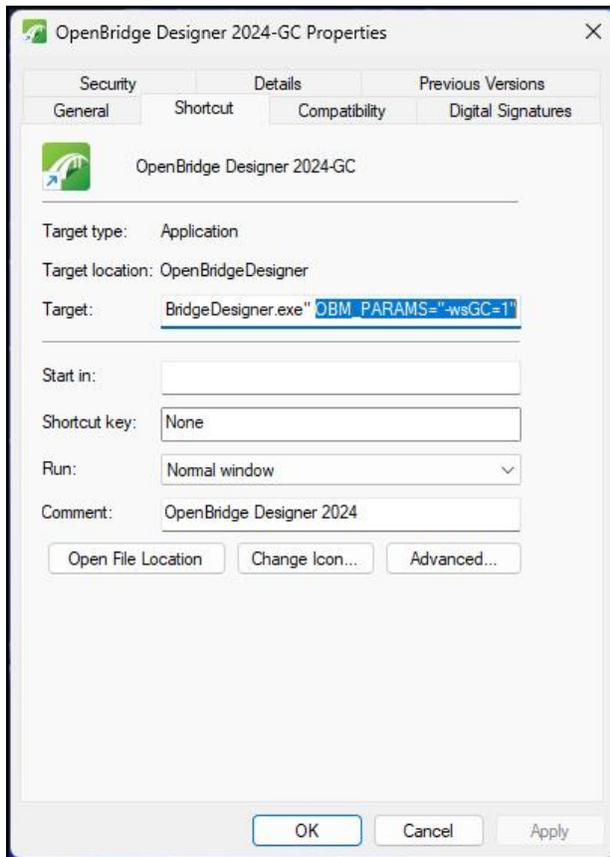
Set-up of OBD/OBM Shortcut to enable use of Generative Component (GC) custom abutment

When working with a Generative Component (GC) custom abutment, if using OpenBridge Designer (OBD) then a shortcut needs to be created with the following text appended to the software executable path. This will open an OBM file enabling the use of GC's by adding the "Computational Design" Workflow capabilities.

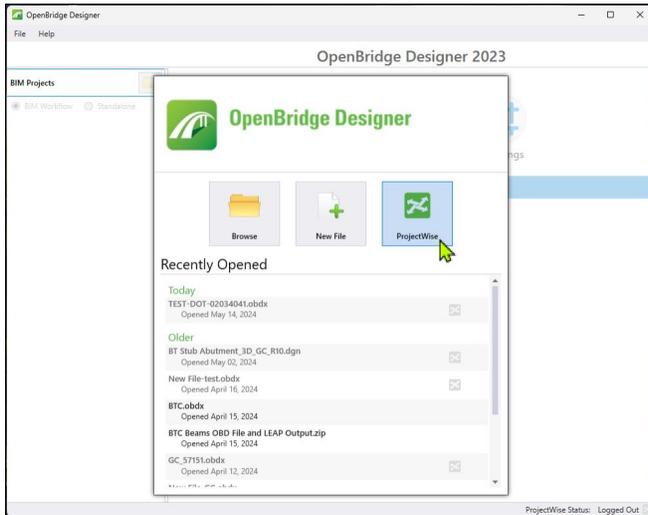
OBM_PARAMS="-wsGC=1"

The following image is showing the shortcut for OBD 2024 version, Update 2.

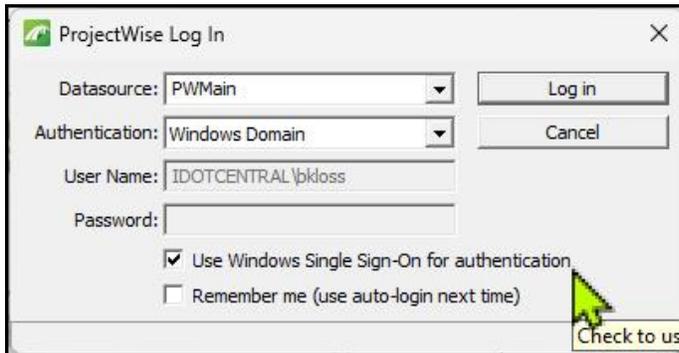
"C:\Program Files\Bentley\OpenBridge Designer 2024.00\OpenBridgeDesigner\OpenBridgeDesigner.exe" OBM_PARAMS="-wsGC=1"



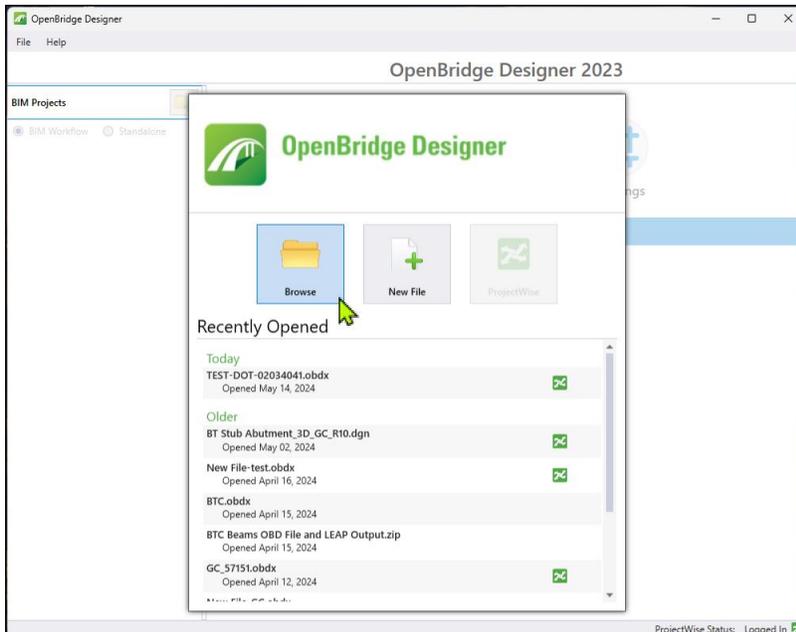
Connect to ProjectWise (PW) through the Desktop OpenBridge Designer.



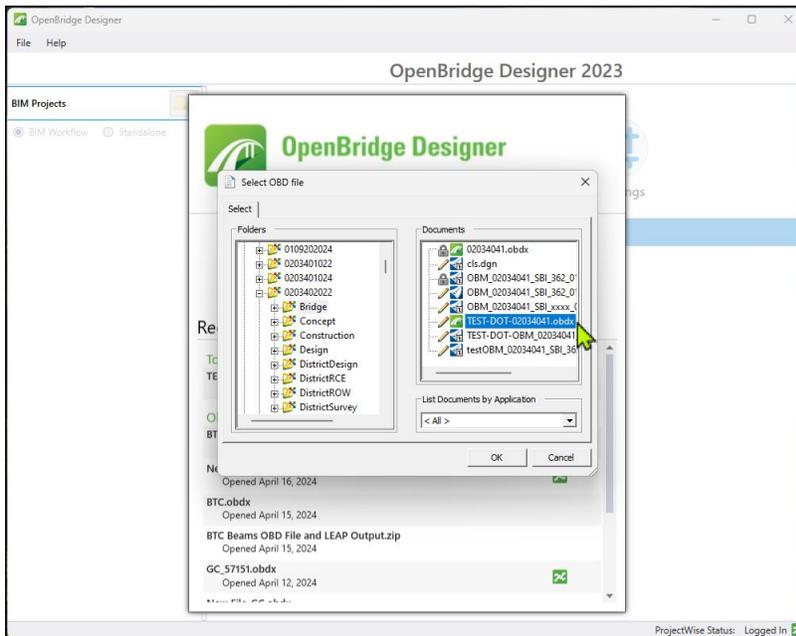
Log In to PW.



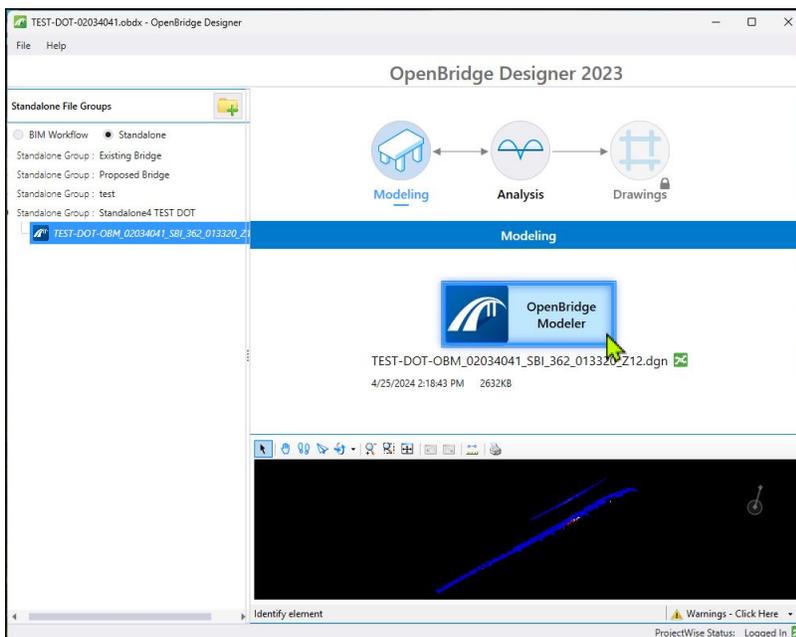
Browse to the existing project .obdx file in PW.



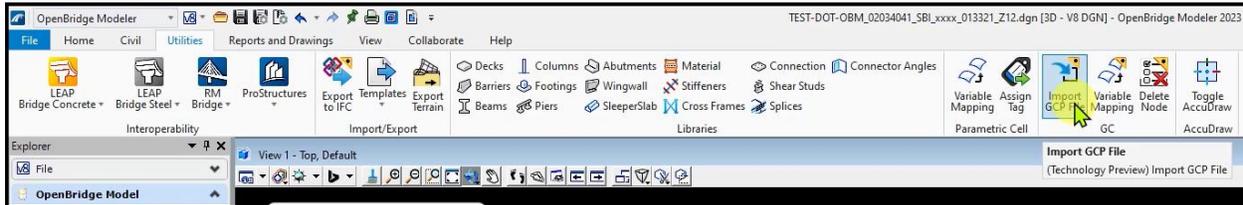
Browse to the existing project .obdx file in PW and select OK.



Select and open the existing OBM file.

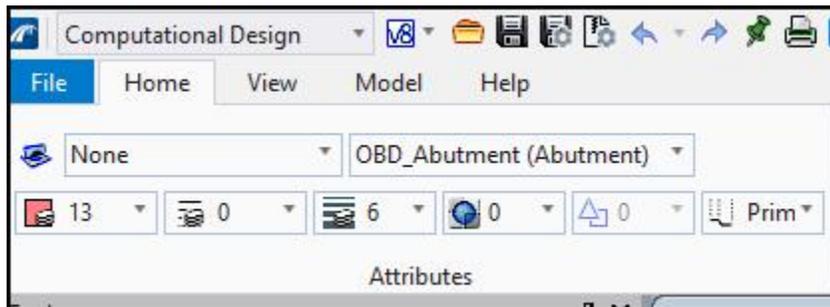


In the ribbon with the workflow set to **OpenBridge Modeler**, under the **Utilities** tab, select **Import GCP File** in the **GC** group.



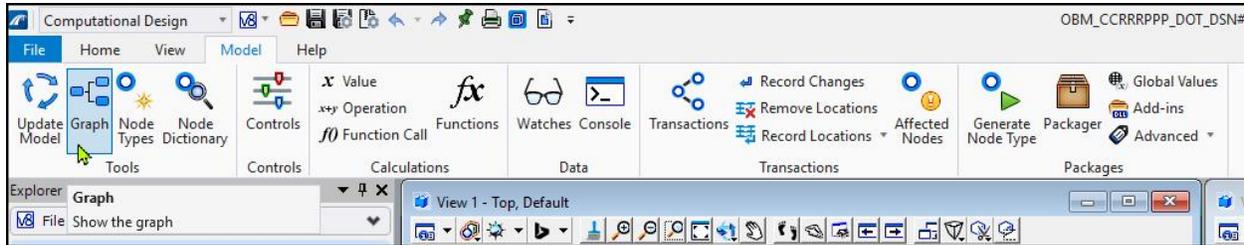
To continue to place the GC abutment see the relevant GC abutment document to use for each GC abutment type.

Note, when placing GC abutments, the element properties (visual attributes) that are applied are dependent on what the active element attributes are set at during the time of placement. When the GC abutment is modified using the Inputs through the Computational Design workflow, the element properties will again use what the active element attributes are set at.

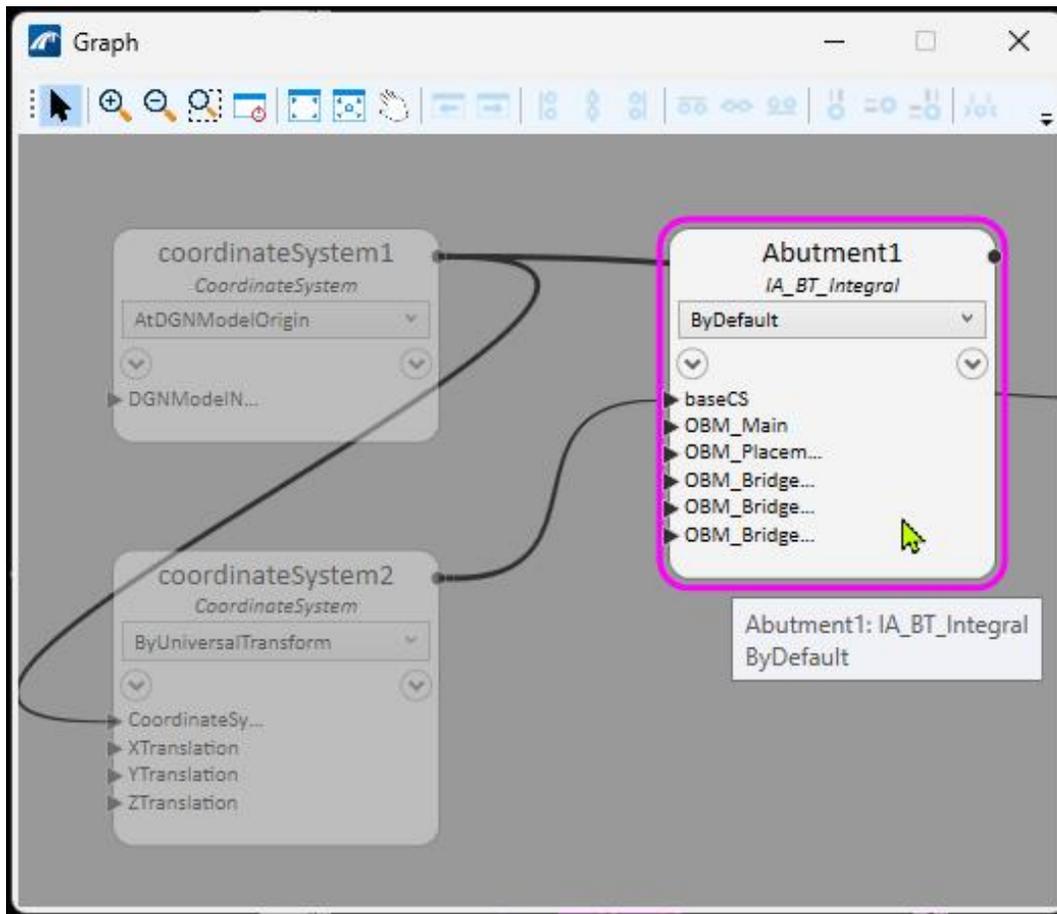


Renaming a GC Custom Abutment once placed in OBM.

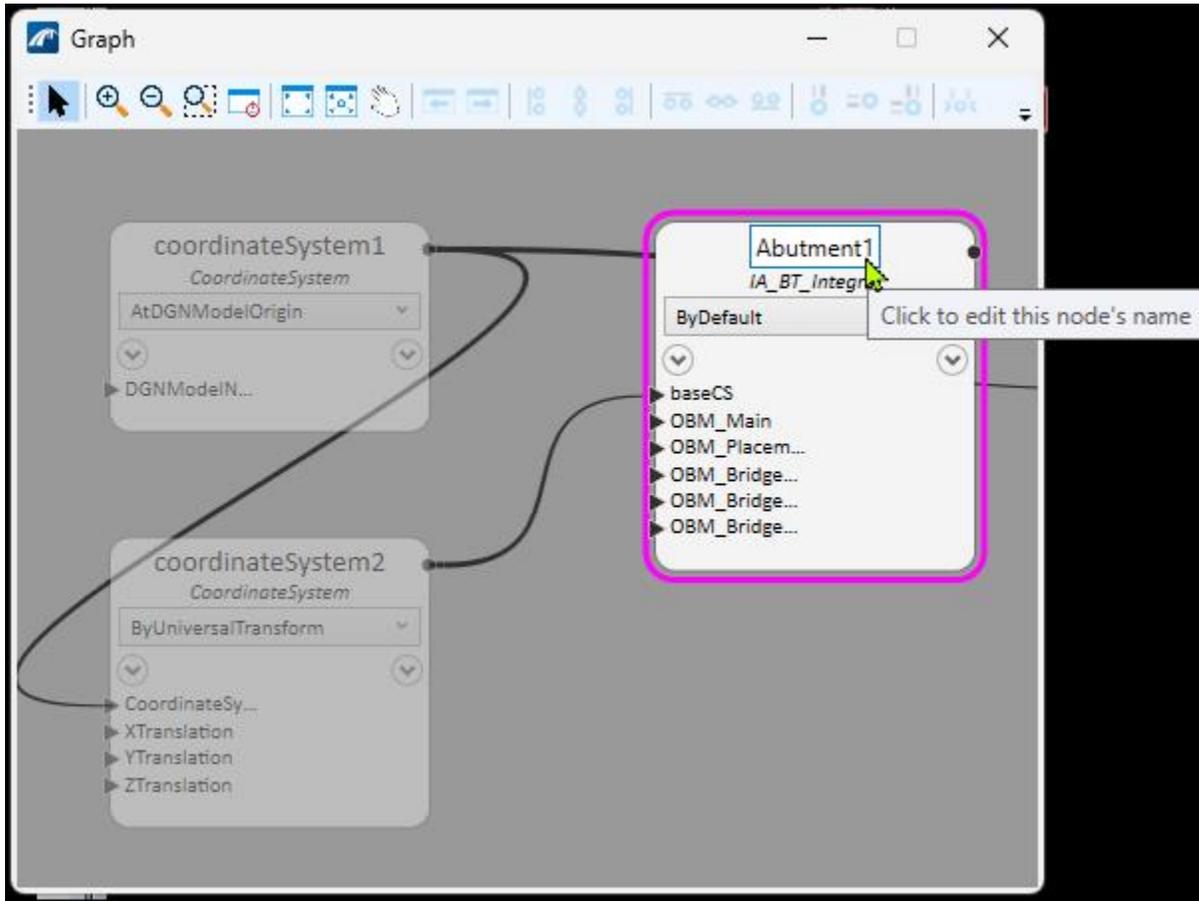
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry and name. These tools are also located under the **Home tab**.



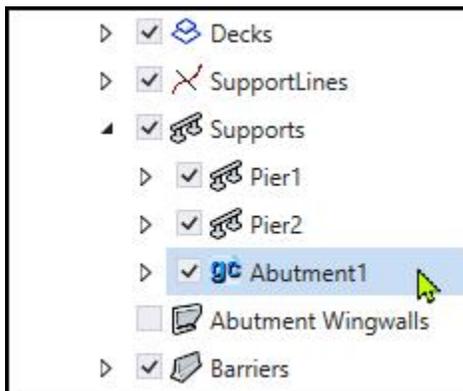
The Graph dialog box will appear, the “Abutment1” box in this example was auto-labeled “Abutment1” *IA_BT_Integral* in the OBM model. Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry. Editing the Node Properties is covered in the CG-Inputs Abutment Documents specific to each abutment type.



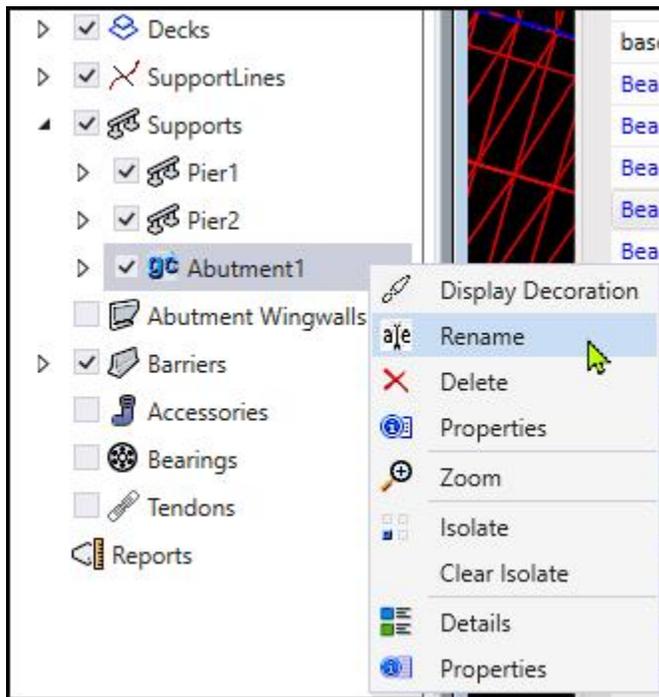
In the GC Graph dialog box, select the “Abutment1” text to rename the abutment. Use a logical name.



Additionally, the GC abutment will need to be renamed in the OpenBridge Model Explorer tree. This should match the name used in the GC Graph dialog box. In this example, OBM has labeled the Generative Component Custom Abutment as “Abutment1”.

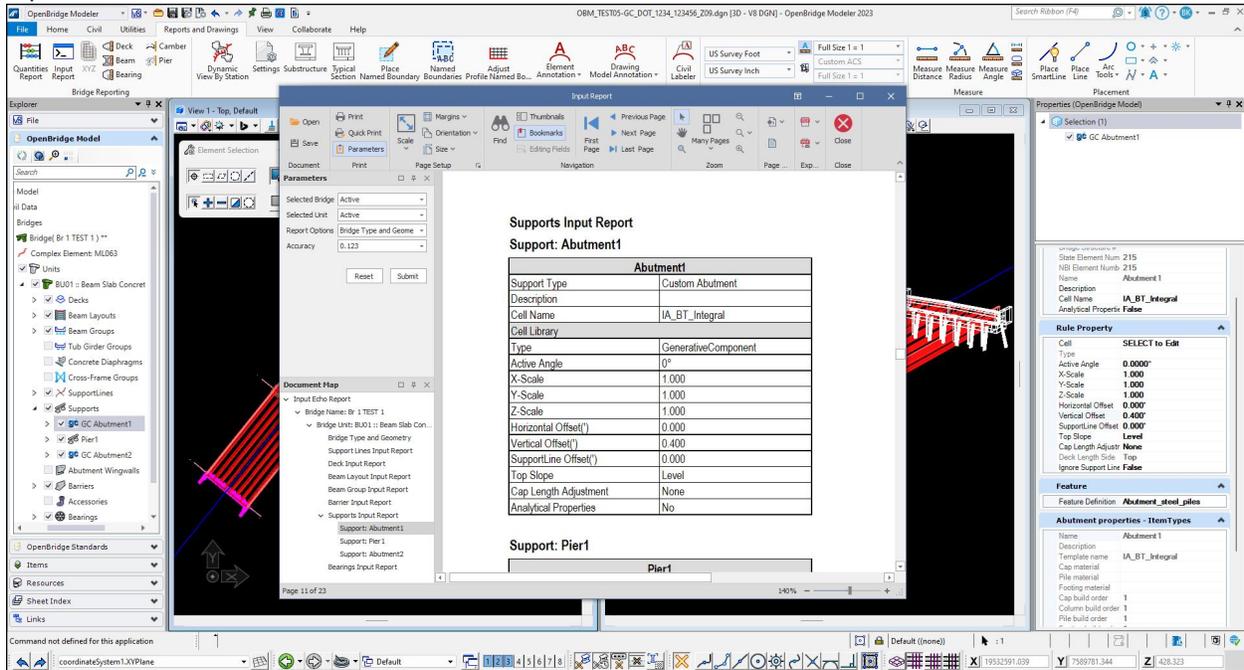


The OBM Supports “GC Abutment1” can be renamed in the OBM structure tree. Renaming in the OBM structure tree does not appear to carry over and rename the Generative Component from the “auto-generated” name of “Abutment1”.

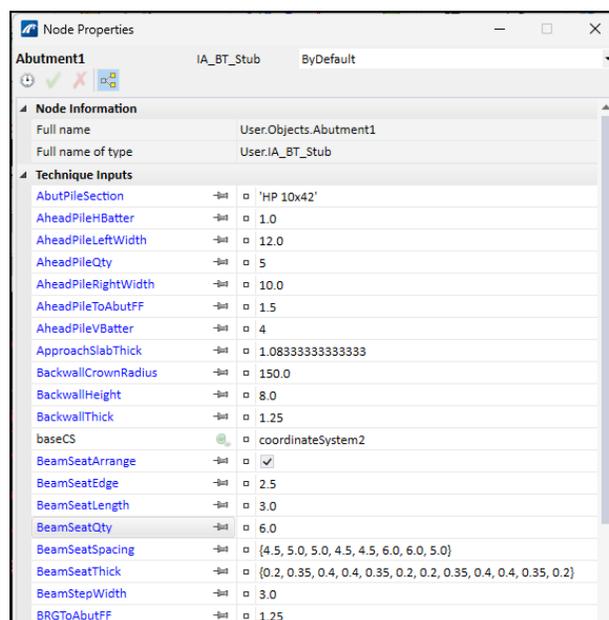


Input Report showing output when Custom Abutments are used.

OBM Input Report on GC Abutments only reports on the Rule Properties that are set for each abutment. It does not provide reports on the individual variables, Technique Inputs, set for each abutment. When creating an Input Echo Report of the OBM file for project records, the GC abutments only provide basic Rule Property information. It is recommended to save a “screen shot” of the Node Properties/Technique Inputs used for each GC abutment used in the OBM file.



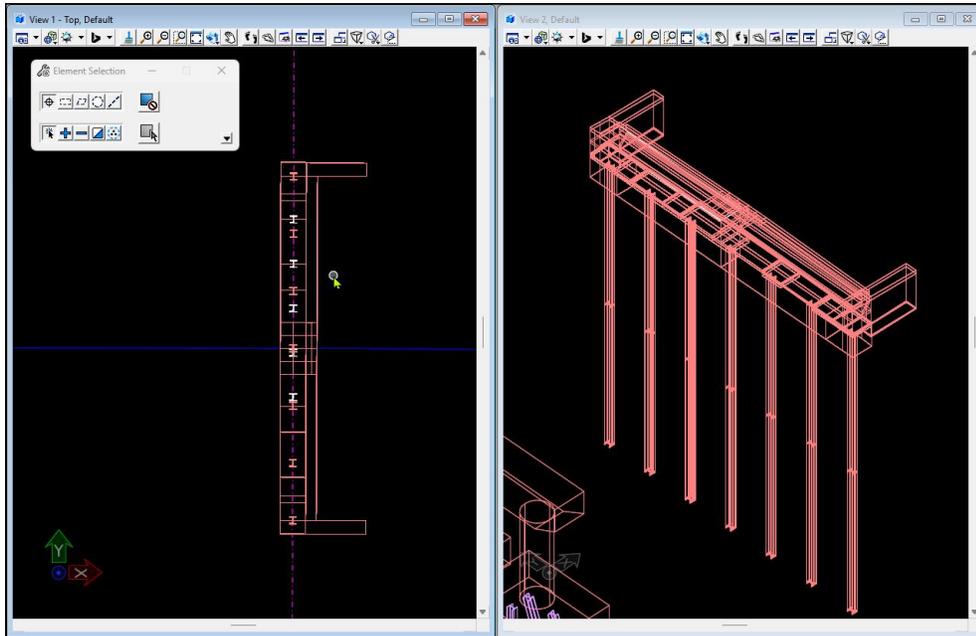
The image below shows an example, partial list, of Technique Inputs edited in the Node Properties of a GC abutment once placed in OBM. This is used to edit the geometry of each type of GC abutment. The Technique Inputs are specific to each individual abutment and type. It is recommended to save a “screen shot”, or other form of record, of this Node Properties/Technique Inputs used for each GC abutment used in the OBM file.



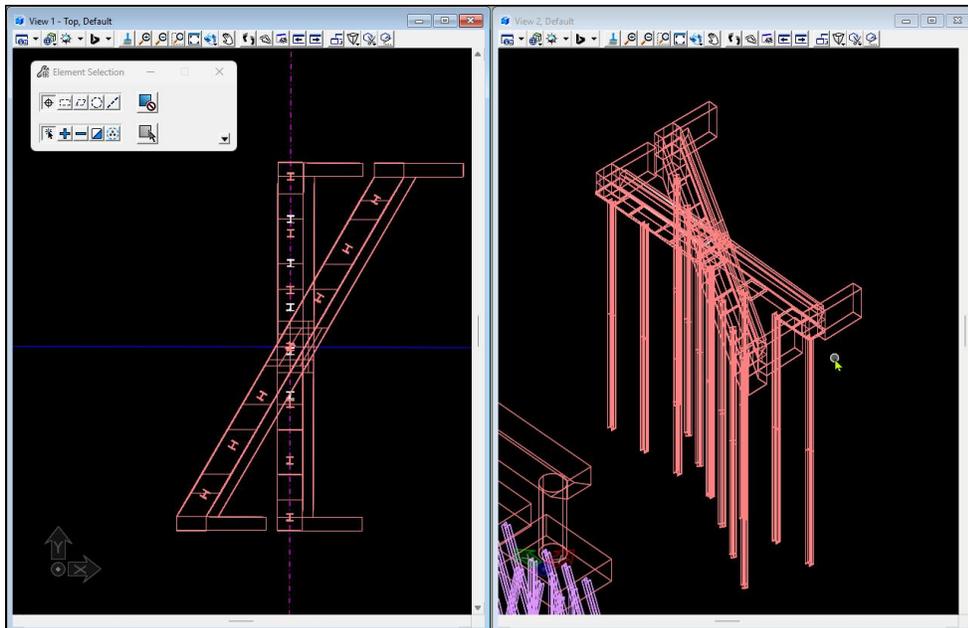
Rebuilding an existing GC abutment that may have broken or static elements.

This is needed when wanting to rebuild a GC abutment that may have remnants or portions of the shapes that become static copies of the original. These static elements may have the same or different colors as the original elements.

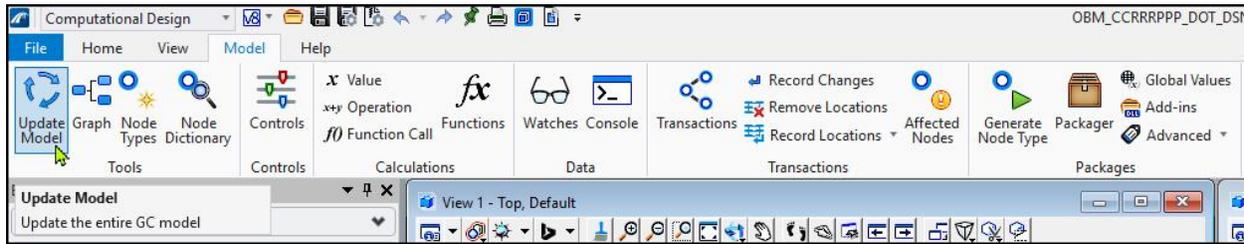
The example image below shows a GC abutment along with static elements may have the same or different colors as the original elements. In this image the static elements may not appear obviously different than the active GC elements. Some static elements may overlay, or be offset from, the active GC managed elements.



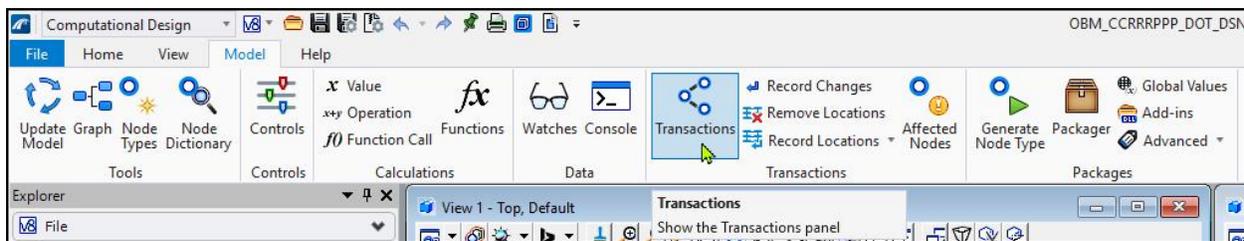
The example image below shows the GC abutment with a skew change. This is to visualize the difference of the static elements that do not move when the GC is changed.



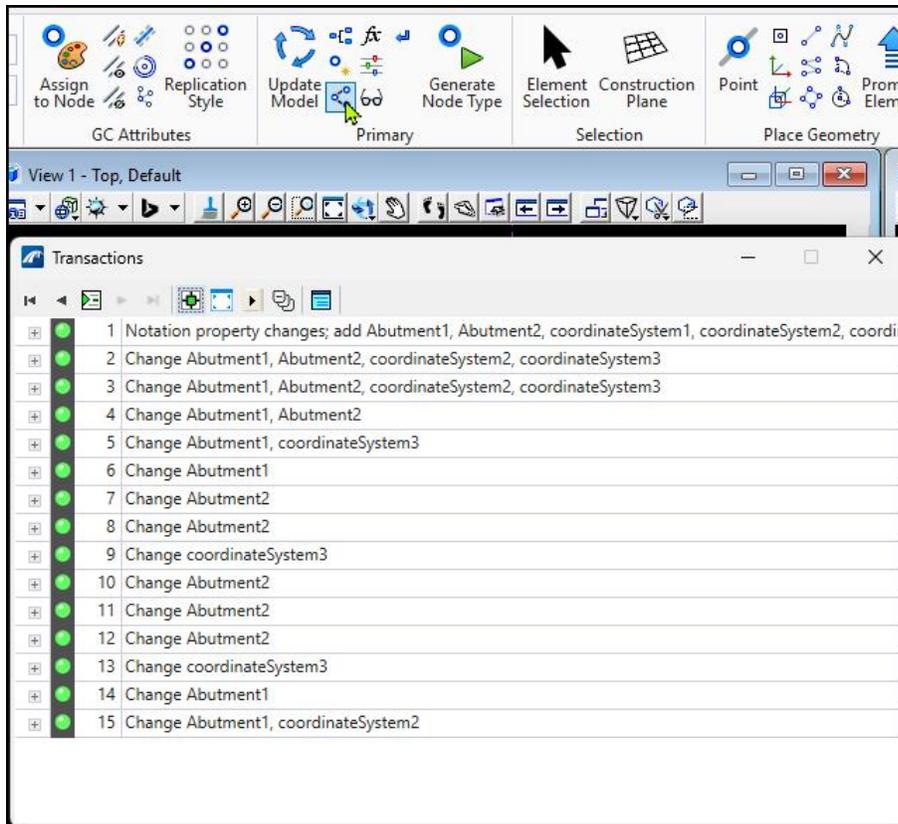
First, try using the **Update Model** tool in the **Computational Design workflow** under the **Model tab** of the ribbon to see if this fixes the broken static elements. If this does not work, then re-running the “Transactions” is the next process to try. These tools are also located under the **Home tab**.



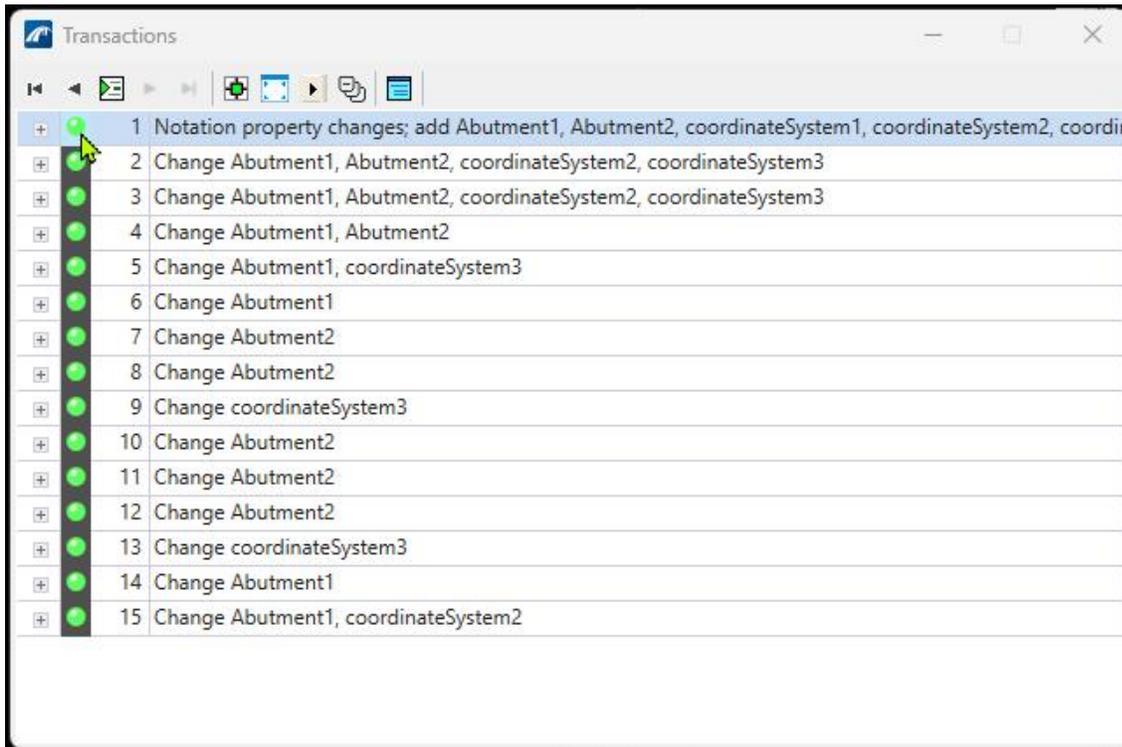
The **Transactions** tool is in the **Computational Design workflow** under the **Model tab** of the ribbon.



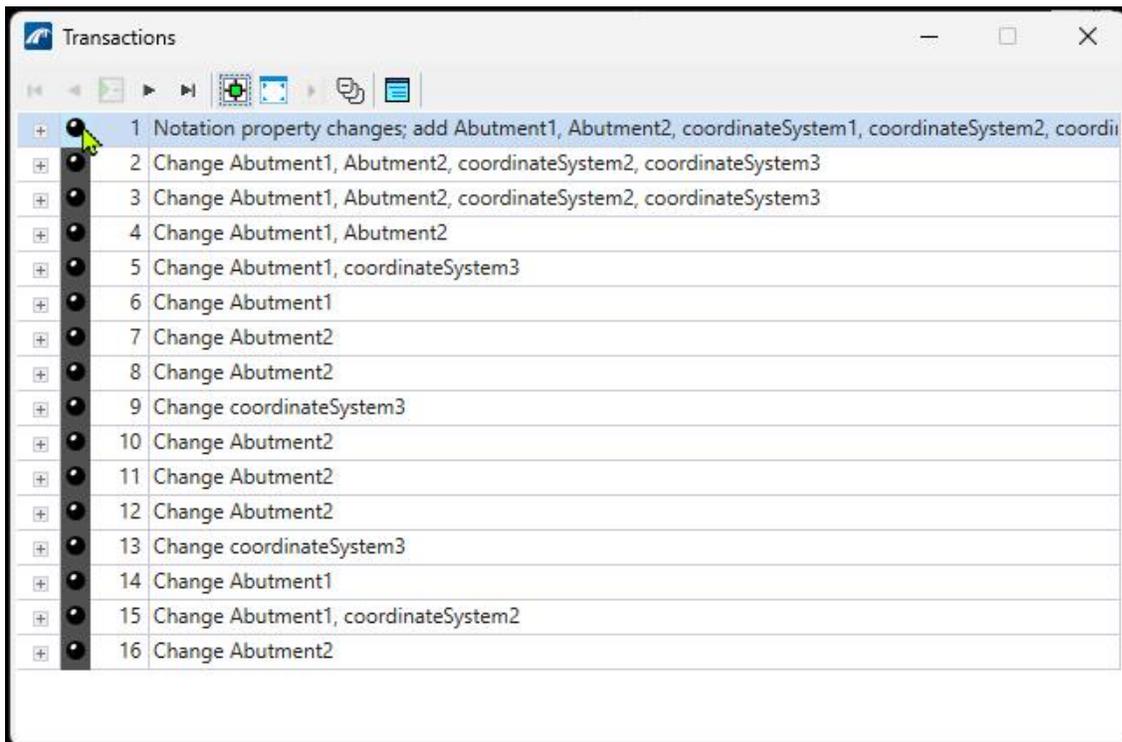
Selecting “Transactions” opens the following dialog box.



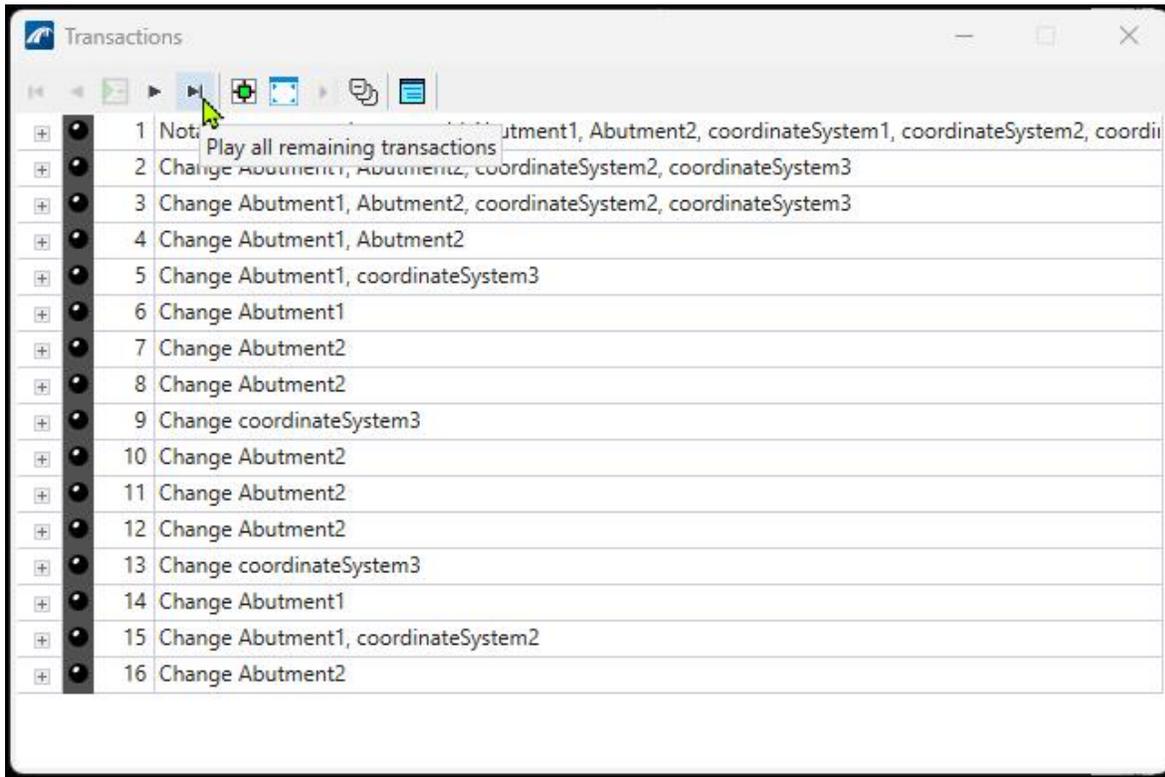
Turn off, left click, the top transaction button. This will turn off all transactions below it. This will remove all GC's that are in the model. The following steps will rebuild all GC's that are in the model.



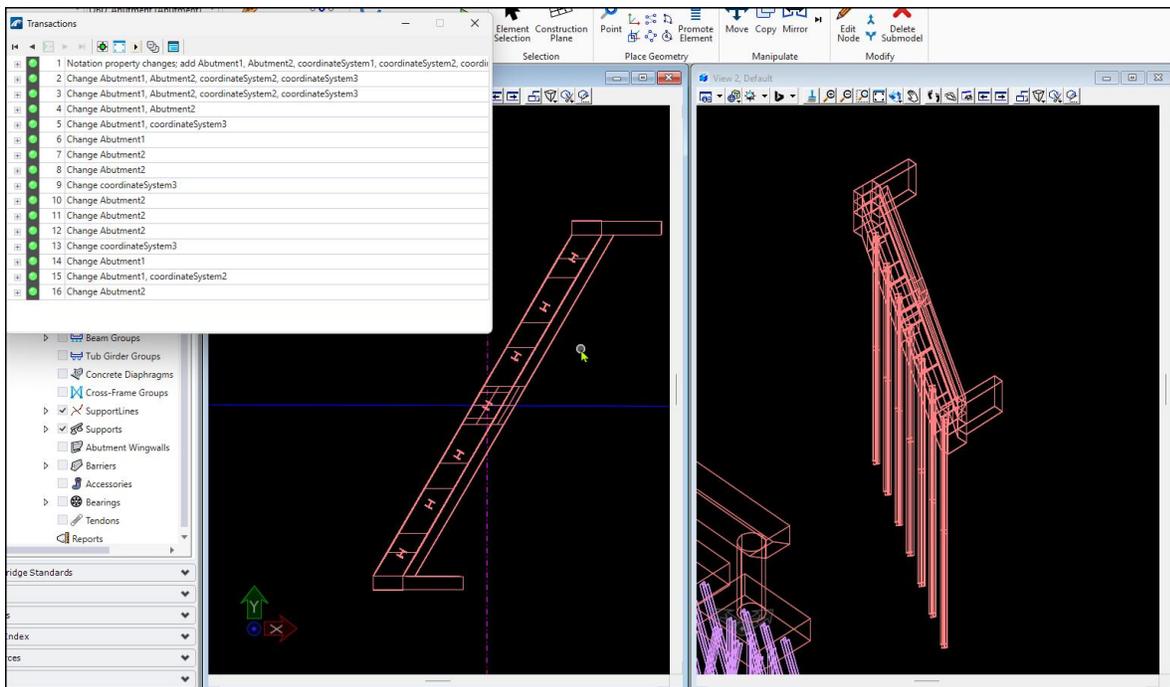
Turning off the top transaction button will turn off all transactions below it.



Select the “Play all remaining transactions” tool will replay/re-run all transactions and rebuild the GC abutments. This will rebuild all GC’s that are in the model.



The example image below is showing the rebuilt GC’s that are in the model with the broken static elements removed.

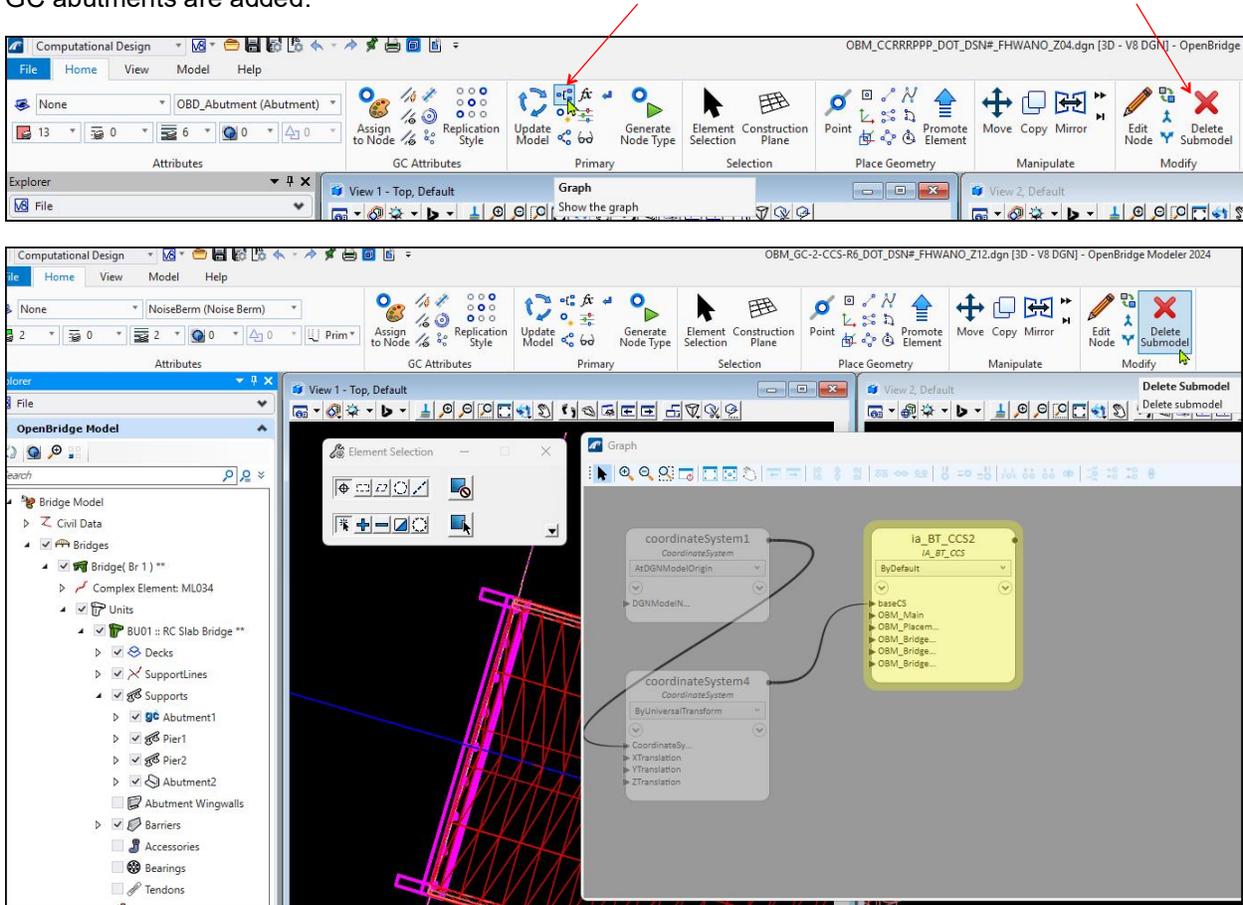


Removing existing GC and GC-Package (gcp) files from an OBM file.

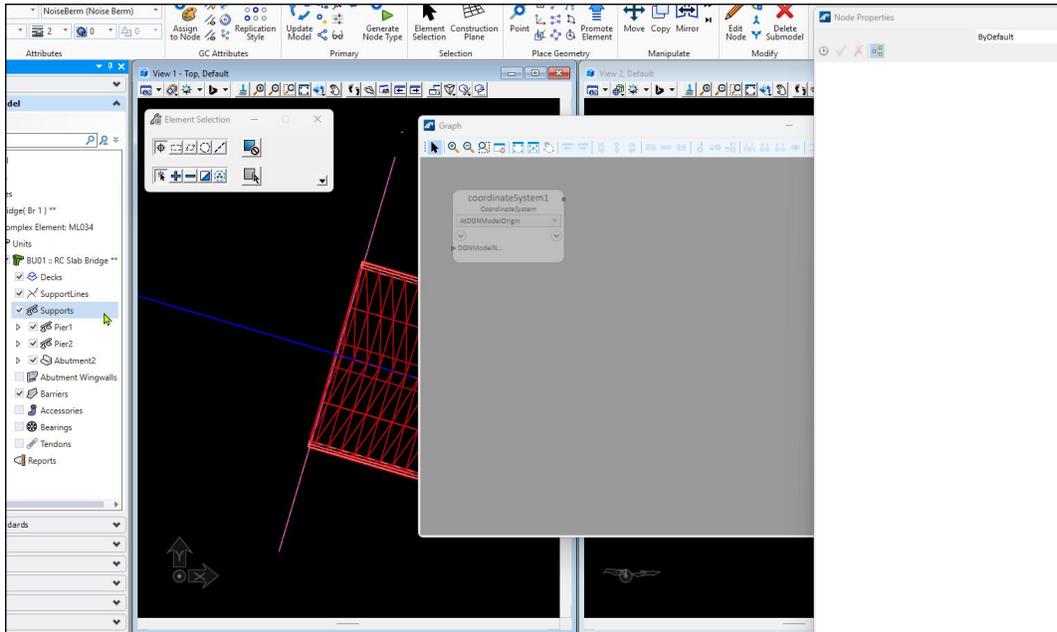
This is needed when wanting to replace an existing GC abutment and existing gcp file used with that abutment, for an updated gcp file used for an updated or different GC abutment. **This is necessary when the existing and replacement GC abutments are the same name.**

In the Ribbon, set the workflow to **Computational Design**, use the following steps.

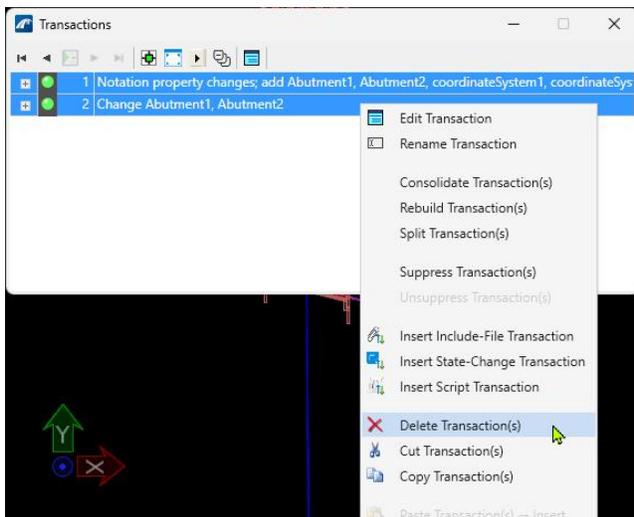
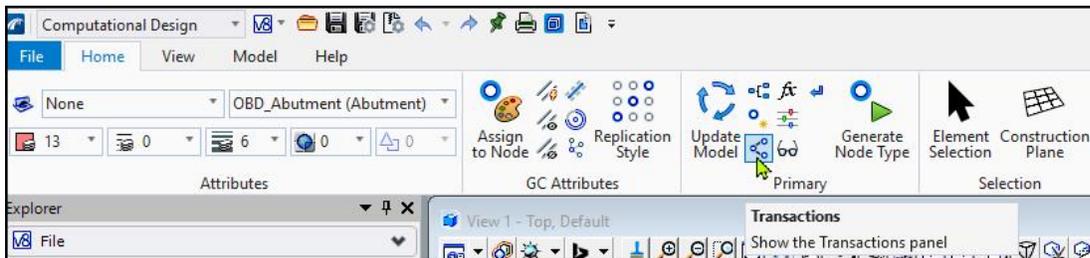
In the **Home tab** of the Ribbon, select the **Graph** tool to open the Graph dialog and select the GC abutment for deletion. In the **Home tab** of the Ribbon, use the **Delete Submodel** tool. If deleting both abutments, delete all Graph Submodels, including CoordinateSystem. New ones will be created when GC abutments are added.



The GC abutment should now appear removed from the bridge model.



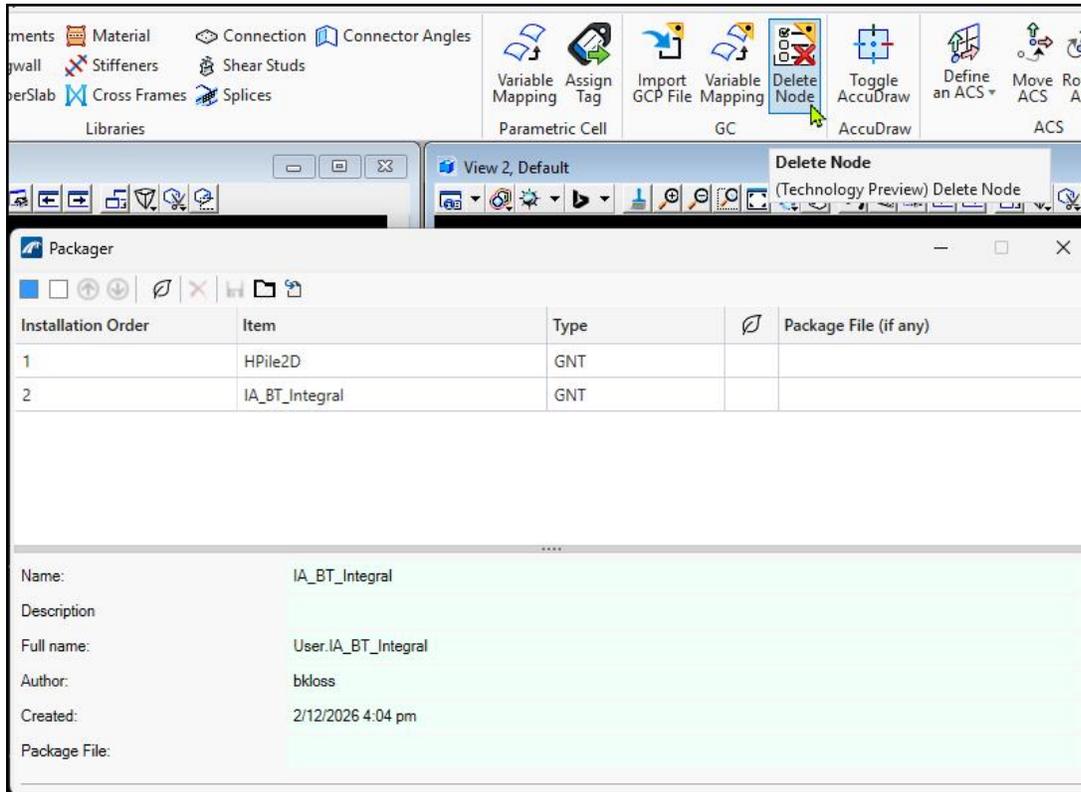
Next, while in **Computational Design workflow**, in the **Home tab** of the Ribbon, select the **Transactions** tool to open the dialog box and ensure the transactions that are recorded when using the GC abutments are deleted. Select/highlight all Transactions, right-click and select “Delete Transaction(s)” to remove all remnants of the GC abutment that is to be deleted.



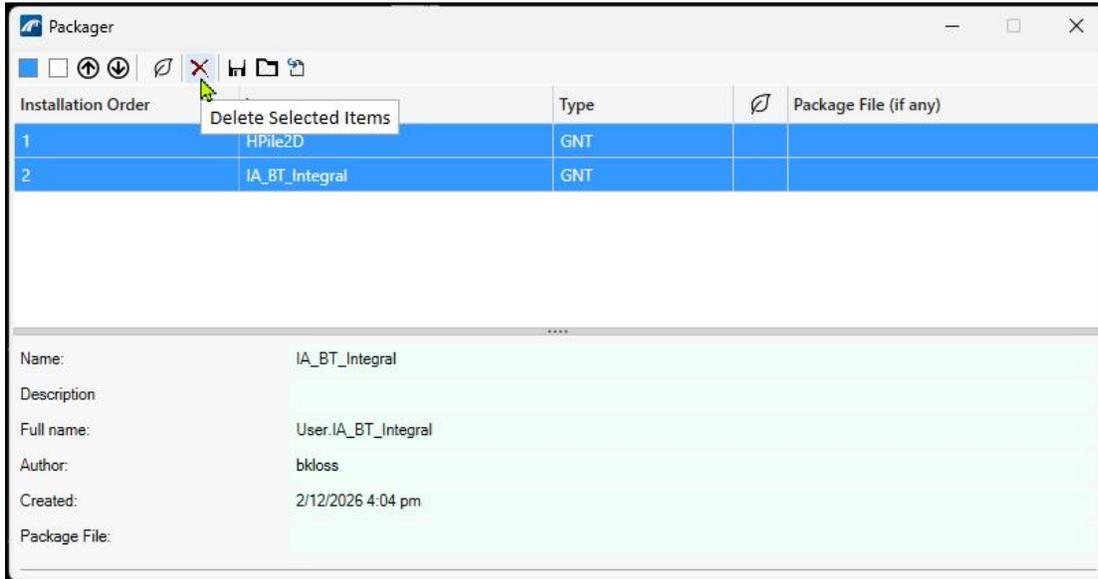
In the Ribbon, set the workflow to **OpenBridge Modeler**, select the **Utilities** tab, select **Delete Node** in the **GC group** of the ribbon.



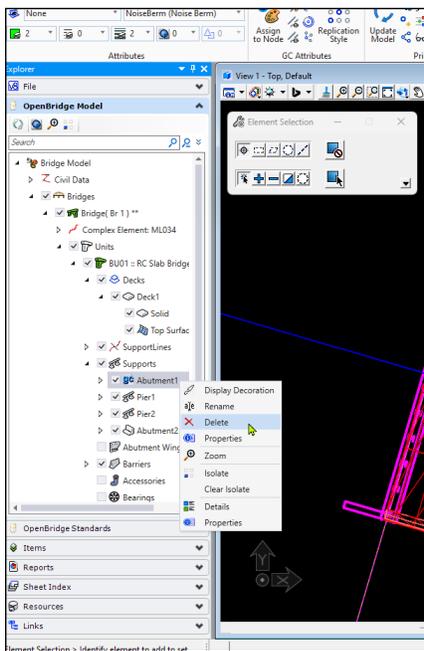
The following Packager dialog box will display.



Select the existing GC “Items” that are in the list, select “Delete Selected Items” to remove them from the OBM file. This will now allow the updated GC-abutment to be placed in the OBM file.

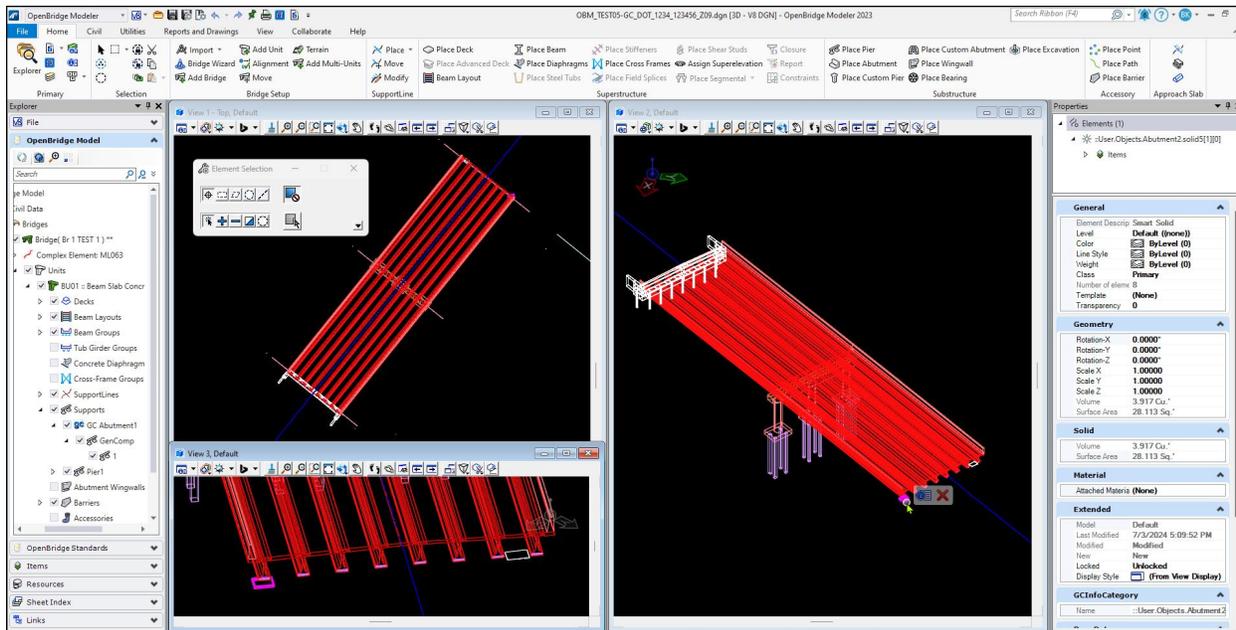


In the OpenBridge Model explorer tree, if the deleted GC abutment is still visible, select the “gc Abutment” in the OBM Supports, right click, select “Delete”.



After completing the removal/deletion of the GC Package files, then the new/replacement GC Package (gcp) file may be installed using the “Import GCP File” and “Variable Mapping” steps.

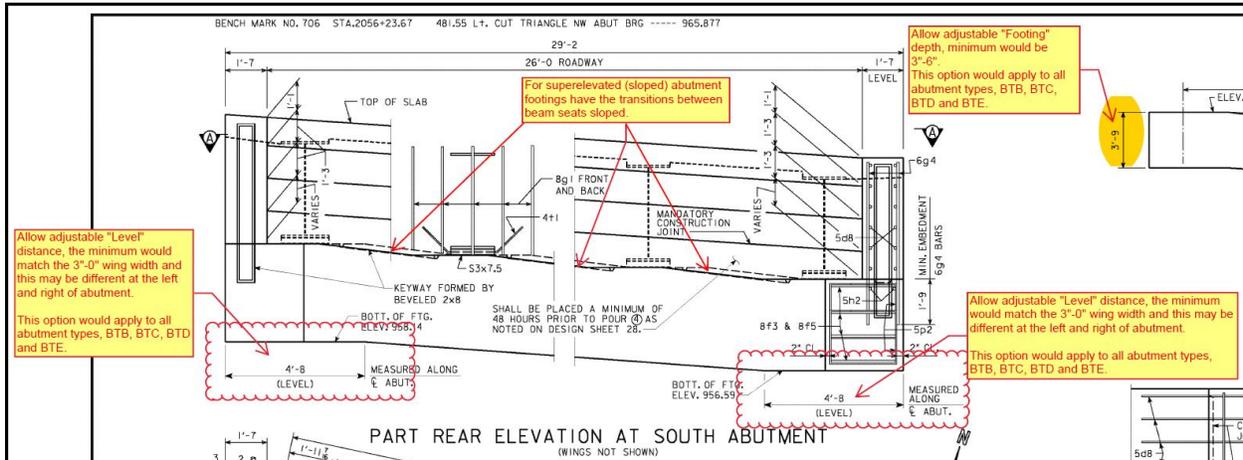
Occasionally, when a GC abutment is deleted while in Computational Design of OBM, sometimes there are remnant solids that are not deleted. It may be necessary to re-open OBM without GC (Computational Design) and then the remnant solids can be deleted.



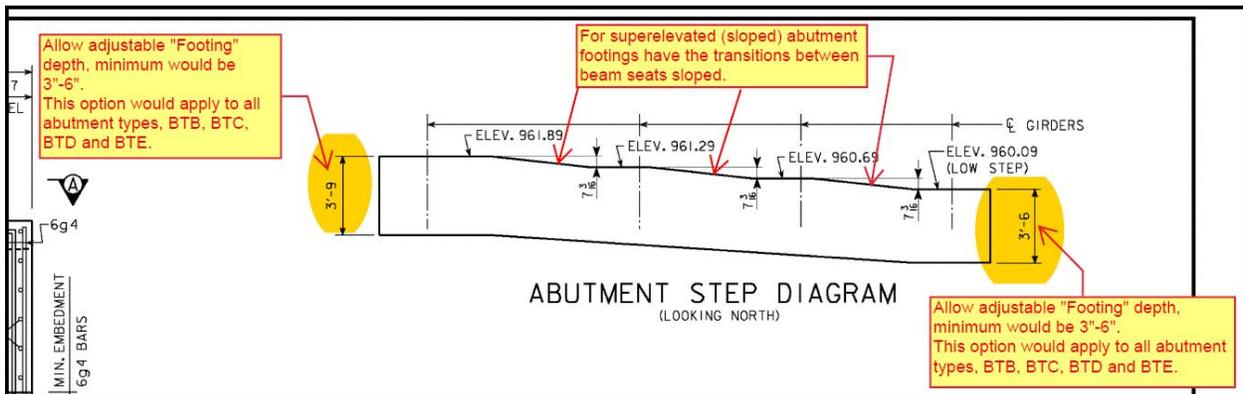
Example scenarios for superelevated (sloped or stepped) substructures.

The following is for general information. This shows past scenarios of abutment geometry used on superelevated bridges. The current GC abutments used for superelevated sloped integral abutment footings have the transition between beam seats “sloped” as shown in the images below.

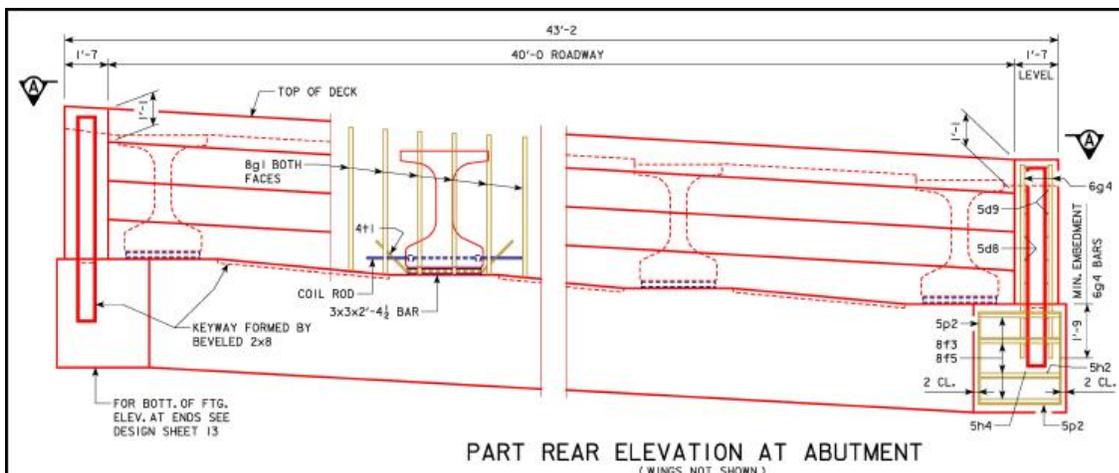
Sloped Integral Abutment Example - Sloped bearing steps (beam seats) for sloped footing only.



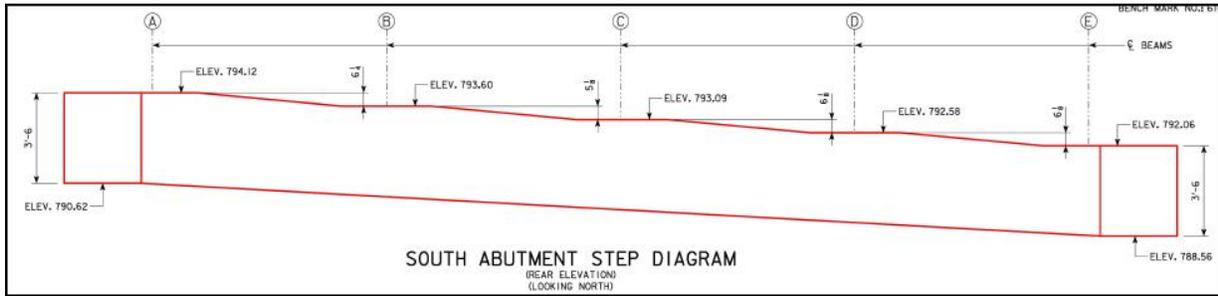
Sloped



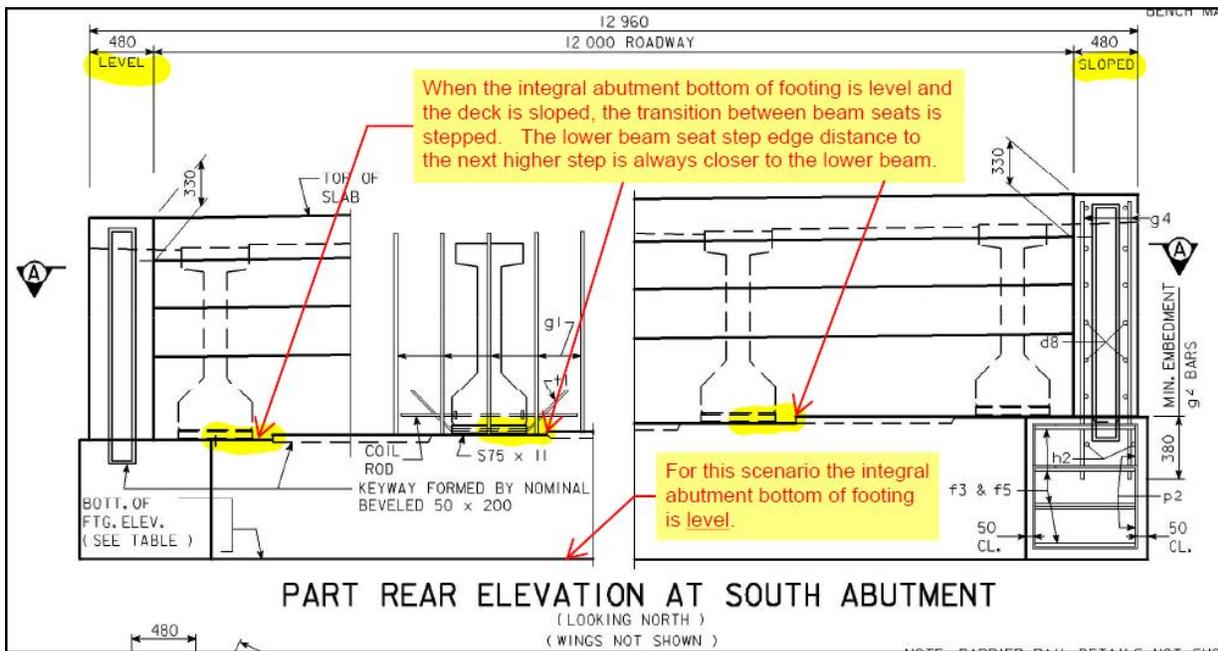
Sloped



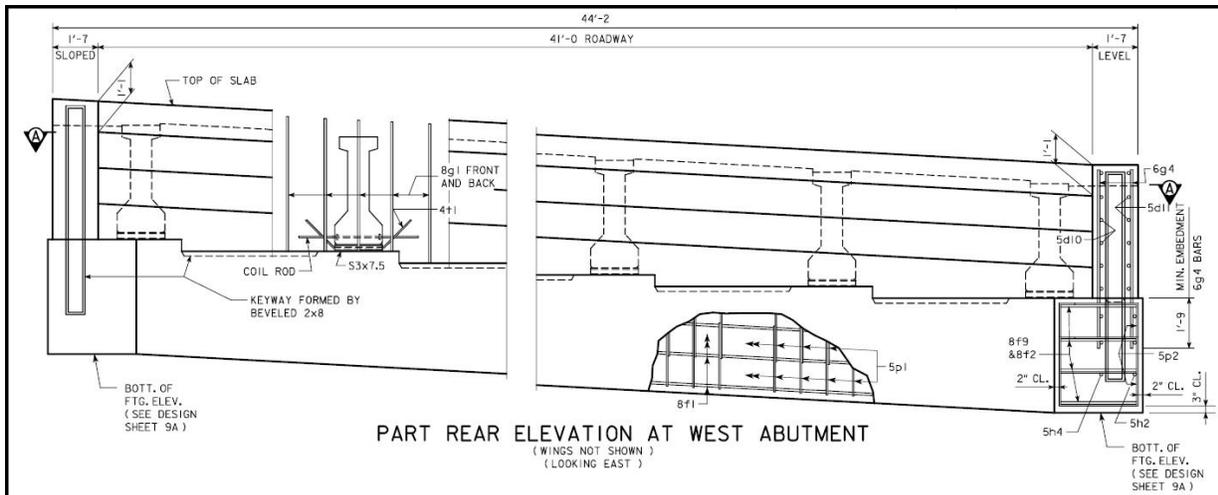
Sloped



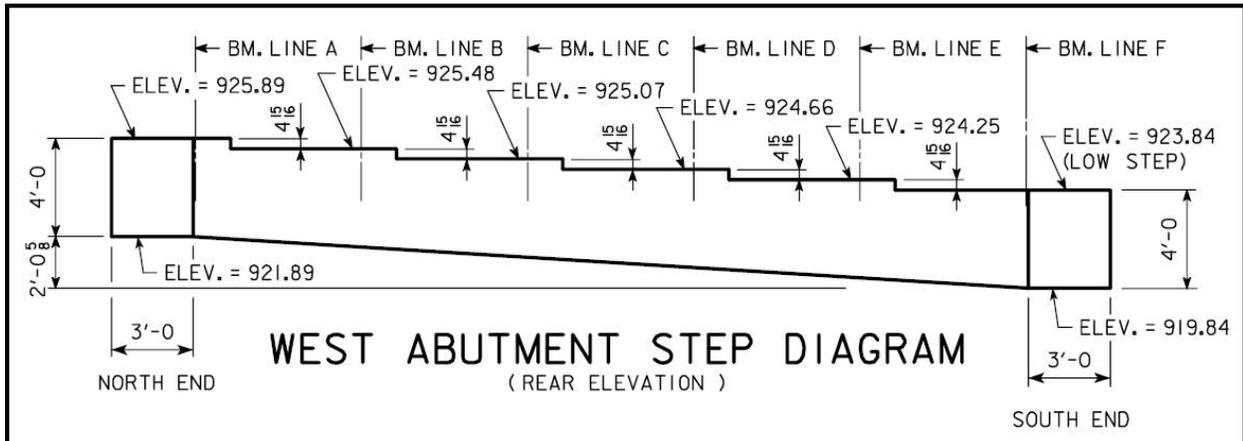
Stepped Integral Abutment – Older Past Example



Stepped – Older Past Example



Stepped – Older Past Example



Generative Component - CCS 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.

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

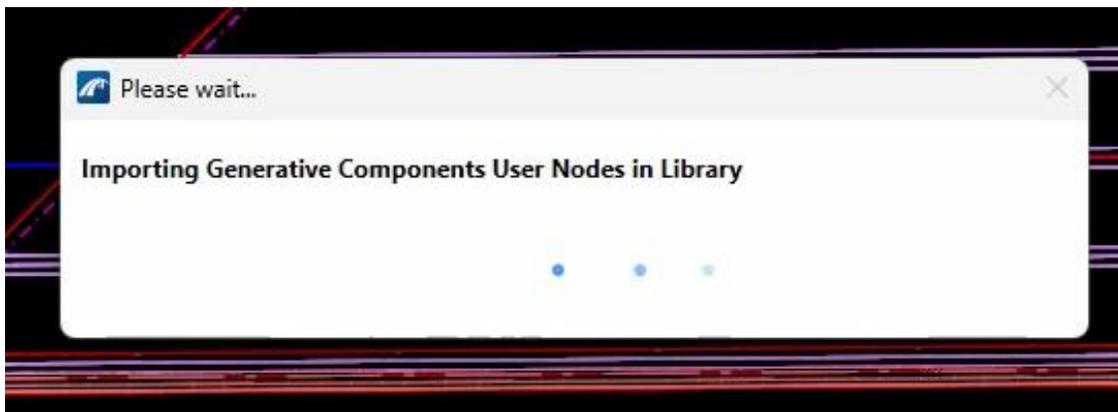


Locate the **IA_CCS_Abut_R6.gcp** file to work with the **IA_BT_CCS** abutment.

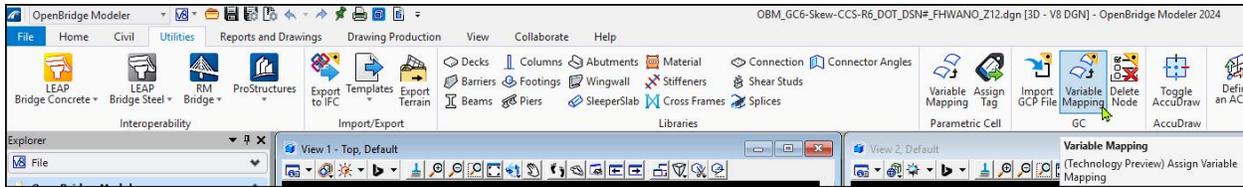


The **IA_CCS_Abut_R6.gcp** file is located on ProjectWise in the following area
pw:\\NTPwint1.dot.int.lan:PWMMain\Documents\Resources\ClientWorkspaces\lowaDOT\lowaDOTProduction\Organization-Civil\lowaDOT_Standards\Bridge Templates\GC\IA_CCS_Abut_R6.gcp

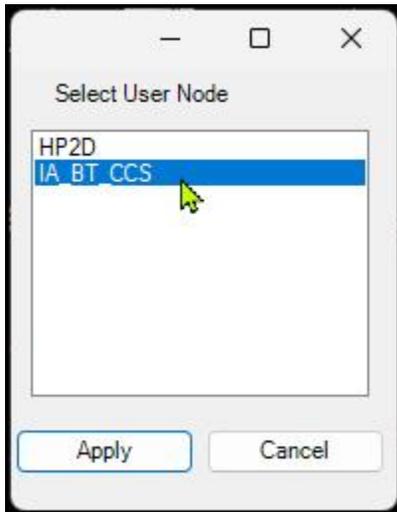
The following dialog box will appear.



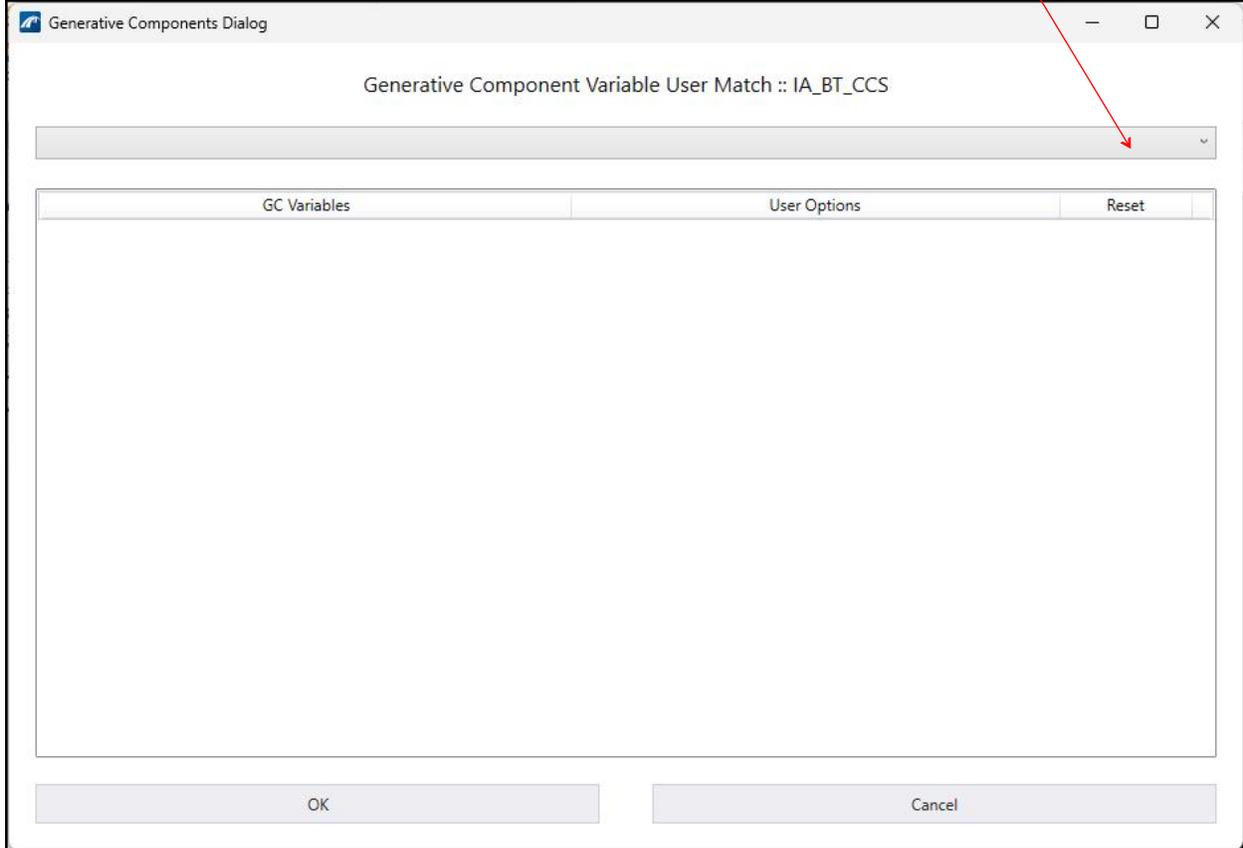
In **OpenBridge Modeler workflow**, select the **Utilities tab**, select **Variable Mapping** in the **GC group**.



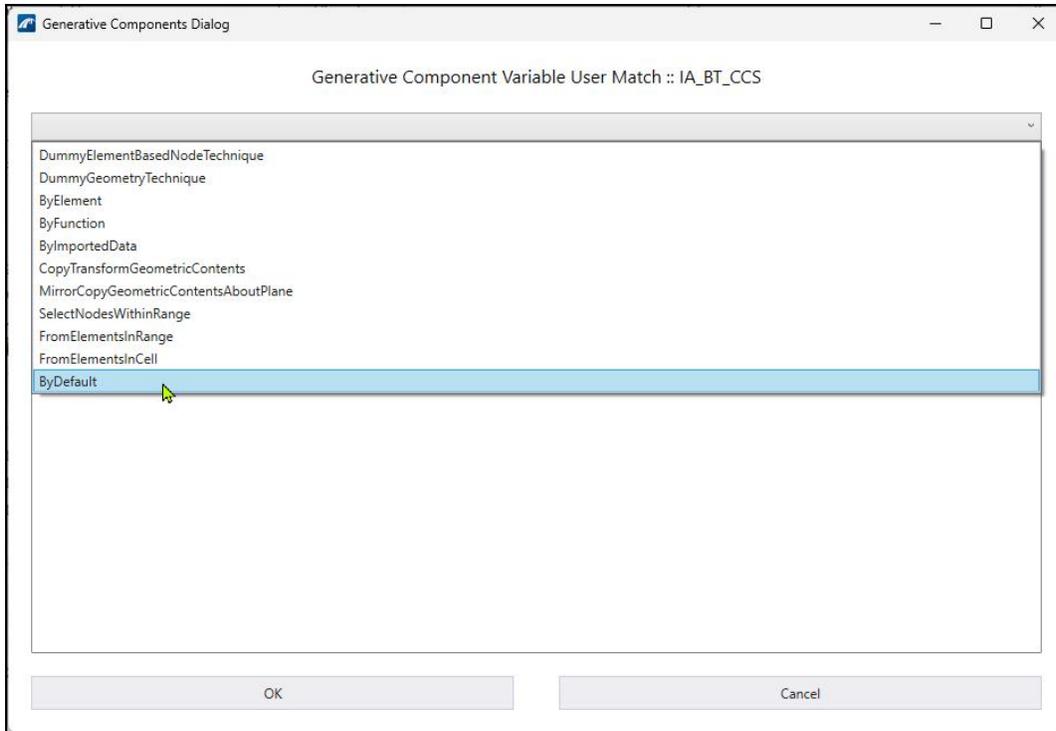
Select **IA_BT_CCS** and “Apply”. Even though the name has “BT” in it, this is not beam related and is used for CCS bridges.



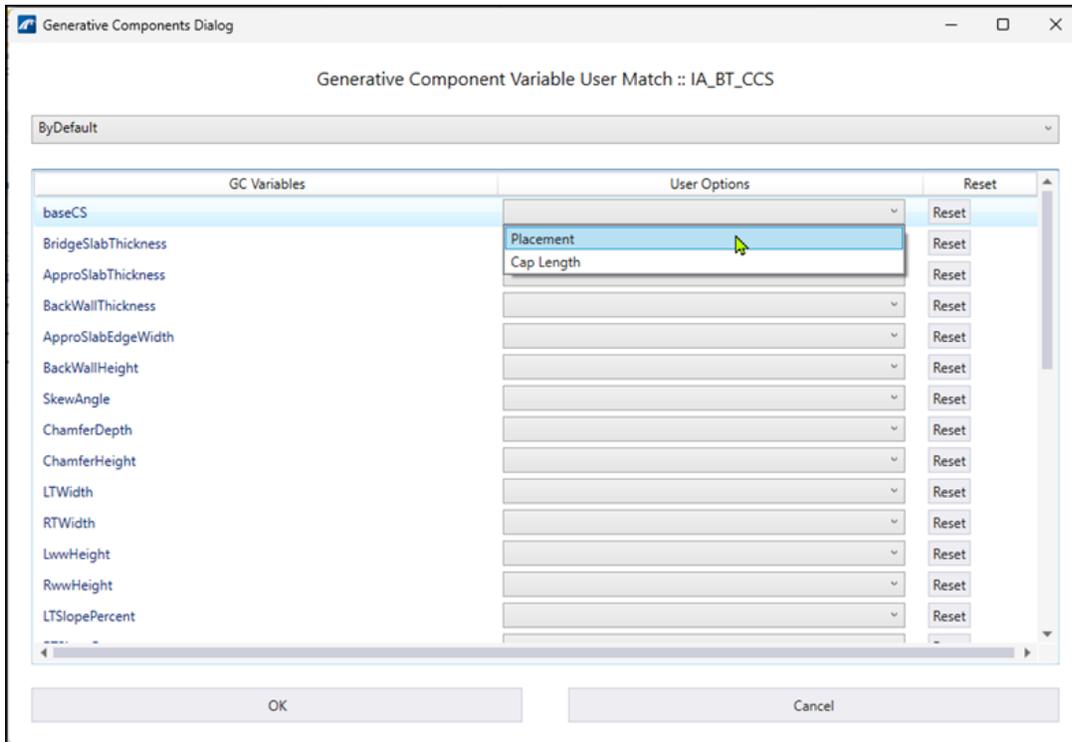
The following dialog box will appear. Select the pull-down arrow in the top gray bar that appears empty, shown below.



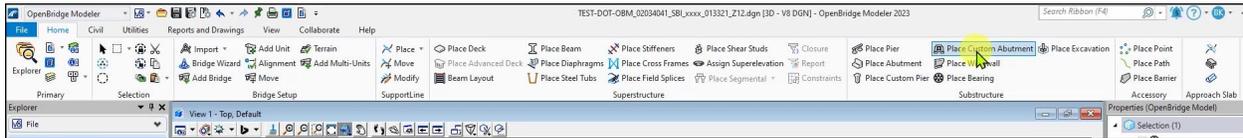
Select **ByDefault**.



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

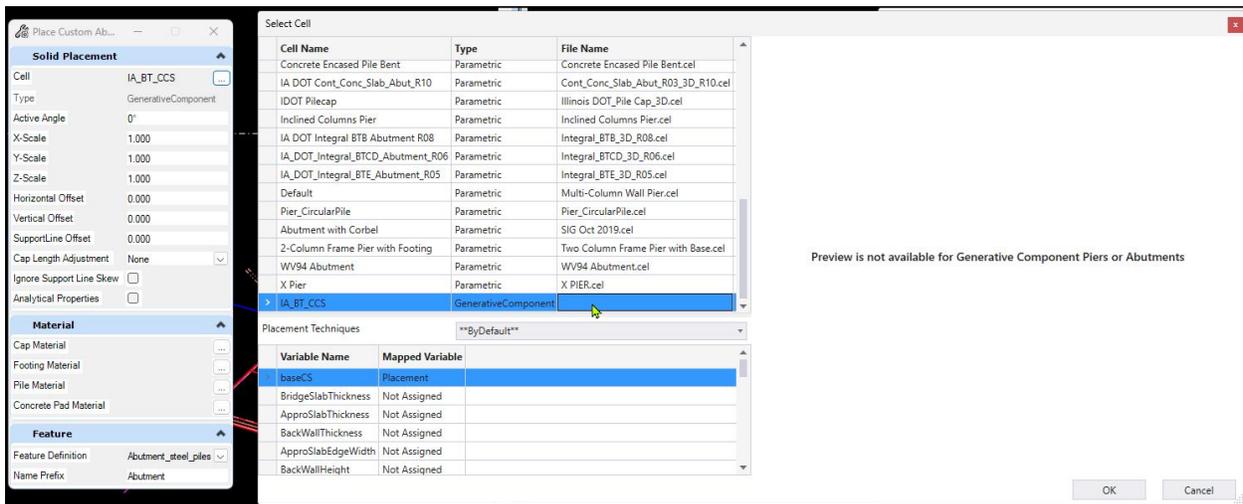


In the ribbon under the **OpenBridge Modeler workflow**, under the **Home tab**, select **Place Custom Abutment**.

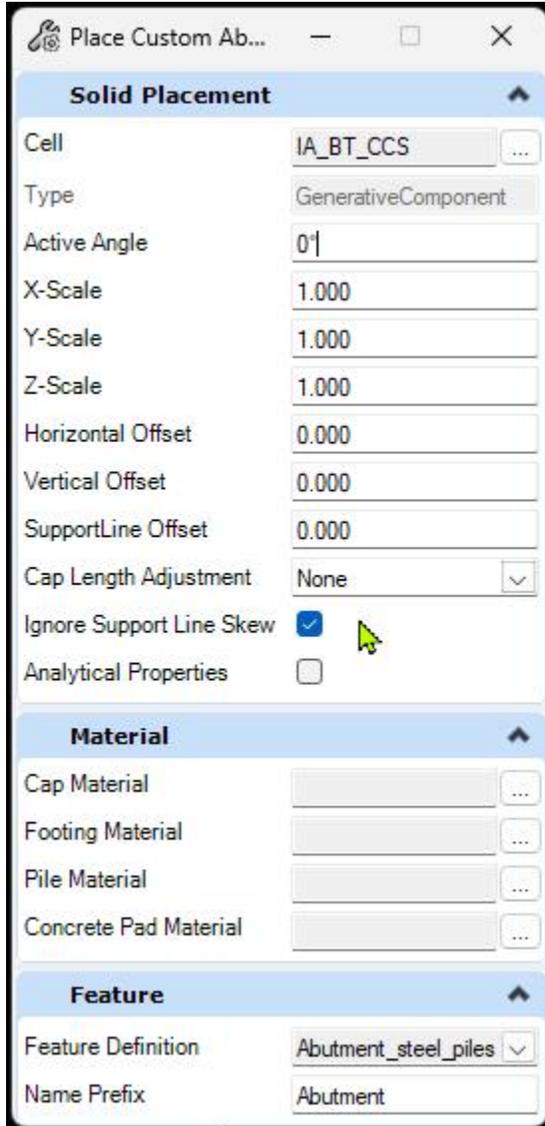


Place Custom Abutment **IA_BT_CCS**.

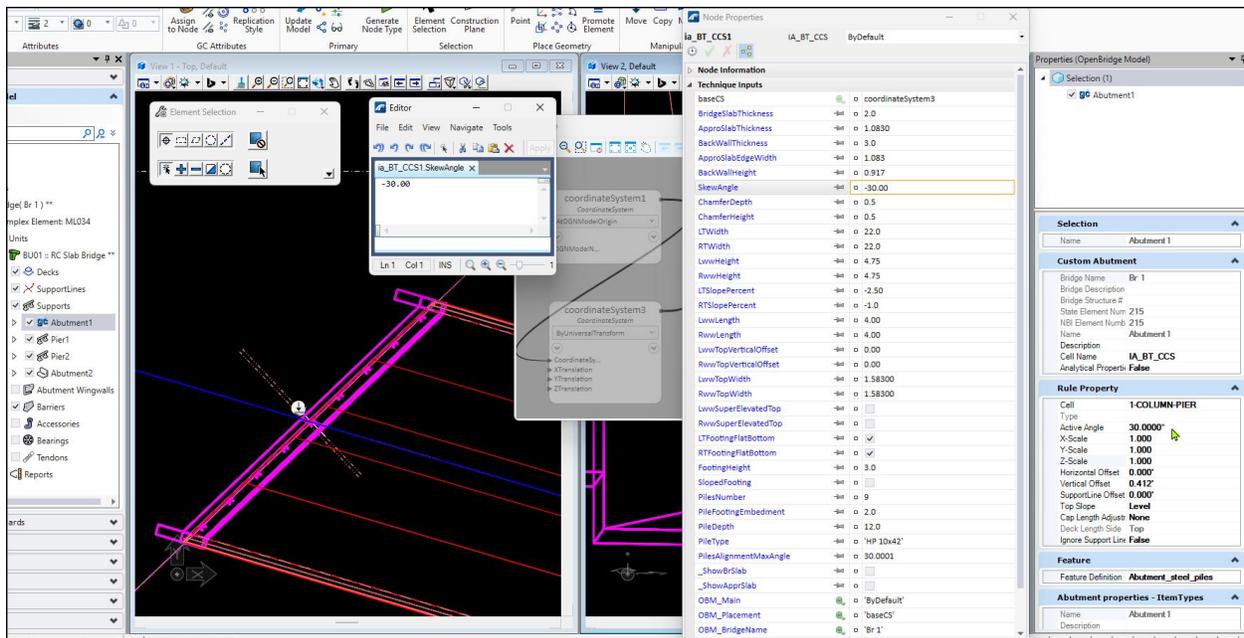
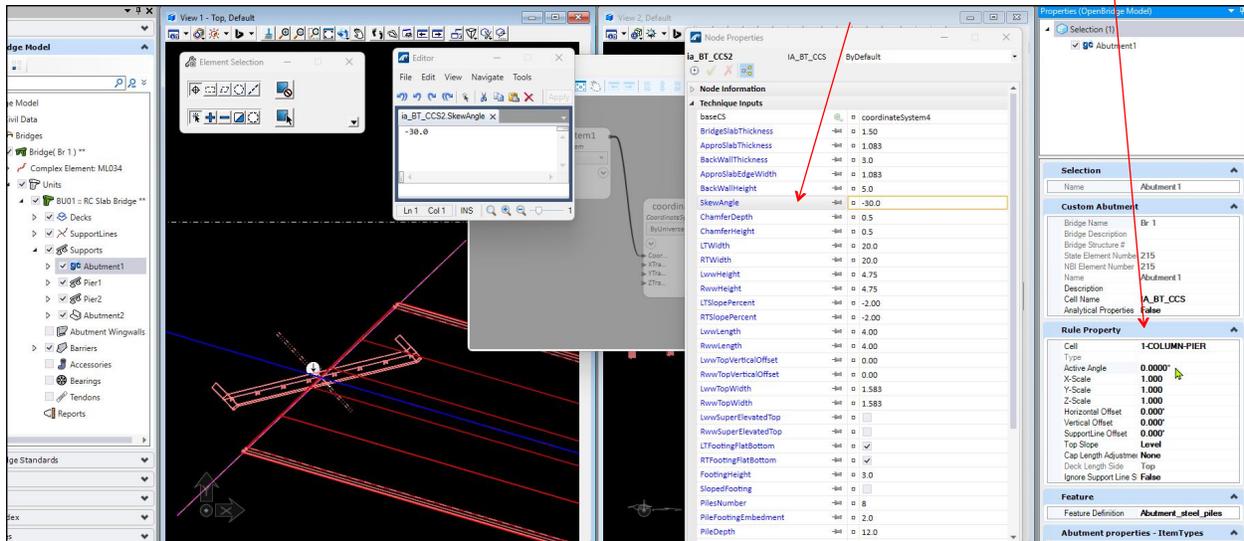
Note, in the image below the “Cell Type” is “GenerativeComponent” and “Preview is not available for Generative Component Piers or Abutments”. Parametric cell types typically will provide a preview of the cell.



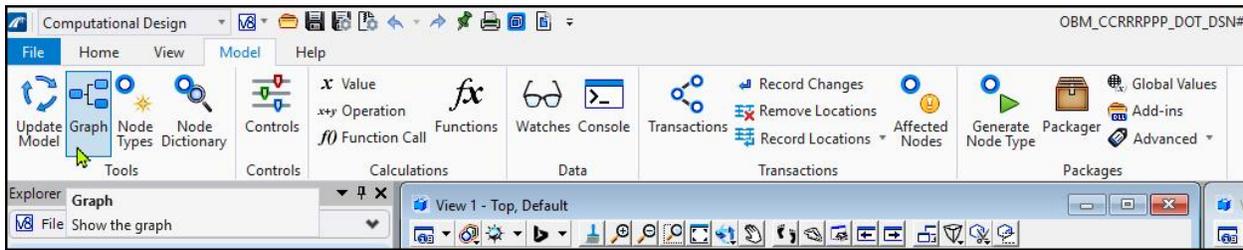
Select the "Support Line" to place the GC abutment on. Set "**Ignore Support Line Skew**" - checked **On**. For the near abutment (down station) the Active Angle is set at zero (0). For the opposite far abutment (up station), the Active Angle is set to 180. The GC abutment skews are applied in the Technique 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**.



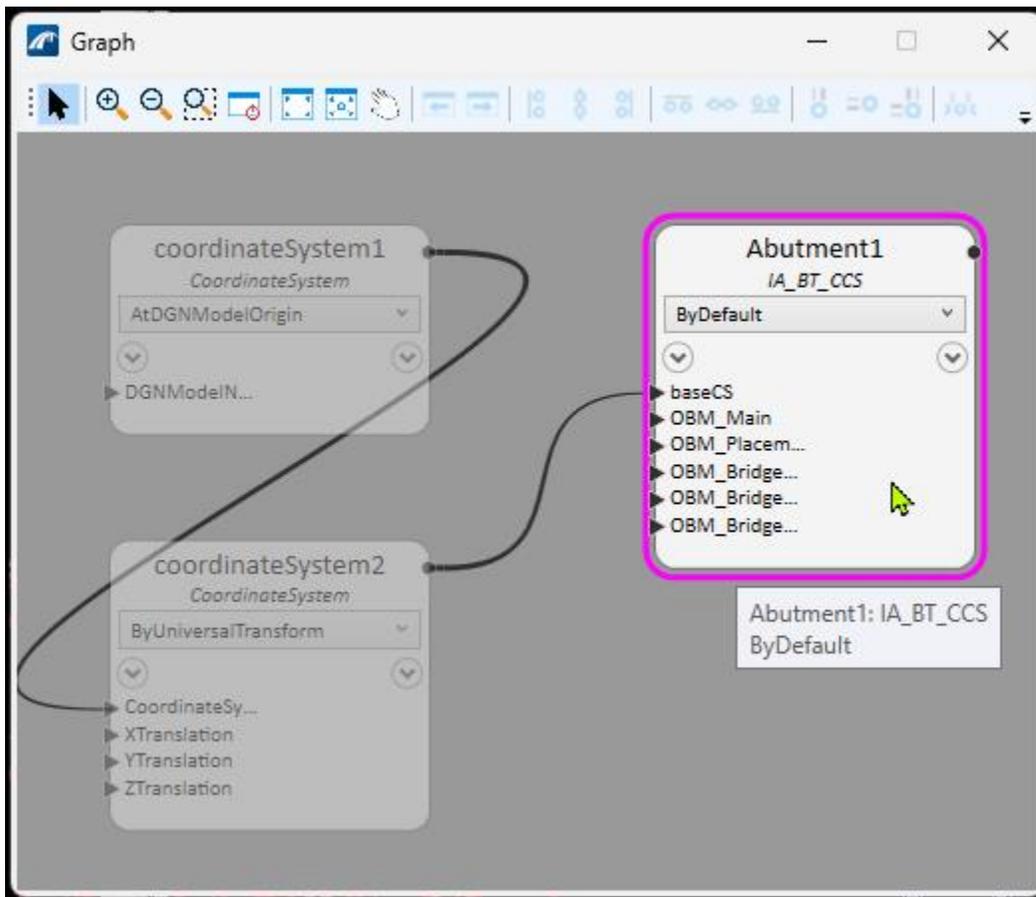
If not setting **"Ignore Support Line Skew"** as checked **On** when placing the custom abutment, the skew may need to be set in two locations, the **Rule Property** and the individual Skew variable in the **Node Properties** of the GC **"Technique Inputs"**. The image below is showing the variables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



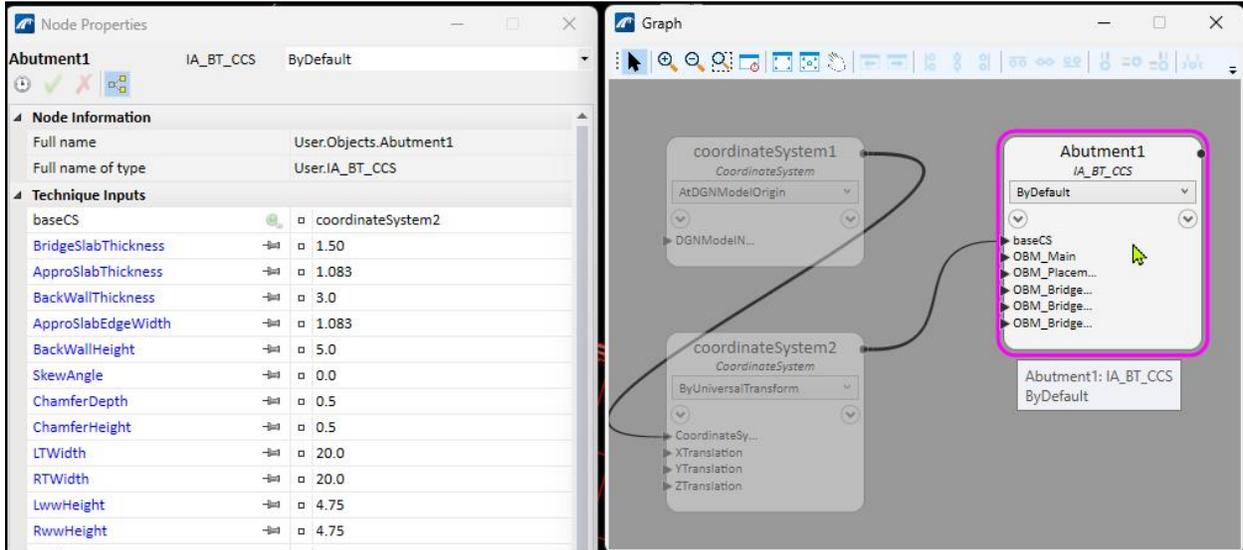
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry. These tools are also located under the **Home tab**.



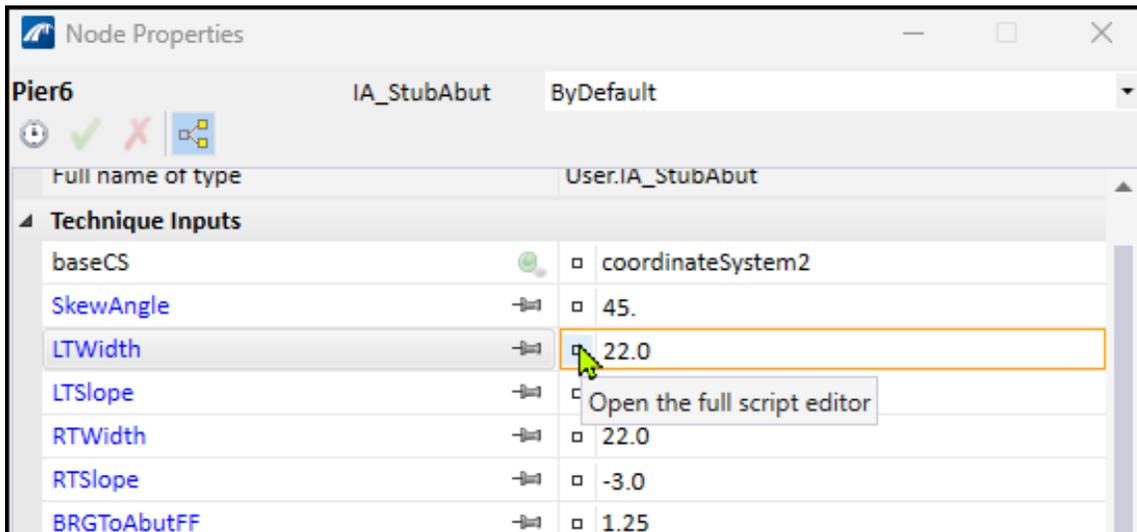
The Graph dialog box will appear, the “Abutment1” box in this example was auto-labeled “Abutment1” IA_BT_CCS in the OBM model. Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry.



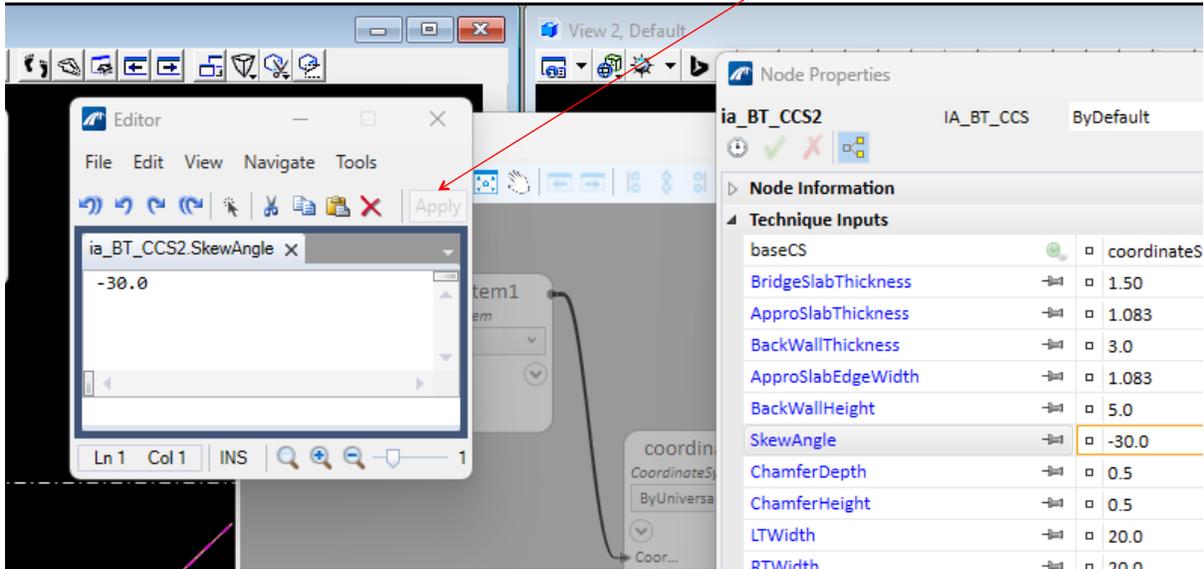
By double-clicking the “Abutment1” Graph box, *IA_BT_CCS*, this will open the Node Properties dialog box.



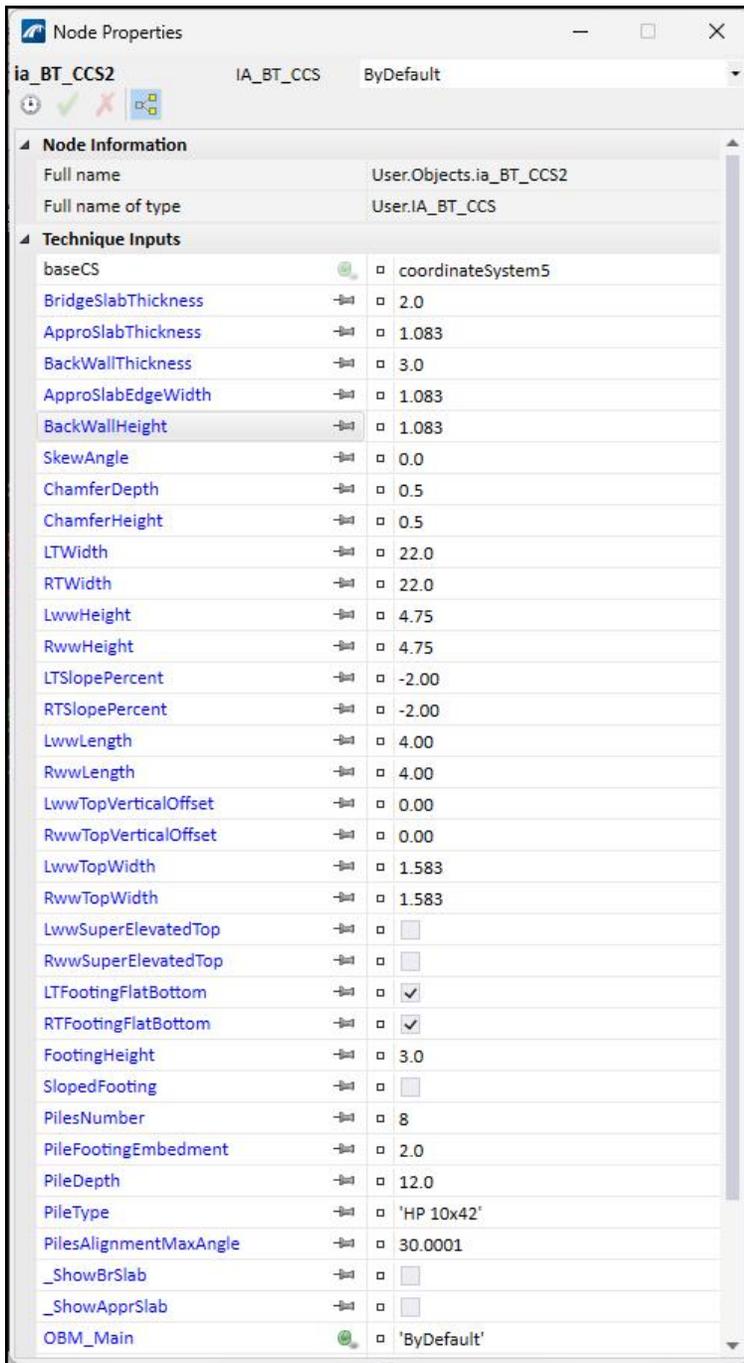
The adjustments of the GC abutment geometry will be made through editing the Technique Inputs in the Node Properties. Edits are done one at a time by either selecting the “box □” to open the full script “Editor” or by selecting the values in each line to directly edit them. It is recommended to use the 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.



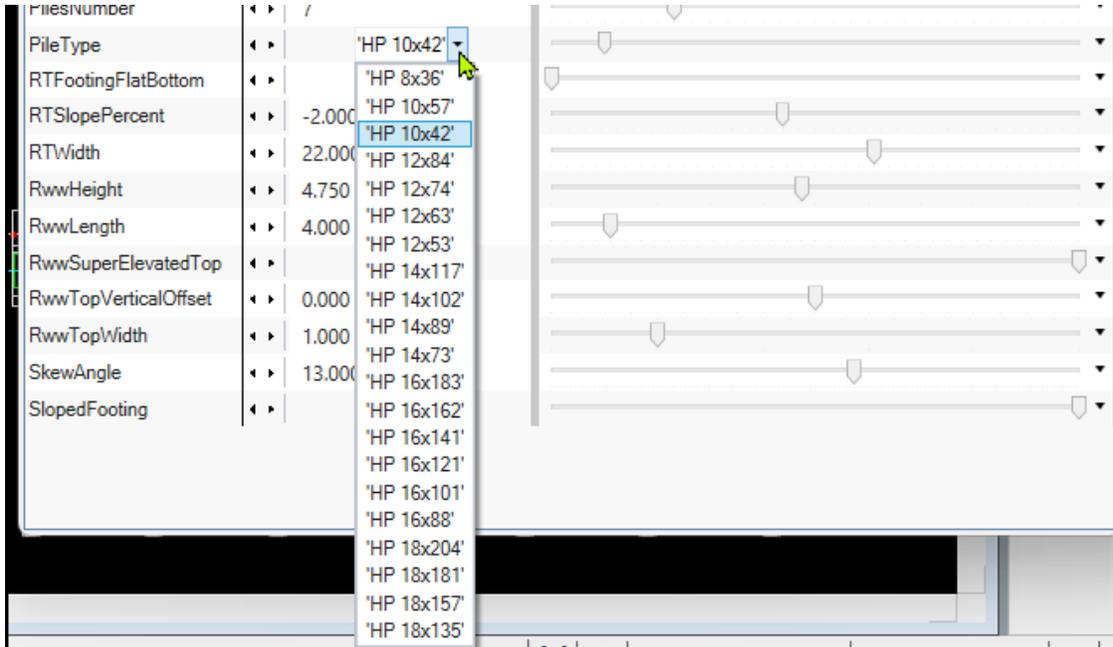
The image below shows a list of the “Technique Inputs” available.



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

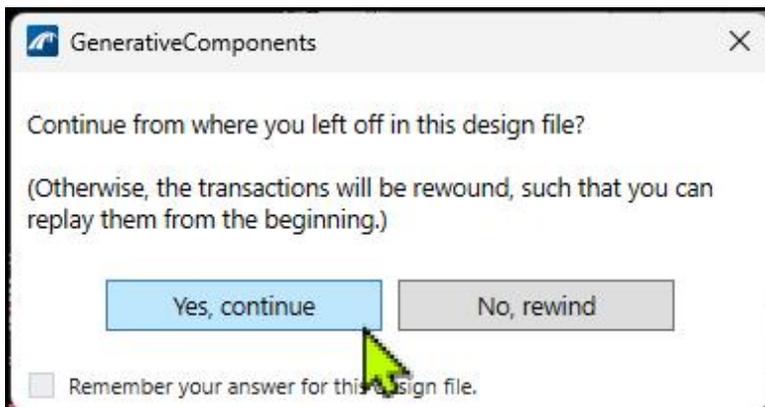


This image below is shown for information only; this example shows the list of **PileType** sizes for entering in Technique Inputs in the Node Properties. This pull-down list is only visible in the GC cell file itself where the development of the abutment shape is done. The pull-down list is not available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



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 orientation. The Node Properties below are listed in the same sequence as they are displayed in the Node Properties dialog entry in OBM, not alphabetical.

BridgeSlabThickness = Vertical distance measured at centerline (crown) of bridge slab (*min. value=0, max. value=5*).

ApproSlabThickness = (paving notch vertical) Depth, vertical distance, of the approach slab on top of abutment backwall (*min. value=0, max. value=1.21*).

BackWallThickness (abutment footing width) Abutment footing thickness horizontal distance from front to back faces (*min. value=0, max. value=5*).

ApproSlabEdgeWidth = (paving notch horizontal) Distance, horizontally and perpendicular to abutment backwall, of approach slab embedment/overlap on top of abutment (*min. value=0, max. value=3*).

BackWallHeight = Vertical distance at centerline of abutment between top of abutment footing to bottom of deck/slab (*min. value=0, max. value=20*).

SkewAngle = Angle of skew along centerline of abutment. A positive value is Right Ahead, a negative value is Left Ahead (*min. value= -90, max. value=90*).

ChamferDepth = Horizontal distance of chamfer along bottom of slab from front face of abutment backwall (*min. value=0, max. value=2*).

ChamferHeight = Vertical distance of chamfer along front face of abutment backwall and bottom of slab (*min. value=0, max. value=2*).

LTWidth = Left Lane Width from centerline (crown) of bridge slab to left gutter line (*min. value=0, max. value=36*).

RTWidth = Right Lane Width from centerline (crown) of bridge slab to right gutter line (*min. value=0, max. value=36*).

LwwHeight = Left Wing Wall vertical distance (*min. value=0, max. value=10*).

RwwHeight = Right Wing Wall vertical distance (*min. value=0, max. value=10*).

LTSlopePercent = Left Lane Slope in Percent from centerline (crown) of bridge slab to left gutter line (*min. value= -16, max. value=16*).

RTSlopePercent = Right Lane Slope in Percent from centerline (crown) of bridge slab to right gutter line (*min. value= -16, max. value=16*).

LwwLength = Left Wing Wall horizontal distance (longitudinal) along left gutter line (*min. value=0, max. value=36*).

RwwLength = Right Wing Wall horizontal distance (longitudinal) along right gutter line (*min. value=0, max. value=36*).

LwwTopVerticalOffset = Left Wing Wall vertical distance offset (elevation change) at end of wing wall. A positive value moves the top of wing wall at end of wall, vertically up. A negative value moves the top of wing wall at end of wall, vertically down. This Input does not move the bottom of the wing wall, it remains fixed. (*min. value= -10, max. value=10*).

RwwTopVerticalOffset = Right Wing Wall vertical distance offset (elevation change) at end of wing wall. A positive value moves top of wing wall at end of wall, vertically up. A negative value moves the top of wing wall at end of wall, vertically down. This Input does not move the bottom of the wing wall, it remains fixed. (*min. value= -10, max. value=10*).

LwwTopWidth = Left Wing Wall horizontal distance (transverse) from left edge of deck to left gutter line (*min. value=0, max. value=5*).

RwwTopWidth = Right Wing Wall horizontal distance (transverse) from right edge of deck to right gutter line (*min. value=0, max. value=5*).

LwwSuperElevatedTop = Left Wing Wall top surface (Unchecked = false, Checked On = true). When Checked On (true), this will enable the top face/surface of the left-wing wall to be sloped. This would be used for a superelevated design. When Unchecked (false), this will maintain a level top face/surface.

RwwSuperElevatedTop = Right Wing Wall top surface (Unchecked = false, Checked On = true). When Checked On (true), this will enable the top face/surface of the right-wing wall to be sloped. This would be used for a superelevated design. When Unchecked (false), this will maintain a level top face/surface.

LTFootingFlatBottom = (Unchecked = false, Checked On = true) When Checked On (true), this will enable the Left end of abutment footing, top and bottom at the wing wall, to be sloped. This would be used for a superelevated design. When Unchecked (false), this will maintain a level top and bottom of abutment footing, at the wing wall. The slope will be determined by what the most sloped input is set at, based on the LTSlopePercent or RTSlopePercent value.

RTFootingFlatBottom = (Unchecked = false, Checked On = true) When Checked On (true), this will enable the Right end of abutment footing, top and bottom at the wing wall, to be sloped. This would be used for a superelevated design. When Unchecked (false), this will maintain a level top and bottom of abutment footing, at the wing wall. The slope will be determined by what the most sloped input is set at, based on the LTSlopePercent or RTSlopePercent value.

FootingHeight = Vertical distance at centerline of abutment footing (*min. value=2, max. value=4*).

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 LTSlopePercent or RTSlopePercent values.

PilesNumber = Sets the quantity of H-pile, spacing is automatically equal distance between piles. (*min. value=0, max. value=30*).

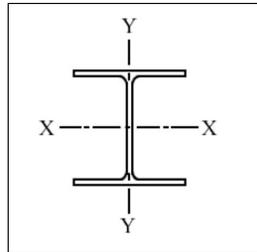
PileFootingEmbedment = Vertical distance from bottom of abutment footing to top of pile (*does not have min. or max. value, default value = 2.0*).

PileDepth = Vertical distance from bottom of abutment footing to bottom of pile (*min. value=0, max. value=200*).

PileType = 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' }

PilesAlignmentMaxAngle = Sets the skew limit, in degrees, that changes the Y-axis of H-pile rotation from along centerline abutment skew to perpendicular to roadway alignment. Set at 30.0001 will cause the pile to rotate when the abutment skew is above 30-degrees.



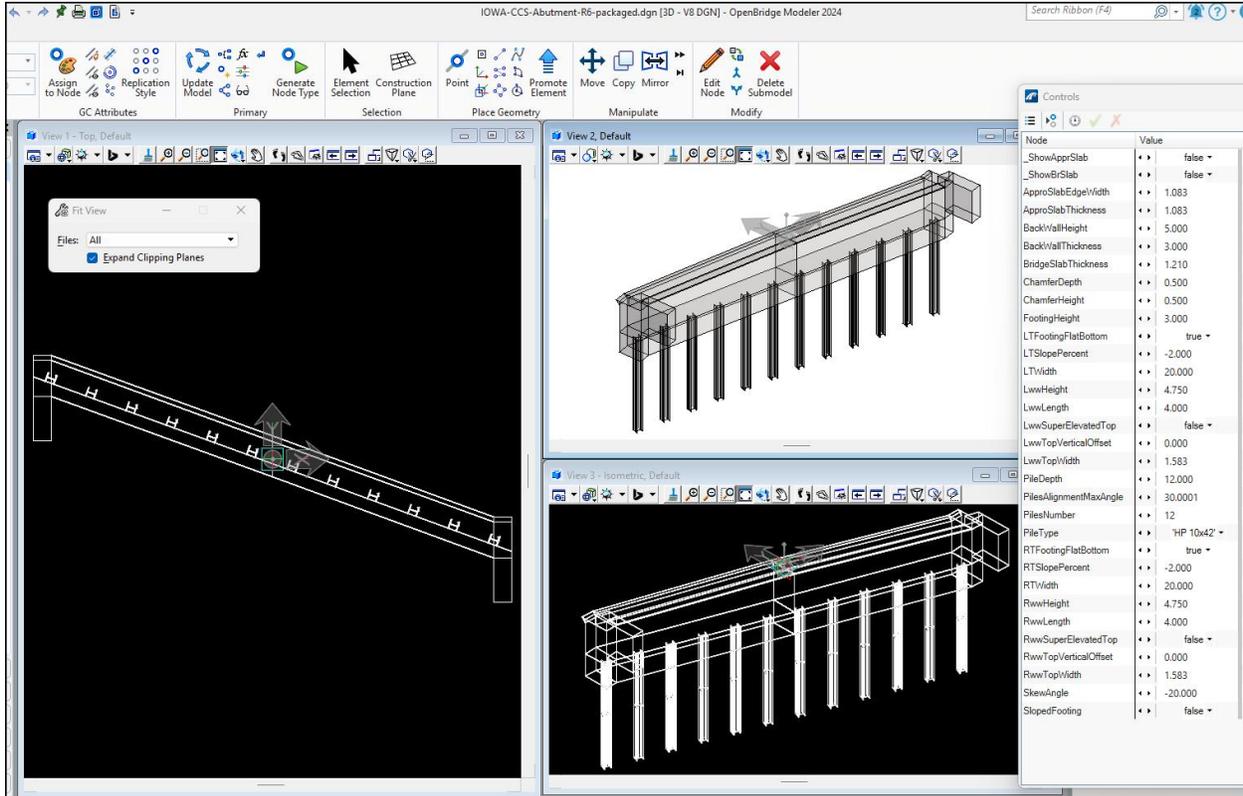
_ShowBrSlab = (Unchecked = false, Checked On = true) This may be used as a visual aid to help model the other inputs of the CCS abutment. When Checked On (true), a short length of the bridge slab will display. **This is not to be kept on display for the final bridge model.**

_ShowApprSlab = (Unchecked = false, Checked On = true) This may be used as a visual aid to help model the other inputs of the CCS abutment. When Checked On (true), a short length of the approach slab will display. **This is not to be kept on display for the final bridge model.**

“IOWA-CCS-Abutment-R6-packaged.dgn”

This is for information only.

The image below is showing the “IOWA-CCS-Abutment-R6-packaged.dgn” GC cell file. This is what appears where the development of the abutment shape is worked on.



Generative Component – Integral Abutment

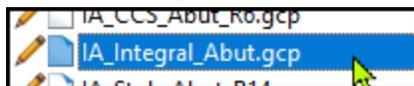
Note, the following guidance may change as technology developments occur with the CADD modeling software and its use affecting workflows for project development.

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.

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

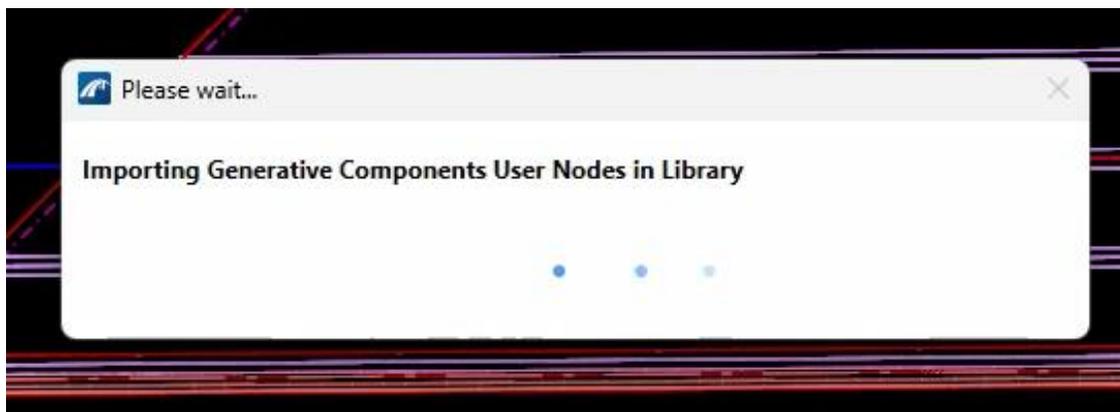


Locate the **IA_Integral_Abut.gcp** file to work with the **IA_BT_Integral** abutment.

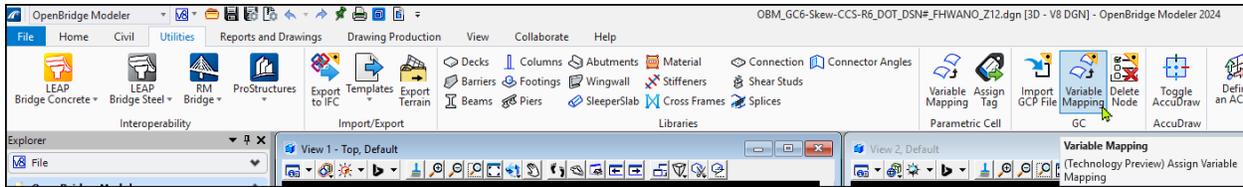


The **IA_Integral_Abut.gcp** file is located on ProjectWise in the following area
pw:\\NTPwint1.dot.int.lan:PWMain\Documents\Resources\ClientWorkspaces\lowaDOT\lowaDOTProduction\Organization-Civil\lowaDOT_Standards\Bridge Templates\GC\IA_Integral_Abut.gcp

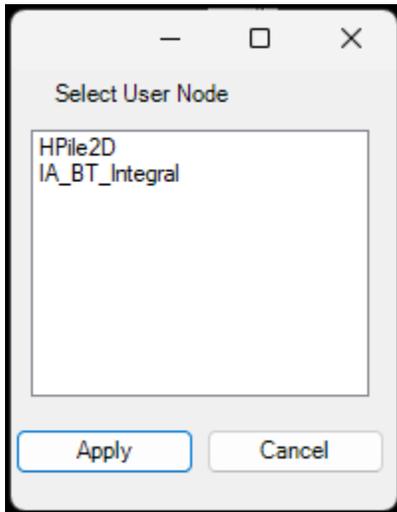
The following dialog box will appear.



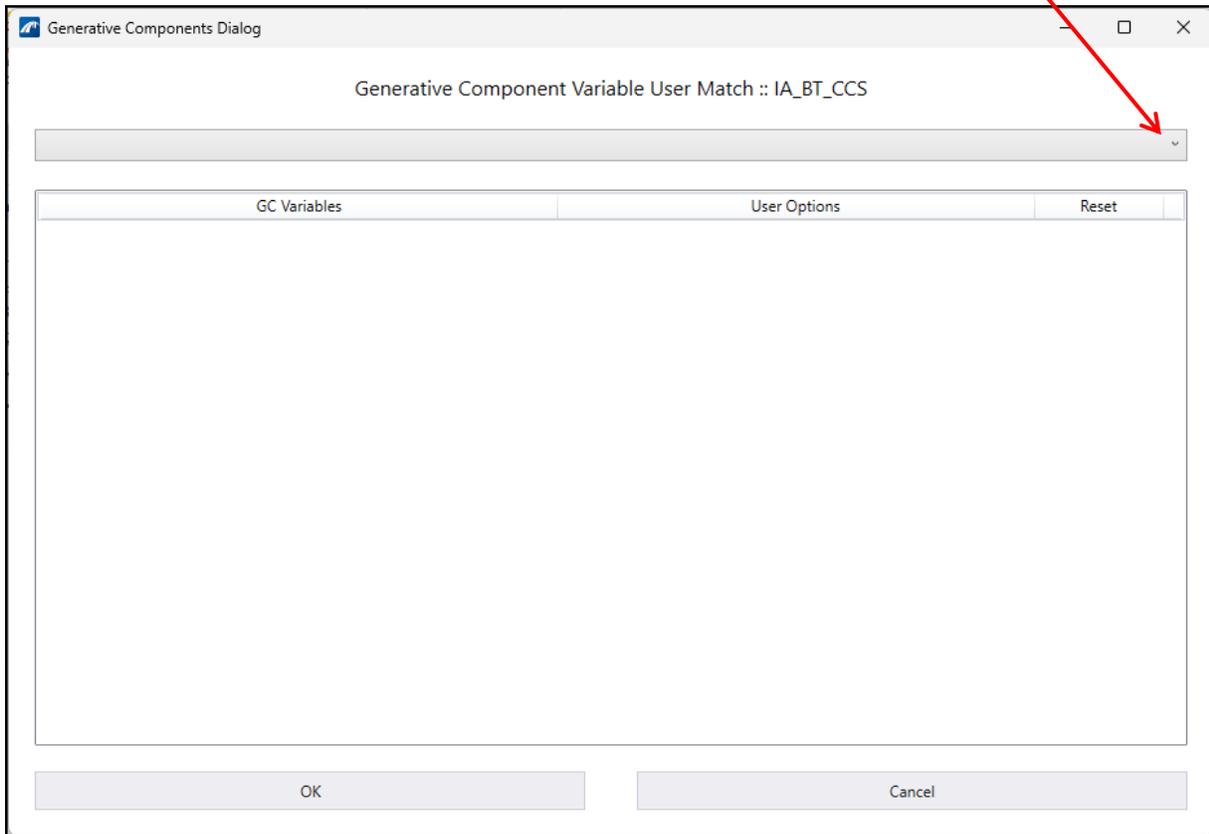
In **OpenBridge Modeler workflow**, select the **Utilities tab**, select **Variable Mapping** in the **GC group**.



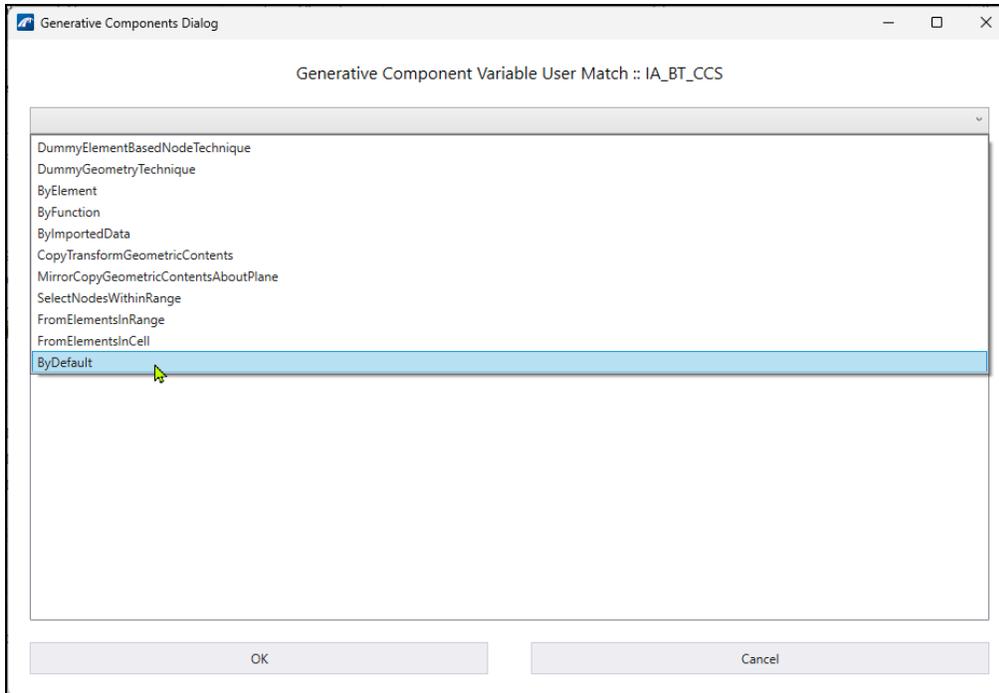
Select **IA_BT_Integral** and “Apply”. Even though the name has “BT” in it, this abutment can be used for BT (Bulb Tee beam) and non-BT beam bridges.



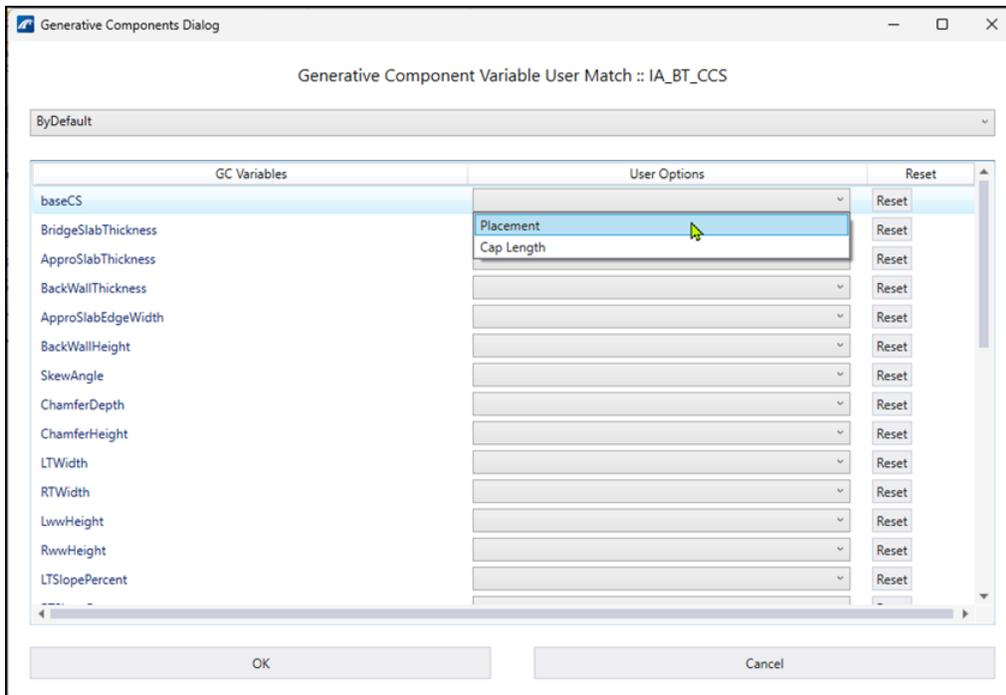
The following dialog box will appear. Select the pull-down arrow in the top gray bar that appears empty, shown below. (The example image is showing IA_BT_CCS, but the pull-down selection is the same for all GC abutments).



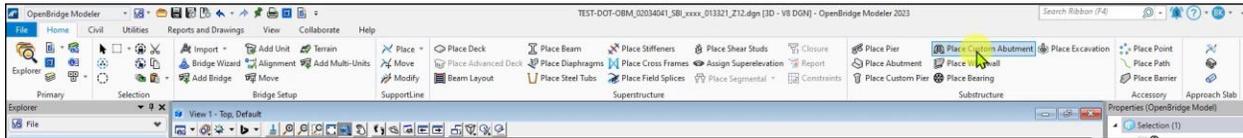
Select **ByDefault**. (The example image is showing IA_BT_CCS, but the pull-down selection is the same for all GC abutments).



From the GC Variables column choose “**baseCS**” and under the User Options column select “**Placement**”. Then select “OK”. (The example image is showing IA_BT_CCS, but the pull-down selection is the same for all GC abutments).

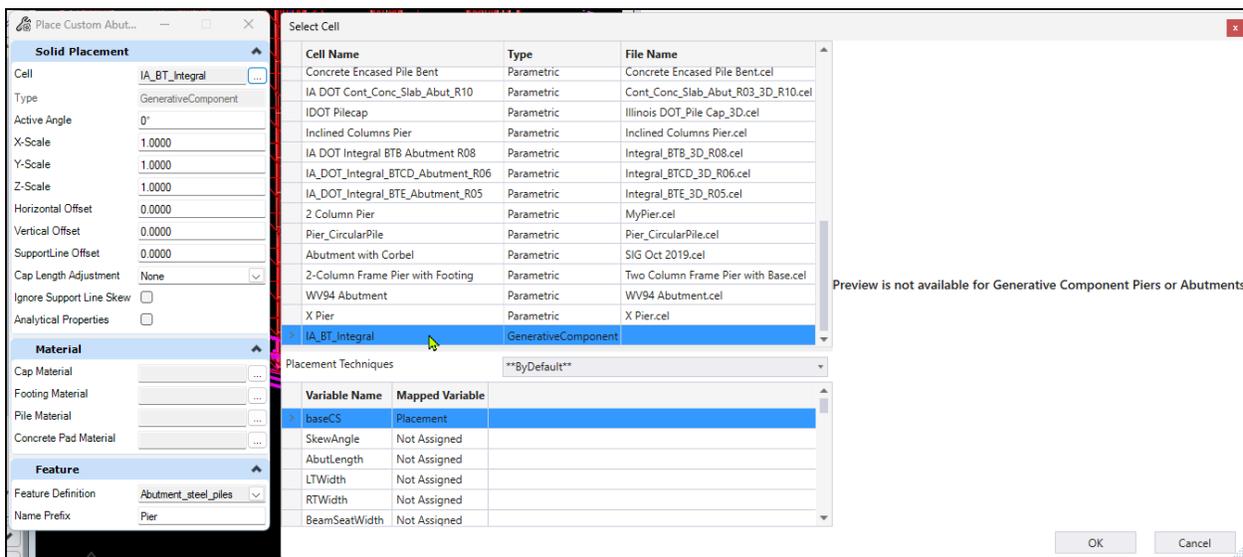


In the ribbon under the **OpenBridge Modeler workflow**, under the **Home tab**, select **Place Custom Abutment**.

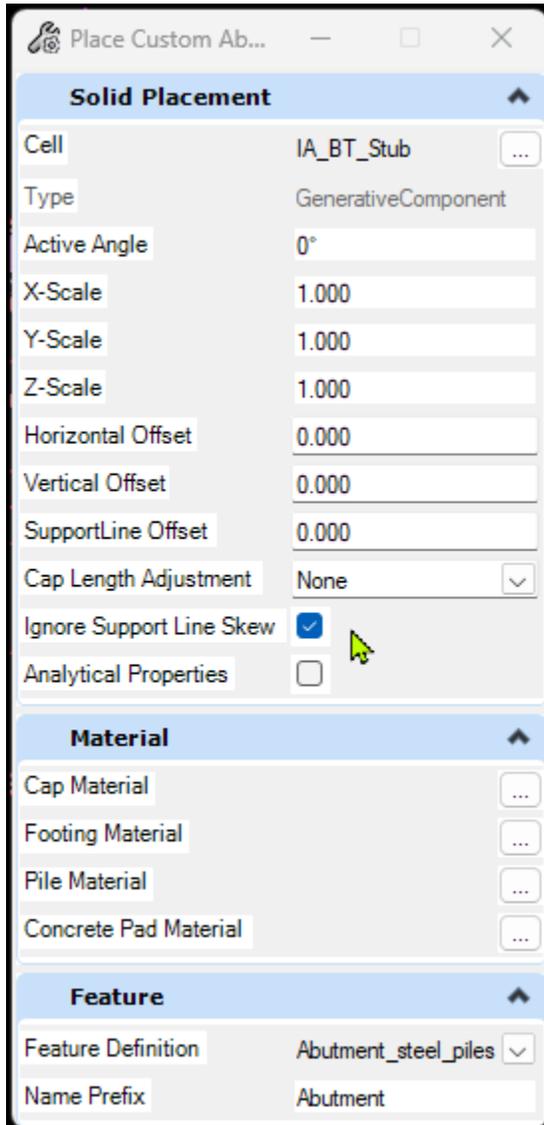


Place Custom Abutment **IA_BT_Integral**.

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.



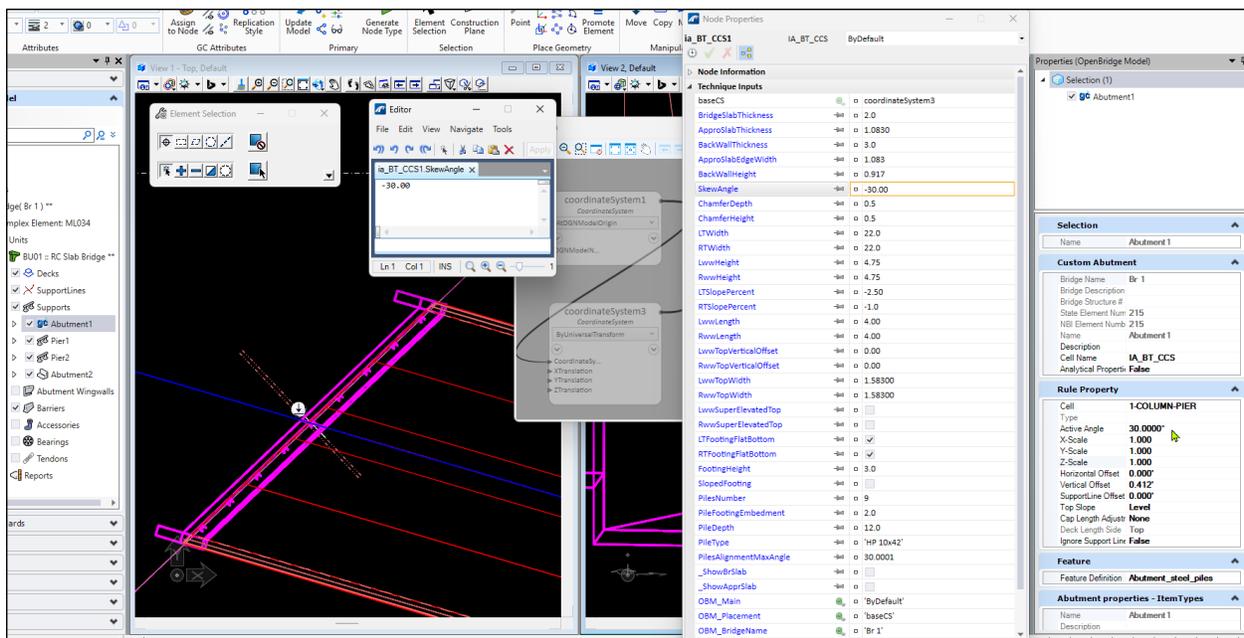
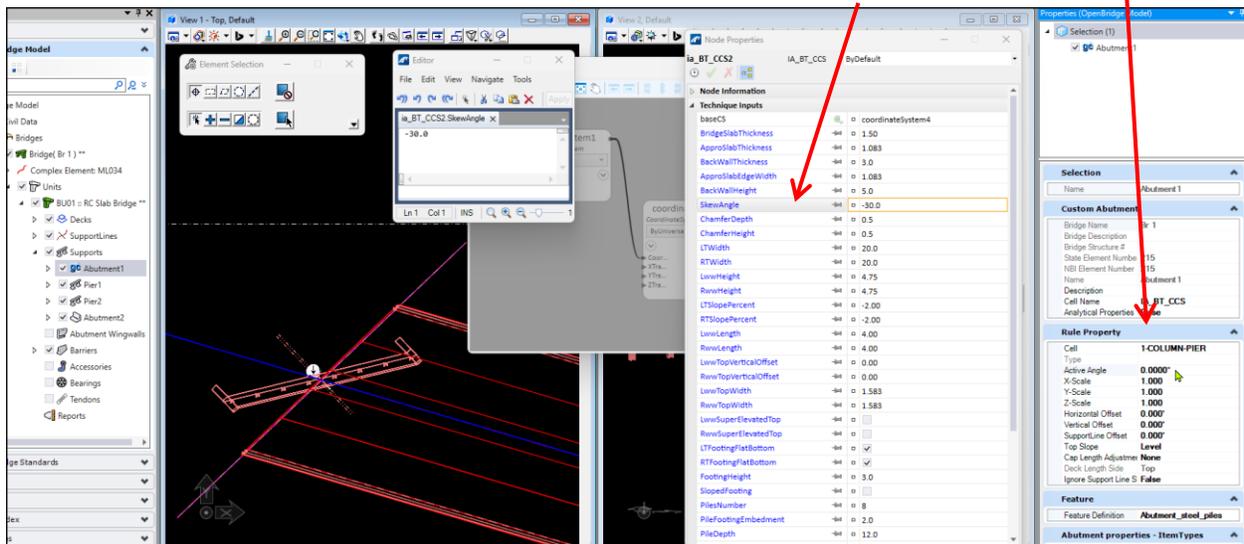
Select the “Support Line” to place the GC abutment on. Set “**Ignore Support Line Skew**” - checked **On**. For the near abutment (down station) the Active Angle is set at zero (0). For the opposite far abutment (up station), the Active Angle is set to 180. The GC abutment skews are applied in the Technique 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**. (The example image is showing IA_BT_Stub).



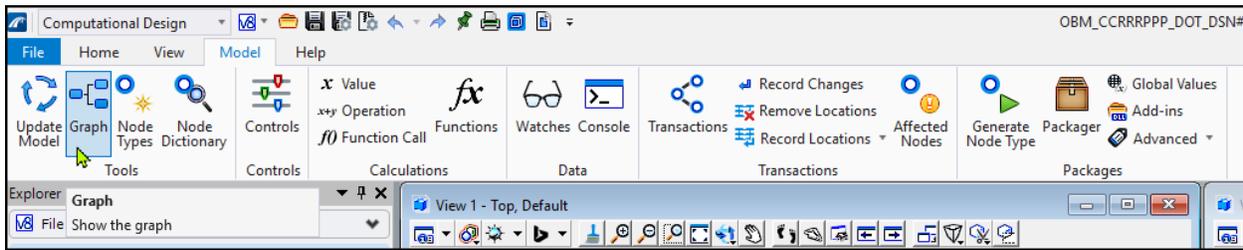
If not setting **"Ignore Support Line Skew"** as checked **On** when placing the custom abutment, the skew may need to be set in two locations, the **Rule Property** and the individual Skew variable in the **Node Properties** of the GC **"Technique Inputs"**. The image below is showing the variables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

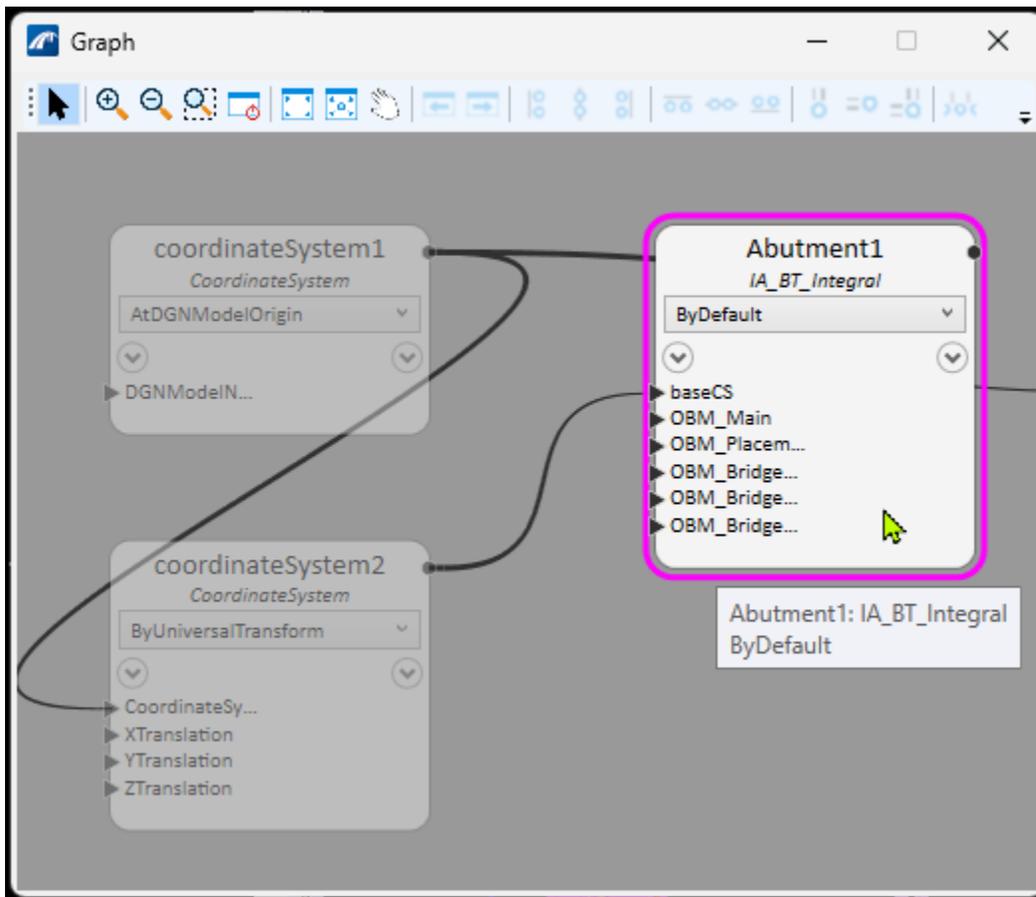
(The example images below are showing the name of the CCS GC Stub Abutment.)



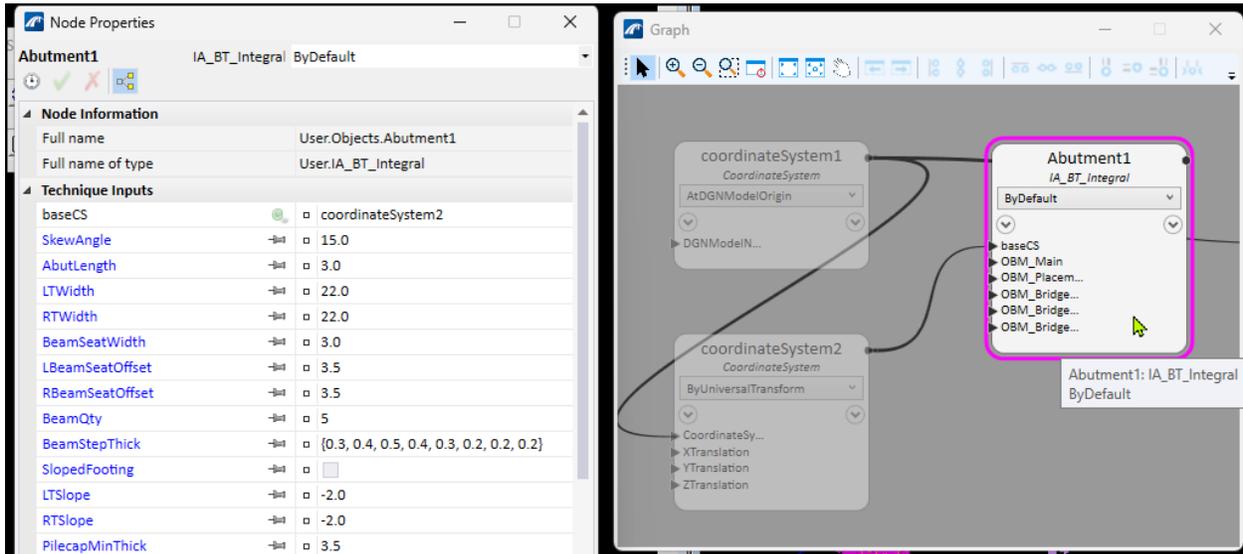
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry. These tools are also located under the **Home tab**.



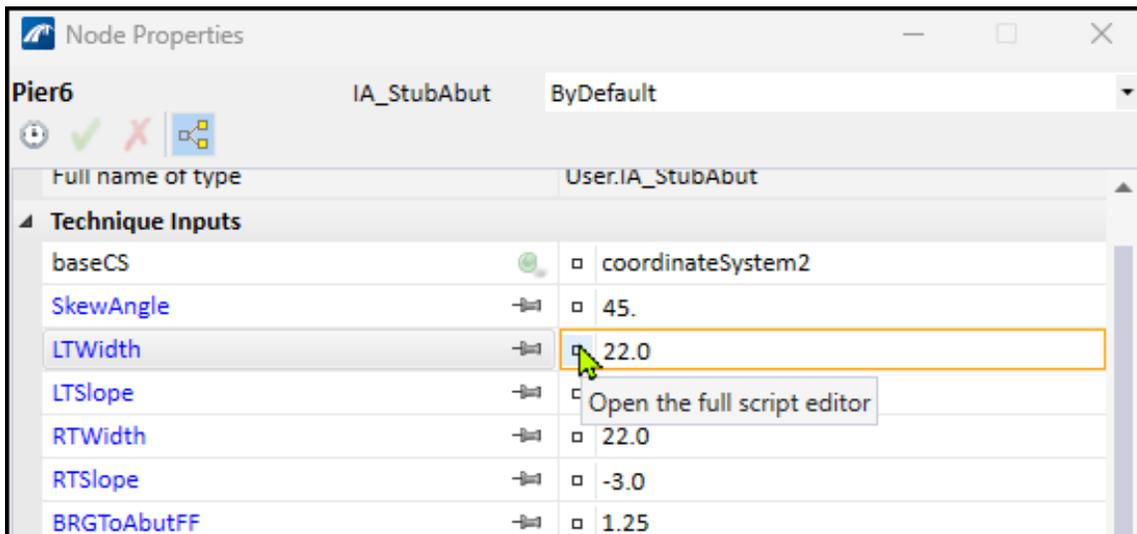
The Graph dialog box will appear, the “Abutment1” box (in this example it was auto-labeled “Abutment1” *IA_BT_Integral* in the OBM model). Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry.



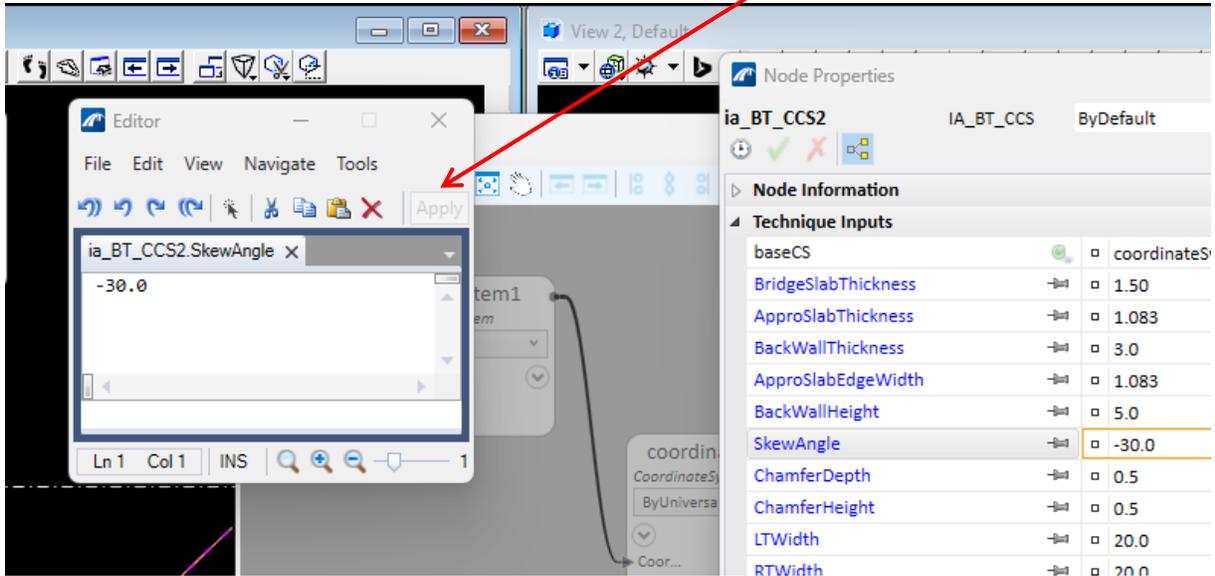
By double-clicking the “Abutment1” Graph box, *IA_BT_Integral*, this will open the Node Properties dialog box.



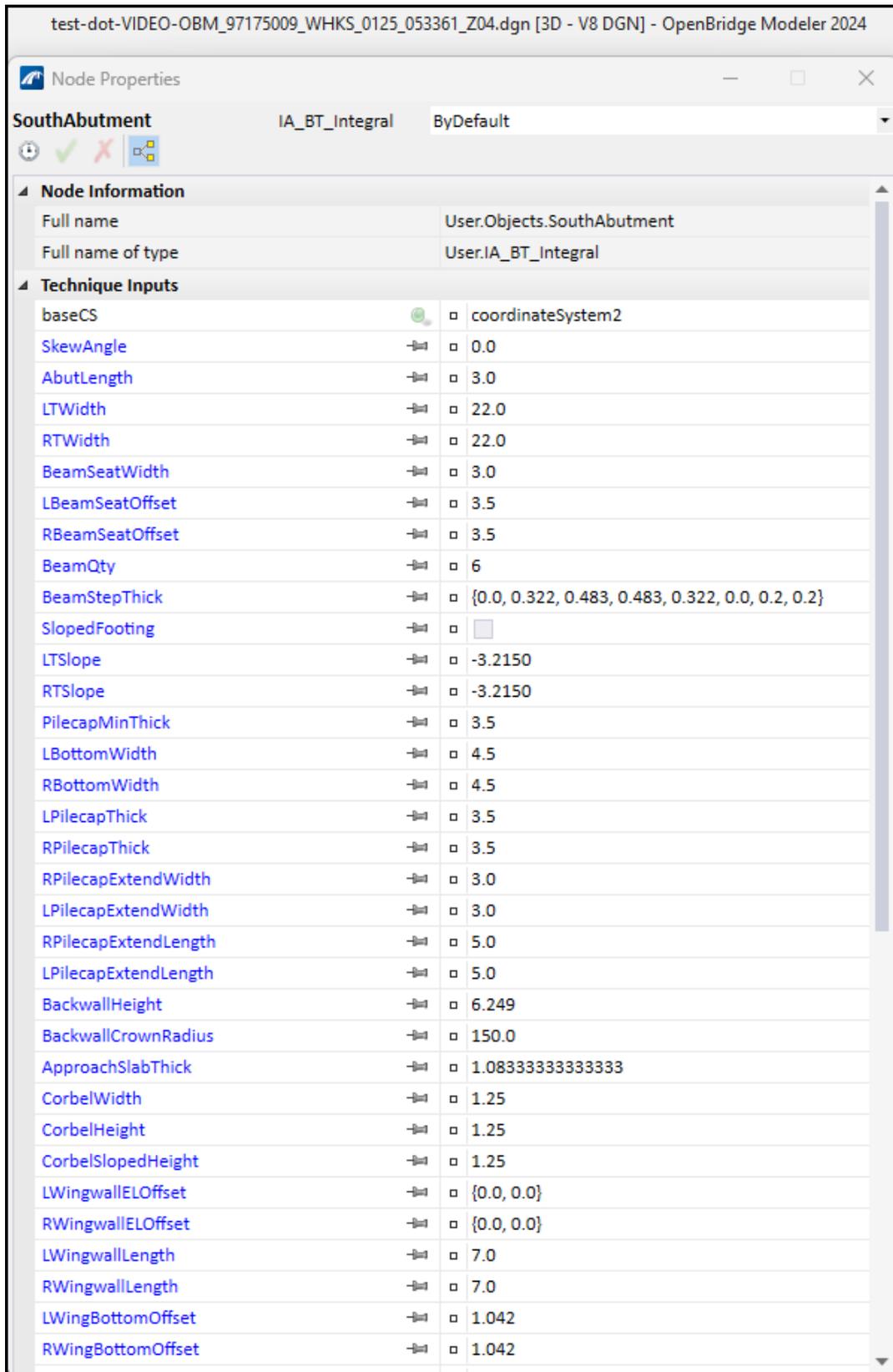
The adjustments of the GC abutment geometry will be made through editing the Technique Inputs in the Node Properties. Edits are done one at a time by either selecting the “box □” to open the full script “Editor” or by selecting the values in each line to directly edit them. It is recommended to use the 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.



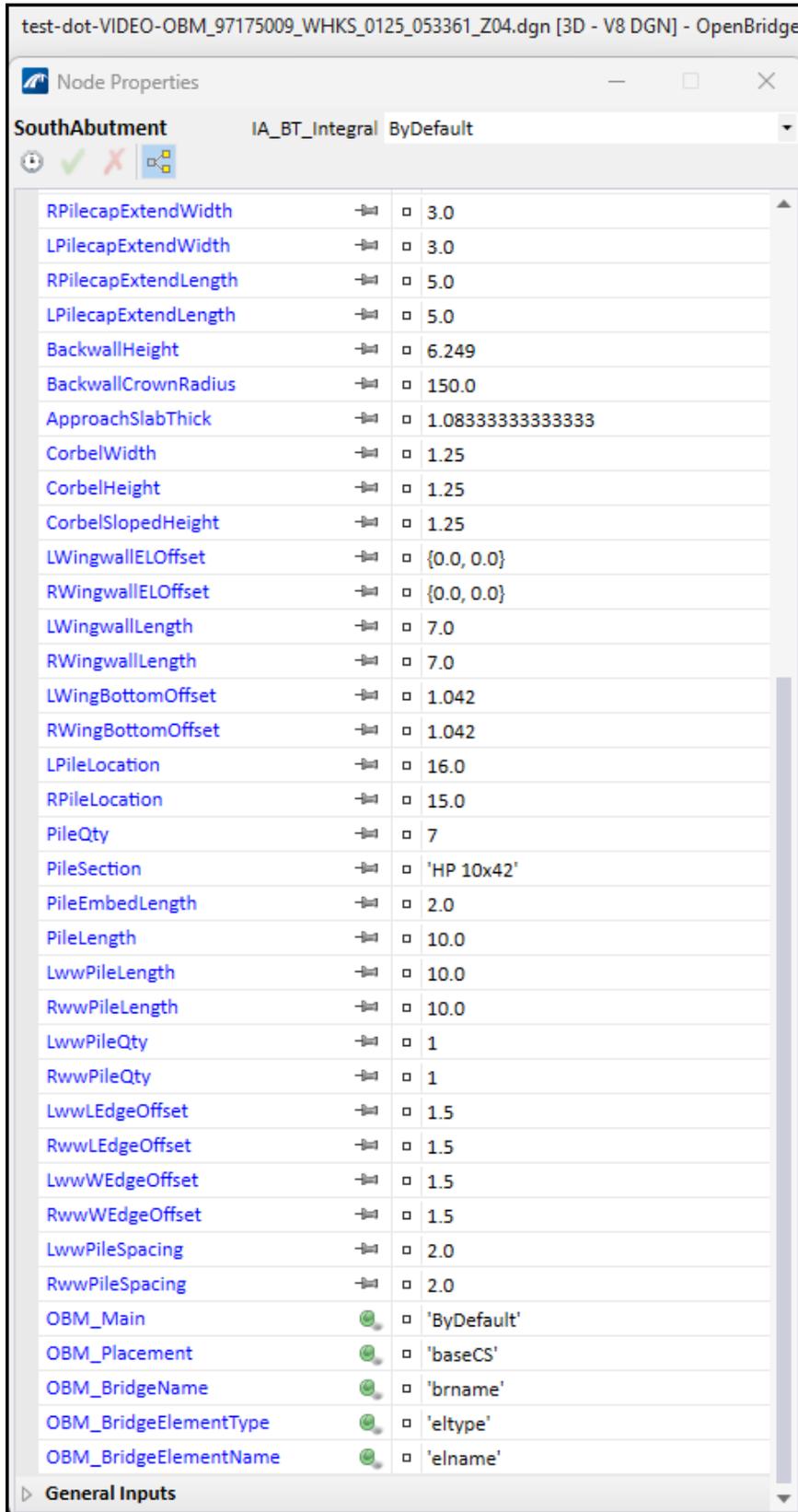
The example image below is showing the full script “Editor” that is used when the box is selected for changes to Technique Input values. Using the full script “Editor” may be more convenient to make edits and prevent any inadvertent entries. Once the value is entered the “Apply” button will become active,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



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.

***_ Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. This variable will be set at zero (0) to not show a wing extension. Some variables will become irrelevant.**

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*).

AbutLength = (abutment footing width) Abutment footing length is horizontal distance from front to back faces (*min. value= 1, max. value=5*).

LTWidth = Left Lane Width from centerline (crown) of bridge slab to left gutter line (*min. value=0, max. value=36*).

RTWidth = Right Lane Width from centerline (crown) of bridge slab to right gutter line (*min. value=0, max. value=36*).

BeamSeatWidth = Beam seat/step width is horizontal distance left and right from centerline beam. For Bulb Tee (BTB, BTC, BTD, BTE) beams set at 3.500. For A & B beams set at 2.500. For C & D beams set at 2.833. (*min. value=1, max. value=5*).

LBeamSeatOffset = Horizontal distance of left outer beam seat/step centerline to inside vertical face of abutment wingwall. For typical Bulb Tee (BTB, BTC, BTD, BTE) beam design set at 1.917. For typical A, B, C, D beam design set at 1.500. (*min. value=0.5, max. value=7*).

RBeamSeatOffset = Horizontal distance of right outer beam seat/step centerline to inside vertical face of abutment wingwall. For typical Bulb Tee (BTB, BTC, BTD, BTE) beam design set at 1.917. For typical A, B, C, D beam design set at 1.500. (*min. value=0.5, max. value=7*).

BeamQty = Number of beams (*min. value=3, max. value=15*).

BeamStepThick = Height of beam steps/seats, change these per design, the quantity of beams will determine what values are used/read from left to right in the list. The individual beam step thickness value is based from the top of abutment footing, zero step or low step. (*default values = 0.3, 0.4, 0.5, 0.4, 0.3, 0.2, 0.2, 0.2*).

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.

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

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

PilecapMinThick = (abutment footing height) Abutment footing thickness is vertical distance from top to bottom (*min. value=3.5, max. value=8*).

LBottomWidth = This only applies when the bottom of abutment footing is sloped. This is the flat (not sloped) horizontal distance of the left-side bottom of footing. (*min. value=3, max. value=8*).

RBottomWidth = This only applies when the bottom of abutment footing is sloped. This is the flat (not sloped) horizontal distance of the right-side bottom of footing. (*min. value=3, max. value=8*).

LPilecapThick = This only applies when the bottom of abutment footing is sloped. Abutment footing wing extension height on left side (*min. value=3.5, max. value=8*).

RPilecapThick = This only applies when the bottom of abutment footing is sloped. Abutment footing wing extension height on right side (*min. value=3.5, max. value=8*).

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

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

* **RPilecapExtendLength** = Right side abutment footing wing extension horizontal length (*min. value=4, max. value=12*). *Note*, for bridges using A, B & BTB beams, the abutments do not have wing extensions. This variable will be set at zero (0) to not show a wing extension.

* **LPilecapExtendLength** = Left side abutment footing wing extension horizontal length (*min. value=4, max. value=12*). *Note*, for bridges using A, B & BTB beams, the abutments do not have wing extensions. This variable will be set at zero (0) to not show a wing extension.

BackwallHeight = Vertical distance at centerline of abutment between top of abutment footing to top of deck (*min. value=3, max. value=15*).

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*).

ApproachSlabThick = Paving notch vertical distance at centerline of approach slab (*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*).

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

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

* **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*). *Note*, for bridges using A, B & BTB beams, the abutments do not have wing extensions. The first variable may need to be set as zero (0) because of how it interacts with the top of the abutment backwall, while the second variable can be set as needed per design, e.g. (0.0, -0.4).

* **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*). **Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. The first variable may need to be set as zero (0) because of how it interacts with the top of the abutment backwall, while the second variable can be set as needed per design, e.g. (0.0, -0.4).**

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

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

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

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

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

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

PileQty = Quantity of main abutment H-pile. Spacing is automatically equal distance between piles (*min. value=2, max. value=20*).

PileSection = 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' }
```

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

PileLength = 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*).

* **LwwPileLength** = Vertical distance of H-pile in left-side abutment wing footing, measured from bottom of abutment footing to bottom of pile (*min. value=1, max. value=200*). **Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. LwwPileQty is then set at zero (0). When this applies this variable becomes irrelevant and is not used.**

* **RwwPileLength** = Vertical distance of H-pile in right-side abutment wing footing, measured from bottom of abutment footing to bottom of pile (*min. value=1, max. value=200*). **Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. RwwPileQty is then set at zero (0). When this applies this variable becomes irrelevant and is not used.**

* **LwwPileQty** = Quantity of H-pile in left-side abutment wing (*min. value=1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions, set this variable to zero (0).*

* **RwwPileQty** = Quantity of H-pile in right-side abutment wing (*min. value=1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions, set this variable to zero (0).*

* **LwwLEdgeOffset** = Left abutment wing, end piling distance along length of wing from vertical center of end H-pile to end of abutment wing (*min. value=0.1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

* **RwwLEdgeOffset** = Right abutment wing, end piling distance along length of wing from vertical center of end H-pile to end of abutment wing (*min. value=0.1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

* **LwwWEdgeOffset** = Left abutment wing piling distance from vertical center of H-pile to left-side outer face of abutment wing (*min. value=0.1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

* **RwwWEdgeOffset** = Right abutment wing piling distance from vertical center of H-pile to right-side outer face of abutment wing (*min. value=0.1, max. value=3*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

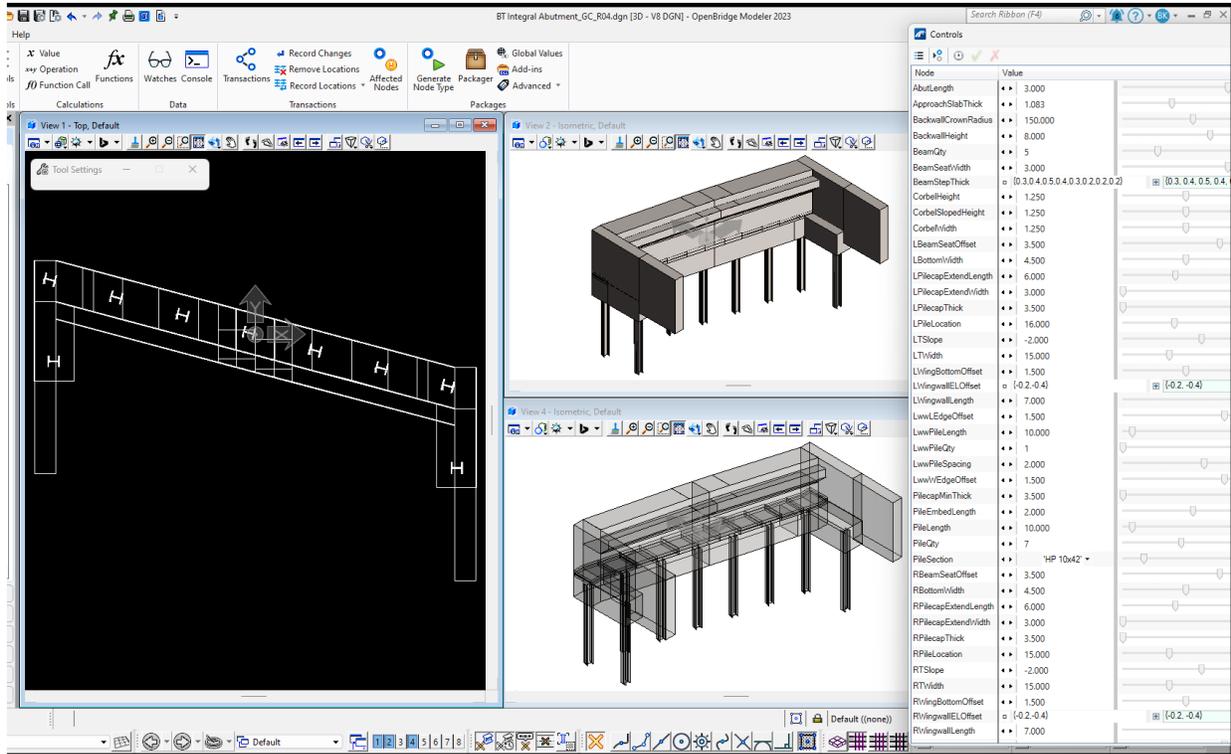
* **LwwPileSpacing** = This only applies when there is more than one pile in abutment wing. Left abutment wing pile spacing, distance is from vertical center to center of H-pile (*min. value=0.1, max. value=5*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

* **RwwPileSpacing** = This only applies when there is more than one pile in abutment wing. Right abutment wing pile spacing, distance is from vertical center to center of H-pile (*min. value=0.1, max. value=5*). *Note, for bridges using A, B & BTB beams, the abutments do not have wing extensions. When this applies this variable becomes irrelevant and is not used.*

UPDATED VERSION (09-03-2024) "BT Integral Abutment GC R04.dgn"

This is for information only.

The image below is showing the "BT Integral Abutment_GC_R04.dgn" GC cell file. This is what appears where the development of the abutment shape is worked on.



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.

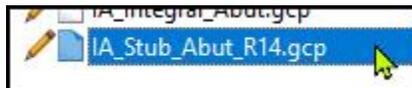
These instructions are used when an OpenBridge Modeler file is opened with the Generative Component (GC) “Computational Design” Workflow enabled. **See the additional document, “General Guidance for Generative Components in OBM”** outlining this process.

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**.

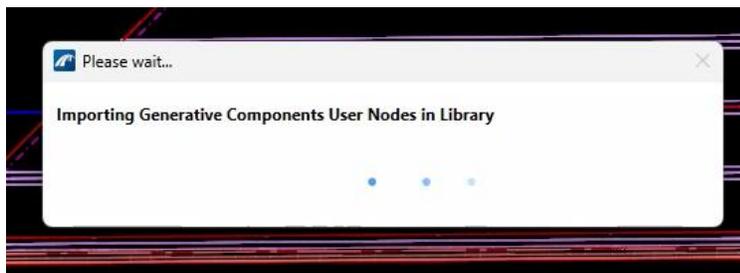


Locate the **IA_Stub_Abut_R14.gcp** file to work with the **IA_BT_Stub** abutment.

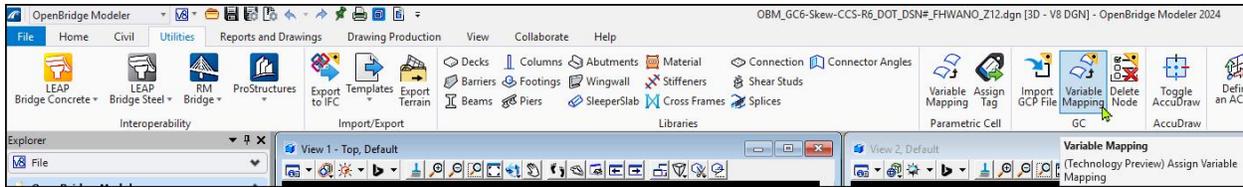


The **IA_Stub_Abut.gcp** file is located on ProjectWise in the following area
**pw:\\NTPwint1.dot.int.lan:PWMMain\Documents\Resources\ClientWorkspaces\lowaDOT\lowaDOTPr
 oduction\Organization-Civil\lowaDOT_Standards\Bridge Templates\GC\IA_Stub_Abut_R14.gcp**

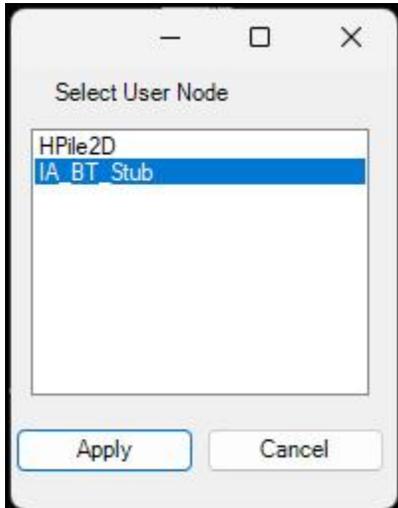
The following dialog box will appear.



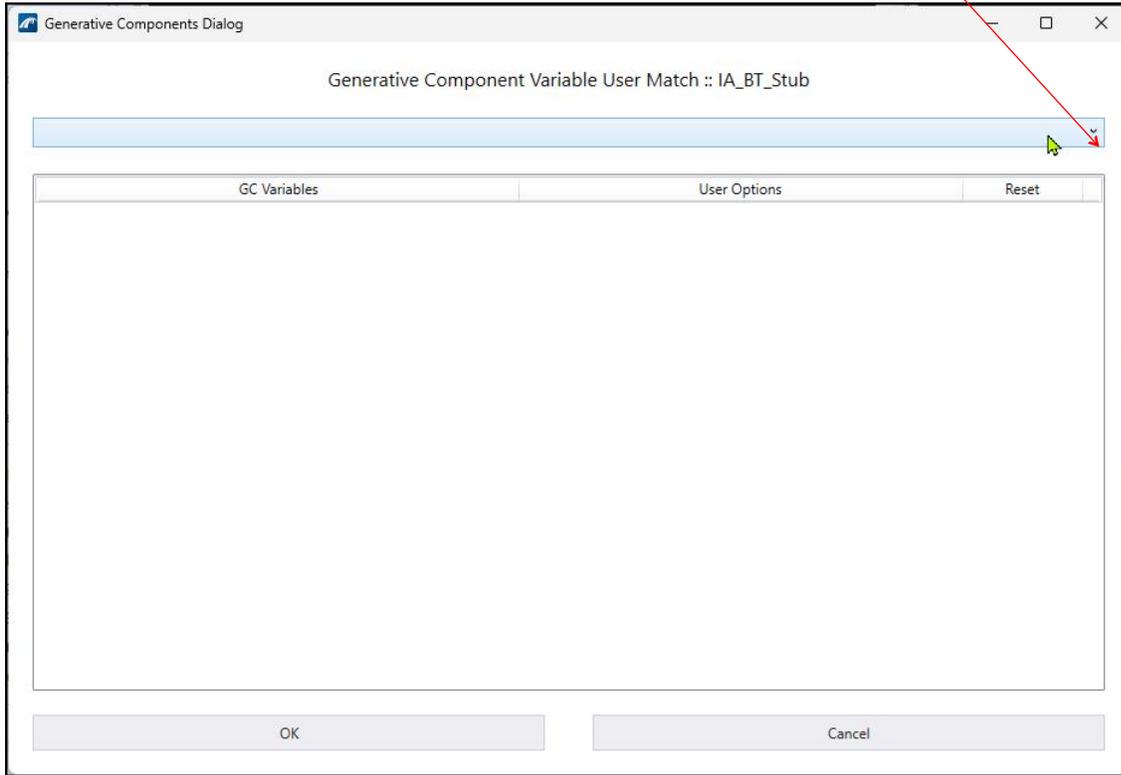
In **OpenBridge Modeler workflow**, select the **Utilities tab**, select **Variable Mapping** in the **GC group**.



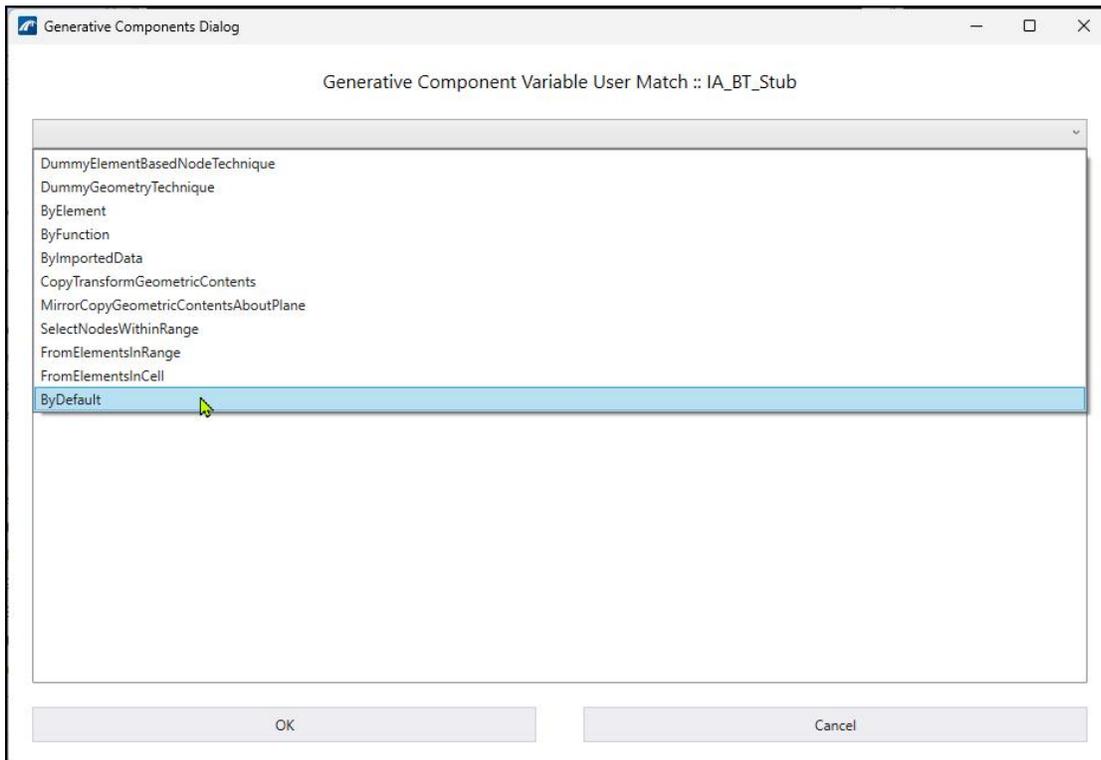
Using the IA_Stub_Abut_R14.gcp file **UPDATED VERSION (08-06-2025)**, the following dialog box will appear. Select **IA_BT_Stub** and “Apply”. Even though the name has “BT” in it, this abutment can be used for BT (Bulb Tee beam) and non-BT beam bridges.



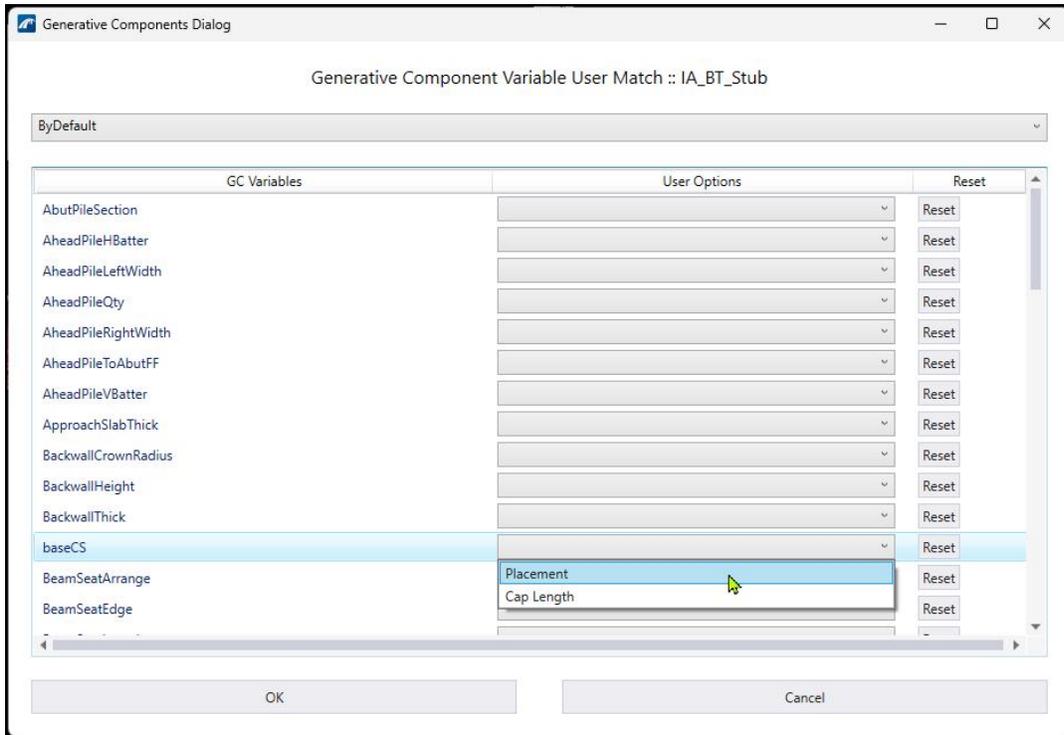
The following dialog box will appear. Select the pull-down arrow in the top gray bar that appears empty, shown below.



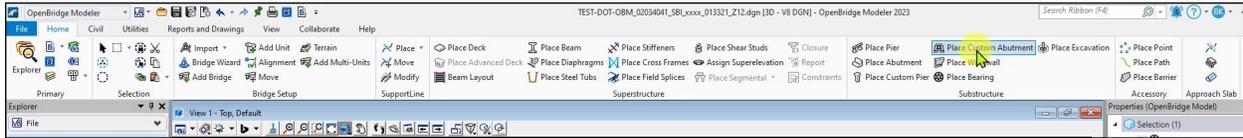
From the pull-down selection, select **“ByDefault”**



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

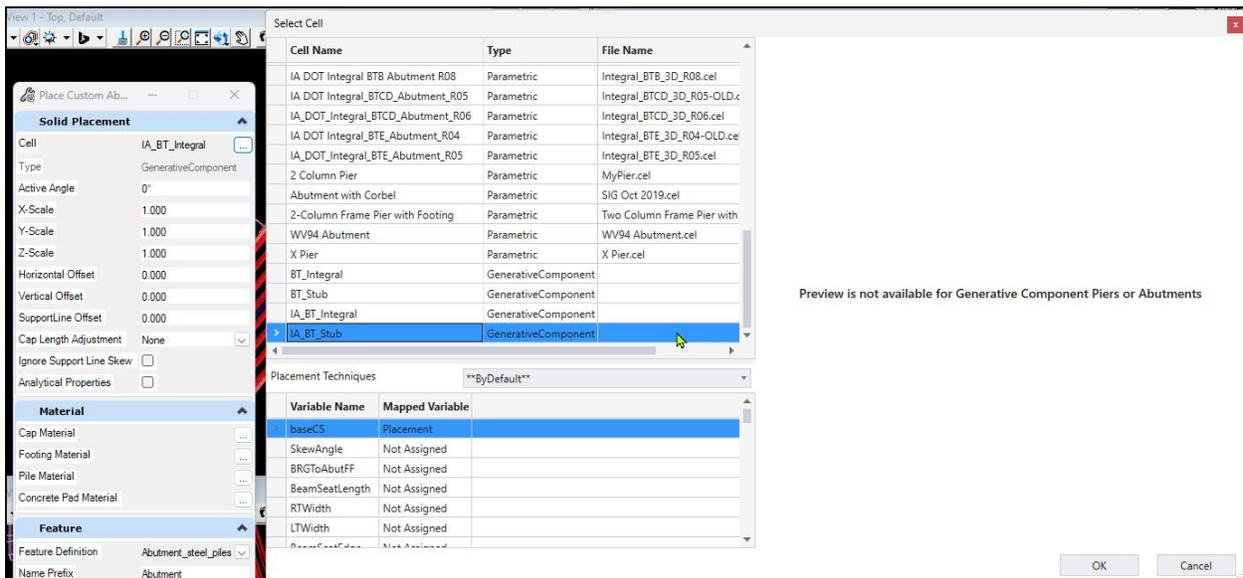


In the ribbon under the **OpenBridge Modeler workflow**, under the **Home tab**, select **Place Custom Abutment**.

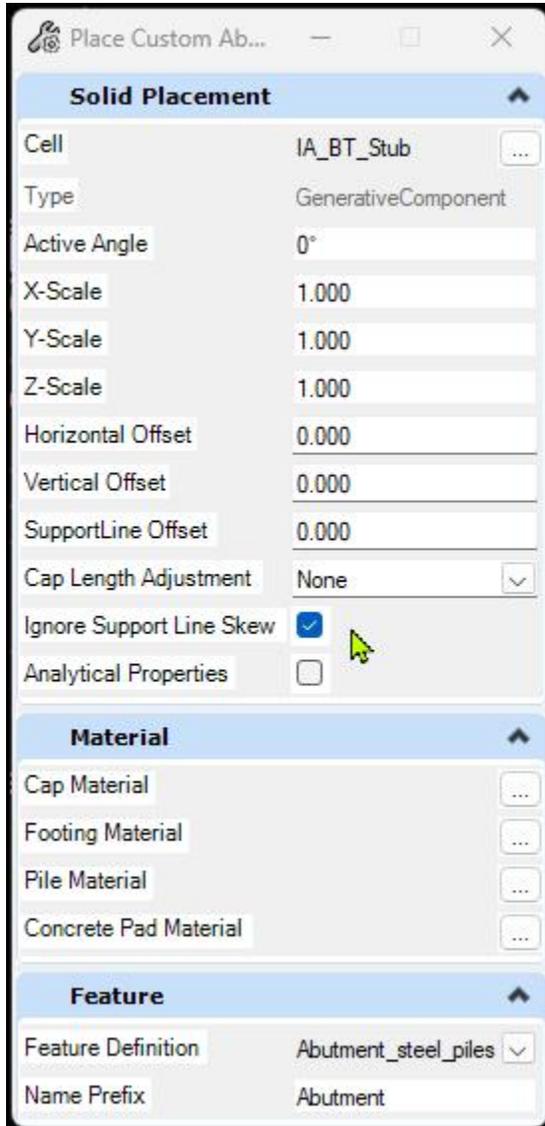


Using the **IA_Stub_Abut_R14.gcp** file **UPDATED VERSION (08-06-2025)**, select the **“IA_BT_Stub”** from the cell library.

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.



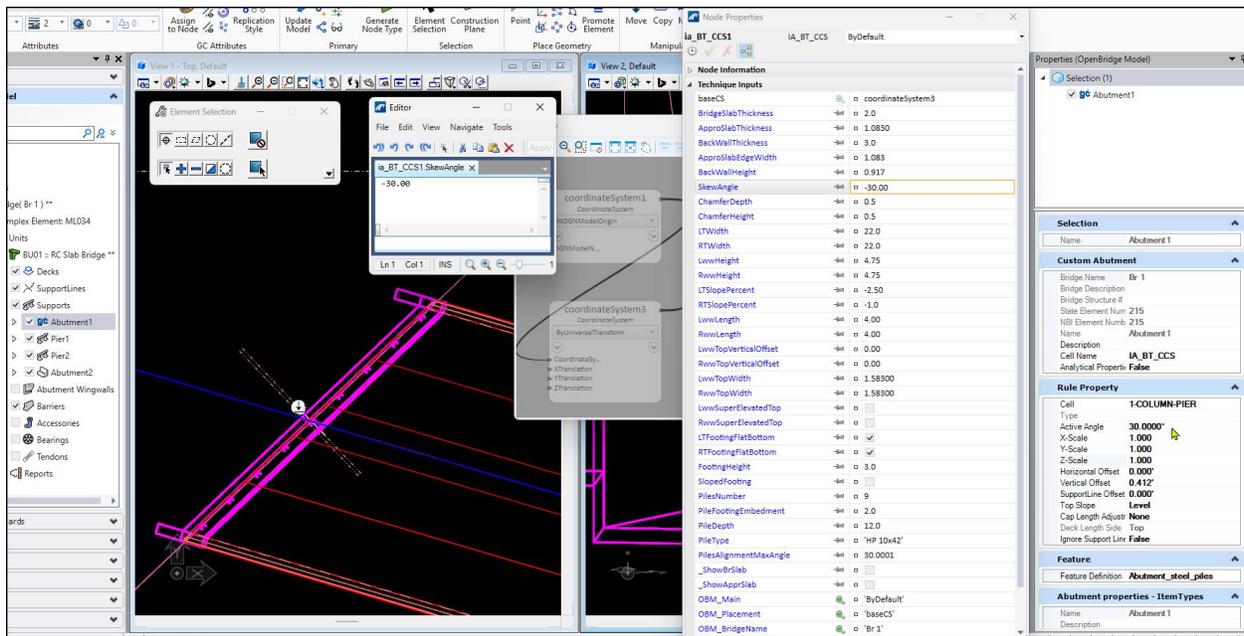
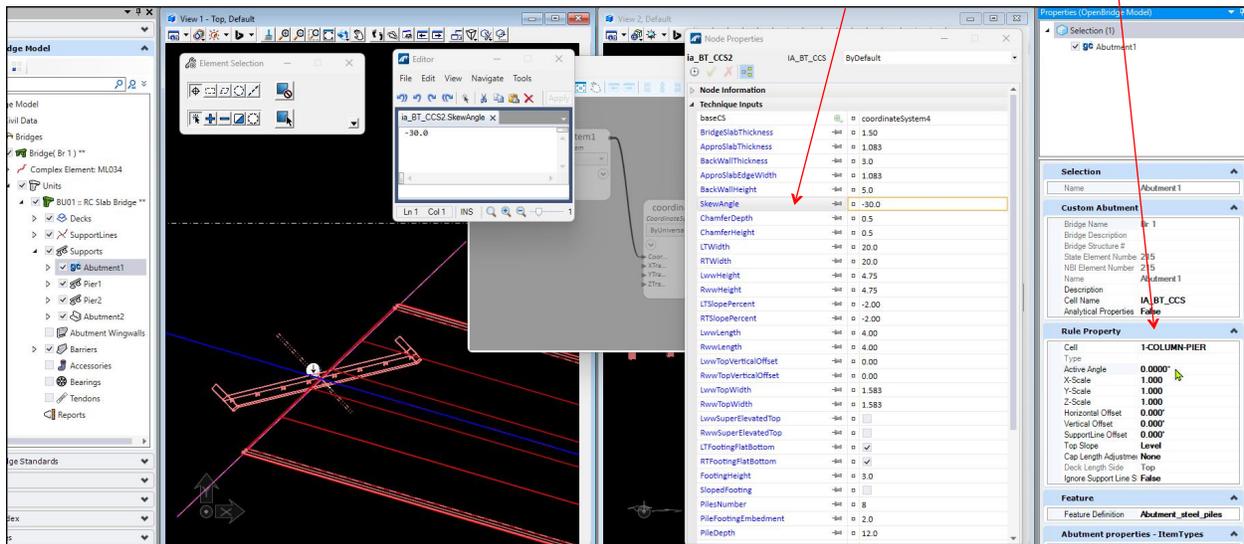
Select the "Support Line" to place the GC abutment on. **Set "Ignore Support Line Skew"-checked On.** For the near abutment (down station) the Active Angle is set at zero (0). For the opposite far abutment (up station), the Active Angle is set to 180. The GC abutment skews are applied in the Technique 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**.



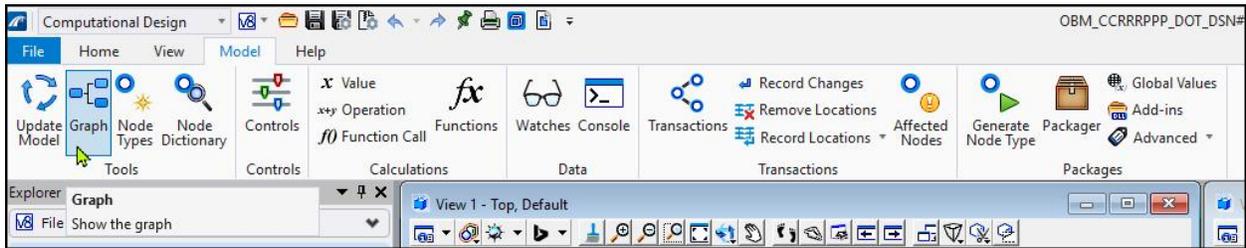
If not setting **"Ignore Support Line Skew"** as checked **On** when placing the custom abutment, the skew may need to be set in two locations, the **Rule Property** and the individual **Skew** variable in the **Node Properties** of the GC "Technique Inputs". The image below is showing the variables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

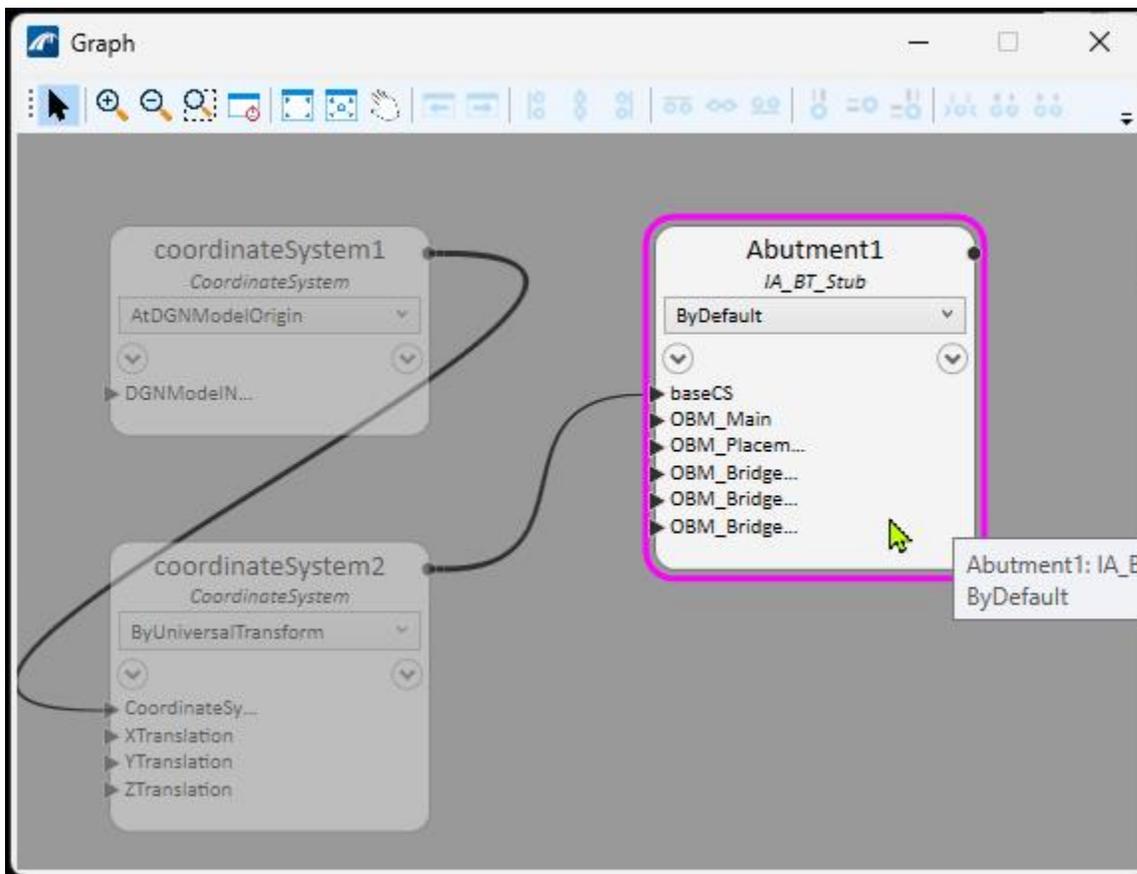
(The example images below are showing the name of the CCS GC Stub Abutment.)



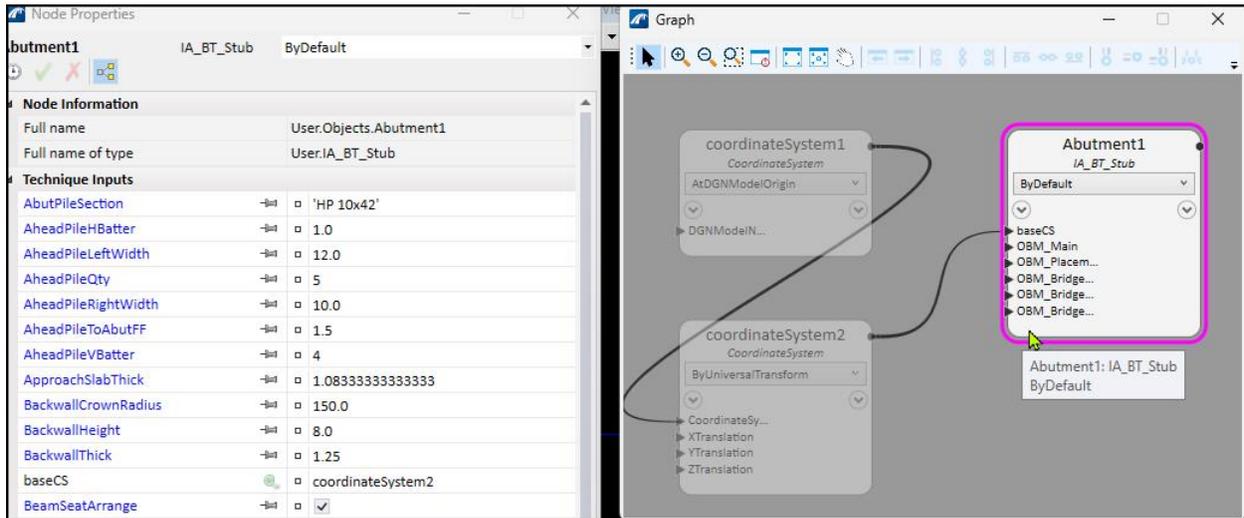
Once the GC custom abutment is placed, in the ribbon change the workflow to **Computational Design** and under the **Model tab**, select **Graph**. Selecting “Graph” will enable the process of editing of the GC abutment geometry. These tools are also located under the **Home tab**.



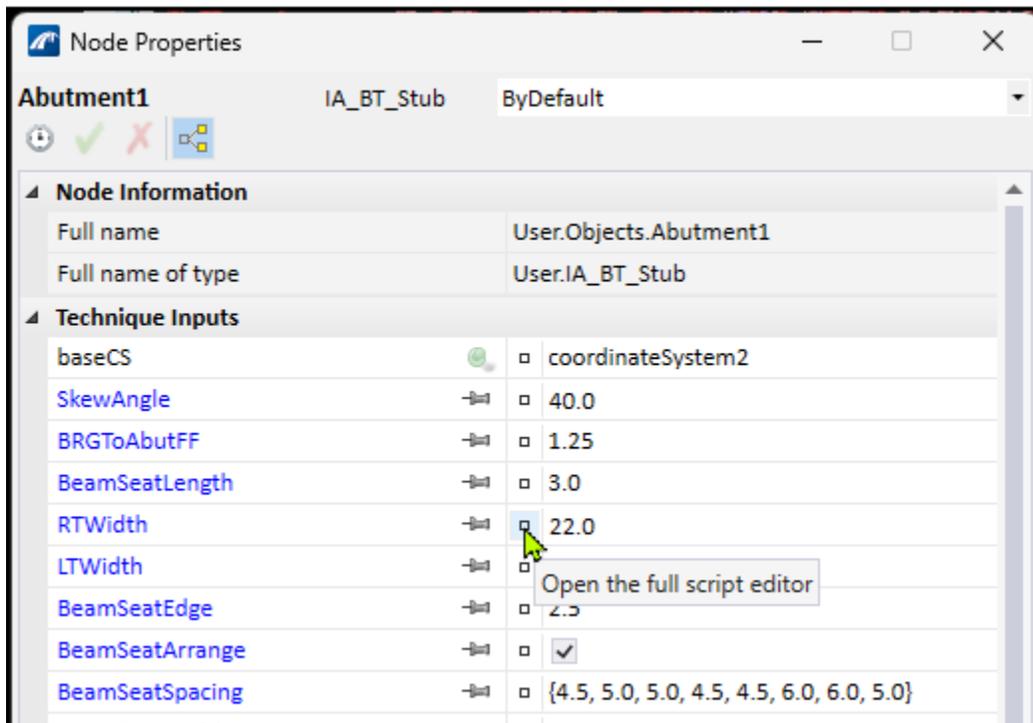
The Graph dialog box will appear, the “Abutment1” box in this example was auto-labeled “Abutment1” *IA_BT_Stub* in the OBM model. Double-clicking the selected “Abutment1” graph dialog box will open the Node Properties dialog to enable the process of editing of the GC abutment geometry.



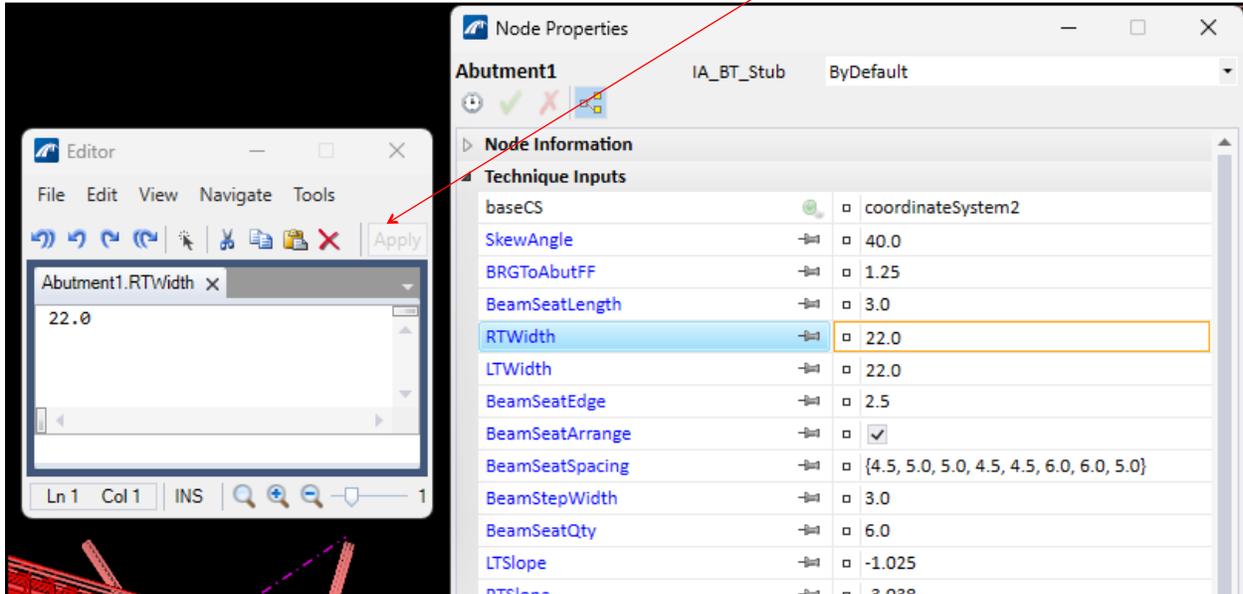
By double-clicking the “Abutment1” Graph box, *IA_BT_Stub*, this will open the Node Properties dialog box.



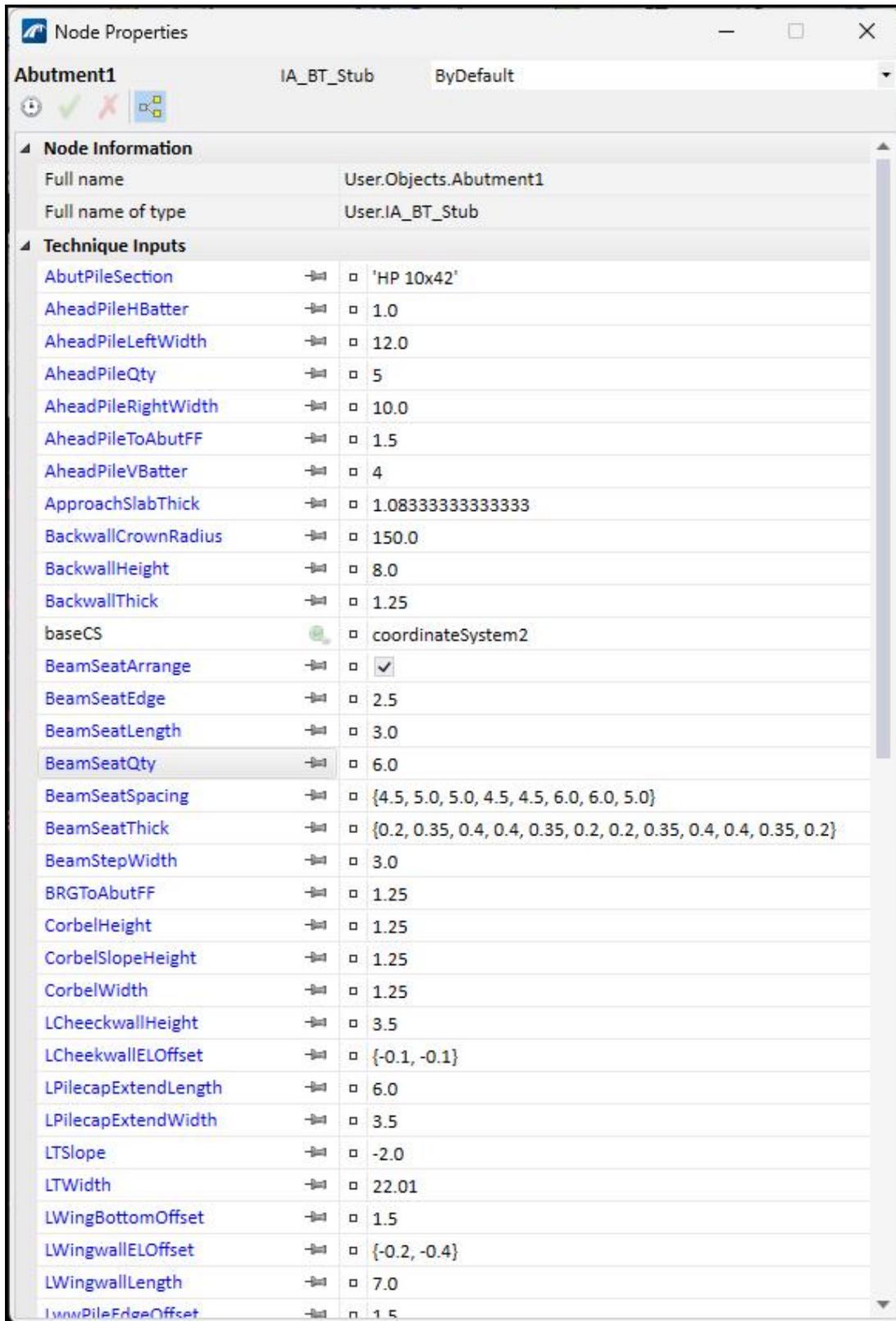
The adjustments of the GC abutment geometry will be made through editing the Technique Inputs in the Node Properties. Edits are done one at a time by either selecting the “box □” to open the full script “Editor” or by selecting the values in each line to directly edit them. It is recommended to use the 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.



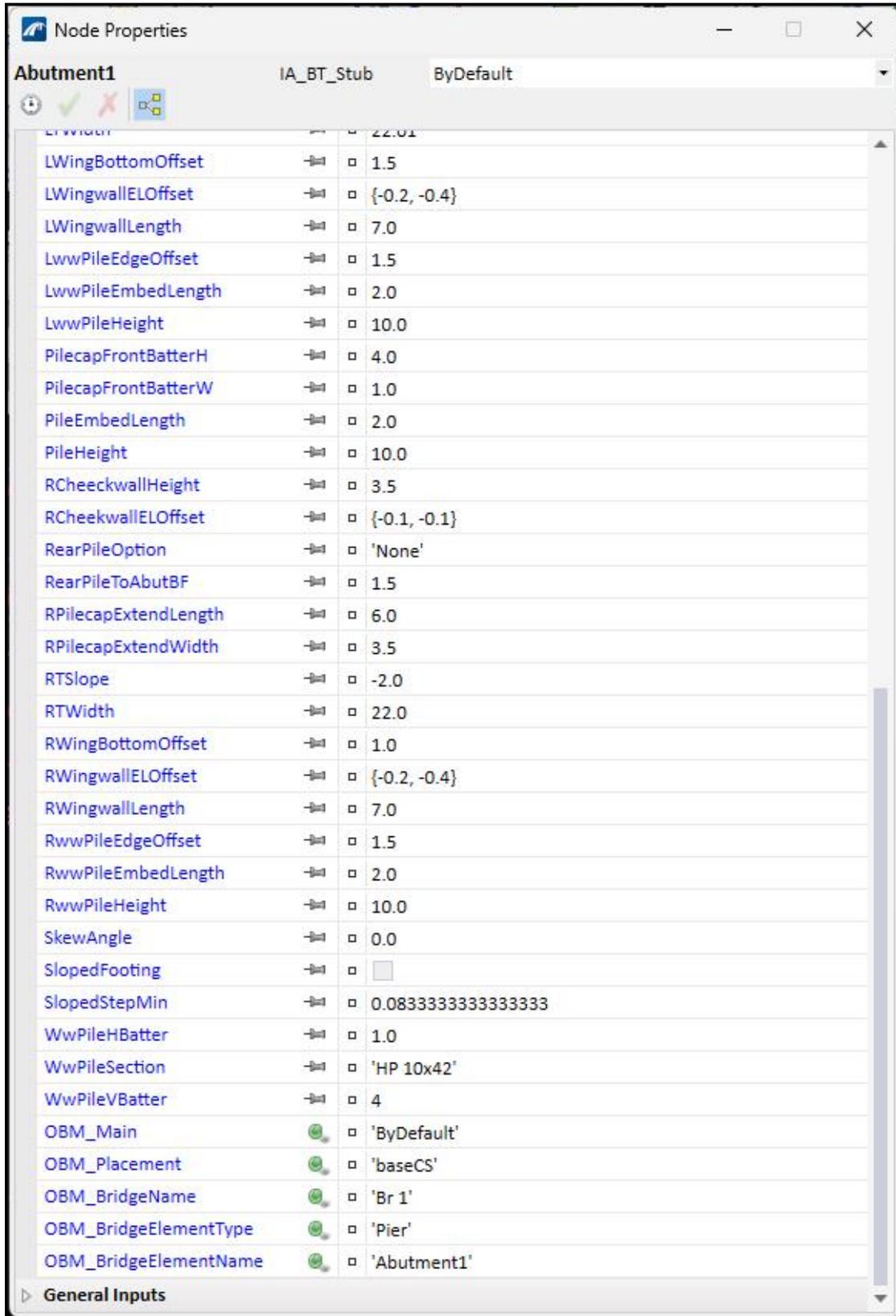
The example image below is showing the full script “Editor” that is used when the box is selected for changes to Technique Input values. Using the full script “Editor” may be more convenient to make edits and prevent any inadvertent entries. Once the value is entered the “Apply” button will become active,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

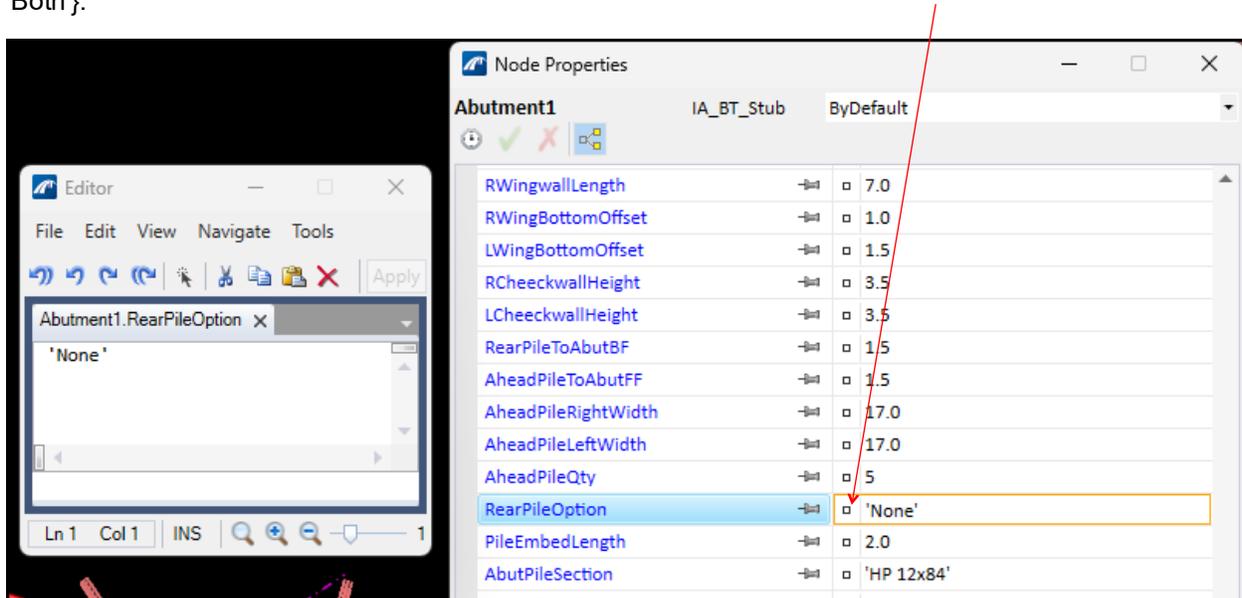


Checking the box of the **SlopedFooting** “On (true)” will enable the abutment to be used for a superelevation design. The **LTSlope** and **RTSlope** inputs will behave accordingly.

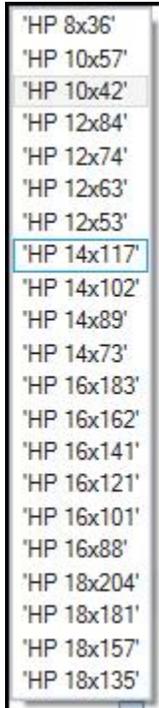


The **AbutPileSection** and **WwPileSection** inputs are set by entering the size accordingly through the full script “Editor” by checking the box. Enter piling input using one of the options exactly as shown, *Example* **'HP 10x57'** {'HP 8x36', 'HP 10x57', 'HP 10x42', 'HP 12x84', 'HP 12x74', 'HP 12x63', '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.

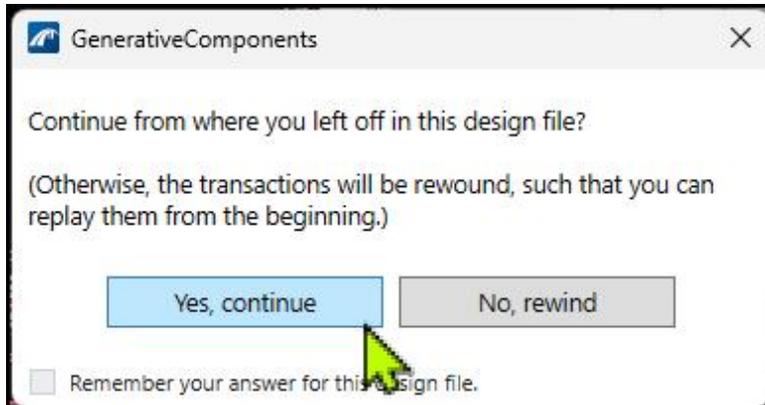


Checking the box of the **BeamSeatArrange** “On” will auto space the beam seats equally. When the box is unchecked “Off” then the **BeamSeatSpacing** inputs control the spacing.

BKG LOADOUTFF	<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.

