

OpenBridge Designer/Modeler Training Manual

Bridge Design, Bridge Division



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Introduction

This training manual is intended for Transportation Engineers, Engineer Assistants, Transportation Specialists, and Design Technicians that are planning to create 3D models of existing and future bridges using OpenBridge Modeler (OBM).

OpenBridge Modeler is not a design tool, it is only a modeling application. This manual will not go into the details of the design and analysis applications included in OpenBridge Designer (OBD).

The training is broken into sections:

- Interfaces Covers the OBD and OBM Interfaces
- Create Bridges one element at a time. Covers the steps to place the different bridge elements.
- Create Bridges using the Bridge Wizard Covers the instructions on how to use the wizard and finish the bridge after placement.
- Place Excavation Demonstrates the excavation tools.
- Place Riprap Demonstrates the linear templates tools in OBM.
- Generate Reports Covers the different reports included in OBM.
- Create and Modify Bridge Templates Shows how to modify and create templates.
- Plan Production Shows how to use the plan production tools in OBM.
- Interoperability Shows how to transfer to the design and analysis applications included in OBD.

For questions about the content included in this manual please contact bridge3ddesign@txdot.gov.

Interfaces of OpenBridge Designer and OpenBridge Modeler

In this section the user will review the OpenBridge Designer and OpenBridge Modeler interface.

OpenBridge Designer Interface

If OpenBridge Designer is not used, please skip to page 7 or the next section to learn about the OpenBridge Modeler interface.

- Open OpenBridge Designer from the Desktop shortcut or the Start menu.
- The welcome page: In this page the user will have three options. Open a file, create a file, and login to ProjectWise (the user must first log-in to ProjectWise, if the files to be opened or created, are stored in ProjectWise)

File 🔶		
	OpenBridge Designer CE 20	21 Release 1
IIM Projects		-
8 IN WARKS O Deduce	OpenBridge Designer	- 8°8
	CONNECT Edition	No.
		Interop.
	-	
	- + 🗠	
	Browse New File ProjectWise	

 Login to ProjectWise using the ProjectWise button. Make sure to NOT enable the auto-login option as this will cause possible inconveniences in the future. The datasource used for trainings is Training and the Authentication is always set to Bentley IMS.

Browse	New File	ProjectWise
🖉 ProjectWise Log In		×
Datasource: Training	•	Log in
Authentication: Bentley IM	IS 💌	Cancel
User Name:		
Password:		
Remem	ber me (use auto-login nex	t time)

Once logged in, press the *Browse* button, and navigate to *Documents* 25 - *CHS Design Projects XX-BRG300 4* - *Design Bridge* and open the OBD Interface.obdx file.
 Note: The XX in the project name will be replaced by the user's first and last name.



• BIM Workflow: This workflow is used when the user wants to strictly manage all models using OpenBridge Modeler. In this workflow the user is not allowed to add LEAP or RM files.



Standalone: This workflow is used when the user wants to create OpenBridge Modeler files.
 From OBM the models can be exported to LEAP or RM Bridge. The models can then be analyzed and designed. Model changes done in LEAP or RM will not be pushed back to OBM.
 In this workflow the user can select the Analysis group to add LEAP or RM files without having an OBM file first.

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	OpenBridge Designer CE 2022 Re	lease 1
Sundative No Sungar	Nodeling Junity Direct	
	Analysin	
	LEAP Bridge Steel	o begin.
	LEAP Bridge Rie Not Created Run application to	r begin.
	RM Bridge Run application to	d 5 begin.

- Drawings: The Drawings button is only available in the BIM workflow. This button provides previews of drawings generated using the plan production tools in OBM. OBD will list all sheets created within the same OBM file when the Drawings button is pressed. For modifications to the sheets, the user needs to launch OBM and make the necessary modifications there. Please note that the TxDOT workflow separates the OBM File from the drawing and sheet files and this button may not be used.
- At the lower right-hand section of the OBD dialog box the user can find the ProjectWise Login status.

ProjectWise Status: Logged Out 🔤 ProjectWise Status: Logged In 🔀

OpenBridge Modeler Welcome Interface

When the user opens **OpenBridge Modeler** from the OBD interface the user will first see the Welcome page.

• Open **OpenBridge Modeler** either by pressing the **OpenBridge Modeler** button in OBD or by double clicking the **OpenBridge Modeler** icon in the desktop or start menu.





Icon in OpenBridge Designer

Icon in Desktop (Standalone OBM)

• When prompted, login to ProjectWise, the datasource used for trainings is Training and the Authentication is always set to Bentley IMS.

🎢 ProjectWise	Log In			×
Datasource:	Training ~		<u>L</u> og in	
Authentication:	Bentley IMS 🛛 🗸		<u>C</u> ancel	
<u>U</u> ser Name:				
Password:				
	<u>R</u> emember me (use auto-login ne	ext time	≘)	

 Left Side Section: In this side of the welcome page, OBM will list the recently used WorkSets. The name of the WorkSpace assigned to the WorkSet is listed above the WorkSet name.

Note: The history will not be populated when working in ProjectWise.



 Right Side Section: In this side of the welcome page, OBM will report the properties of the selected WorkSet.

Note: The ProjectWise properties here refer to the ProjectWise 365 project, which is not the same as the ProjectWise Explorer application that is used in TxDOT.

Properties *	
Name	TXDOT Bridge Training
Description	
WorkSpace	TXDOT
01 DISTRICT ABBR	
02 COUNTY	
03 CONTROL	
04 SECTION	
05 JOB	
06 HIGHWAY NO.	
07 FED. RD. DIV. NO.	
08 FEDERAL AID PRO.	
09 PROJECT MANAGE	
Draiact\A/ica Drai	act Droportion
No projectivise Proj	ect Properties
no project attached.	
Show All Properties	

Middle Section: In this area of the welcome page, OBM will keep track of the previously opened files within the WorkSpace and WorkSet selected. In this section the user can also open existing files using the Browse button or create new files using the New File button.
 Note: The file will appear if the user remains in the same OBM session and while the WorkSet is not changed. This may be lost if the WorkSet is changed, and the user will simply have to use the Browse button to open existing files.

OpenBridge Modeler CE



OpenBridge Modeler User Interface

The OpenBridge Modeler interface is shared by MicroStation CONNECT Edition, ProStructures CONNECT Edition, and OpenRoads CONNECT Edition. The interface is now a ribbon-based interface leaving behind the Toolbox interface; however, toolboxes are still accessible for use.

The Ribbon is categorized by Tasks. This guide we will go over the OpenBridge Modeler task interface.

- Continuing from the previous section, press the *Browse* button and navigate to *Documents* 25 *CHS Design Projects XX-BRG300 4 Design Bridge Bridge X* and open the OBM Interface.dgn. Accept the workspace reload when prompted and let the file load.
 - The File Tab or Backstage View: In this tab the user can access the "New", "Open", "Save", "Save As", "Save Settings", "Print", "Export", "Import", etc. The user can also find tools such as "Batch Convert", "Batch Process", "Packager", and "Compress File", etc. Finally, the user may also find "User Settings", "File Settings", and "Configuration Settings".



- The Home Tab: In this tab the user will find all the tools to perform the activities of the Task selected. For this training manual we are focusing in the OpenBridge Modeler task, so the tools available in the Home tab are the tools to create and modify bridge models. The ribbon is separated by sections as follows:
 - Primary: This section contains the Reference, Raster, and Point Cloud attachments; Level Display and Level manager; Models; Key-In, Accu-draw, and Cells tools; Element Properties; and Explorer tool.



Note: Usually the icons will be small, but for this example the size was set to large.

 Selection: This section will contain the Cut, Copy and Paste which work with the clipboard. The section also contains the Select all, Select None, Select by Attributes, Place Fence and Fence manipulation tools, and Element lock and unlock tools.



Note: Usually the icons will be small, but for this example the size was set to large.

 Bridge Setup: This section has all the tools to setup a new bridge such as import geometry, add new bridge, add new unit, set the bridge alignment, set the bridge terrain, move bridge, and the add multi-unit bridge. In addition, the Bridge Wizard is also located in this section.



 Support Line: This section has all the tools for the placement and manipulation of support lines.

```
    ➢ Place ▼
    ➢ Move
    ➢ Modify
    SupportLine
```

 Superstructure: This section has all the tools to place the superstructure of the bridge. Different tools become available when specific types of bridges are being modeled.



 Substructure: This section has all the tools to place substructure elements including excavation around footings, bearing pads and seats on abutment caps and interior bents.



 Accessory: This section contains all the tools to place ancillary structures such as traffic barriers, 3D cells for luminaries, overhead structures, and signs.

```
    Place Point
    Place Path
    Place Barrier
    Accessory
```

Approach Slab: This section has the tools to place approach slabs and sleeper slabs.
 These tools require additional templates for the sleeper slabs.



- The Civil Tab: In this tab the user will find all Civil tools needed to create a bridge geometry. However, it should be mentioned that all civil geometry should be created using ORD, this tab is strictly used to open dynamic views such as Cross Section or Profile views, and to open optional geometry reports such as Horizontal and Vertical reports, and Cross Section reports. The ribbon is separated by sections as follows:
 - General Tools: This section contains the tools to import and export geometry, apply and remove feature definitions to civil geometry, and the reporting and analysis tools.



 Horizontal: This section has all the horizontal geometry tools. These tools are the same found in ORD. However, the number of tools is limited to what is needed to create a bridge. Additionally, these tools can be used to create riprap elements around abutments.



 Vertical: This section has all the vertical geometry tools. These tools are the same found in ORD. However, the number of tools is limited to what is needed to create a bridge. Additionally, these tools can be used to create riprap elements around abutments.

🖽 Open Profile Mode	📐 Lines 🔻	📙 Element Profiles	-
💑 Set Active Profile	👱 Curves 🔻		
Profile Creation 🔹	🗠 Complex Geometry 🤊	,	
	Vertical		

 Superelevation: This section has all the superelevation tools. These tools are the same found in ORD. However, the number of tools is limited to what is needed to create a bridge.



 Cross-Sections: The only tool available in this section is the Dynamic Cross Section viewer. This tool works the same as it does in ORD.

∽ Open Cross Section View Cross-Sections

 Terrain Model: This section has all the terrain tools. These tools are the same found in ORD. However, the number of tools is limited to what is needed to create a bridge. Additionally, these tools can be used to create riprap elements around abutments.



 3D Geometry & Template: These sections have the tools that can be used to create riprap elements around abutments when used along the horizontal, vertical, and terrain tools. These tools are the same found in ORD.



- The Utilities Tab: In this tab the user will find the interoperability tools which are used to transfer data to the analysis and detailing applications. Here the user will also find the import/export tools, templates tools, item types tools, and more. The ribbon is separated by sections as follows:
 - Interoperability: This section has the tools to export and read-in the bridge information to and from LEAP and RM Bridge applications.



• Import/Export: This section has the tool to export and import superstructure and substructure templates, and to export the terrain model to different formats.



 Libraries: This section contains all the different template libraries used by OBM, in this section the user will create the different Deck, Beams, Barriers, Interior Bents, Abutments, and more templates used to create a bridge.



 Parametric Cell: This section contains the tools to map variables of parametric cells to select OBM variables and to tag certain elements of parametric cells as structural elements.



 Generative Component (GC): This section contains the tools for variable mapping for all generative components in OBM.



 Accu-draw & ACS: These sections have the Accu-draw toggle and the auxiliary coordinate system tools, these tools are the same as found in the Drawing task and in MicroStation.



 Item Types & Reports: These sections have the item types that can be attached to elements of the OBM Model and the report tools to create reports used in the item types.



- The Reports and Drawings Tab: In this tab the user can find the plan production tools, reporting tools and other MicroStation tools such as measure, place line, and drawing scales. The ribbon is separated by sections as follows:
 - Bridge Reporting: This section has the tools needed to create different types of reports for different structural elements of the bridge(s), in addition the user can create quantities report and input reports.



 Drawings & Labels: These sections contain all the tools to create drawings. Part of the tools are specific to OBM but the other tools are the same found in the plan production tools of ORD and MicroStation.



 Drawing Scale, Measure, and Placement: These sections have the same tools found in the Drawing task in OBM, ORD, and MicroStation. These tools can be used to change the annotation scale, place 2D/3D elements, and measure elements.



 The View Tab: This tab is common in all applications and tasks, and it has the same tools on all applications used in TxDOT. The user can find view manipulation tools, saved views, view clipping tools, and view navigation tools.



 The Collaborate Tab: This tab contains tools to connect the project with an iTwins project, to check the integrity of the model with clash detection and to markup or annotate the model during reviews.

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Associate Project to Wo	Sync to iTwin	Attach iTwin ▼	Create Issues	Manage Issues	Open iTwin	Project Portal	Clash Detection	Previous Clash	Next Clash	Place Label	Place Note	Cloud by Points
		Collabo	ration				Clast	n Detectio	n	N	larkup	Tools

 TxDOT Custom Tools Tabs: These tabs will contain specific tools targeted only for TxDOT use. These tabs will only be found in the Drawing task because this task is common on all applications. Some of these tabs include Axiom, WinCore and possibly custom tools.



 $_{\odot}$ Axiom Tab: To import Excel, Word, and Powerpoint data into 2D drawings only.

			₽	12 34	(\mathbf{i})	
Microsoft Office Importer	Paste from Paste Excel or Word from Ch	Edit art	Manage	List all Links	Paste Info	Office Paste Settings
User Favorites	Tools		Edit			Settings

• WinCore Tab: To be used in 2D drawings only.



For additional information on the individual tools consult the OpenBridge Modeler help documents here: <u>OpenBridge Modeler Help (bentley.com)</u>

Creating Bridge Models – One element at a time.

Now that we are familiar with the OpenBridge Interface we will proceed to create a new Bridge Model without using the Bridge Wizard. This section will use a workflow that strictly saves the files in ProjectWise and the local environment will not be used. In this section we will be creating one Precast Model and one Steel Model to review all the tools.

Note: This section will not guide the user on how to create terrain files and 3D alignment geometry for the bridges. The assumption is made that these files have been previously created by the Roadway group. To learn how to create these files and more using ORD please enroll to the <u>DES750: OpenRoads Designer for</u> <u>Plan Development</u> training in Peoplesoft.

Create a New OpenBridge Designer File

If OpenBridge Designer is not getting used, please skip to page 20 or next section to start with OpenBridge Modeler.

• Close all sessions of OBM and then close and re-open **OpenBridge Designer**.



• Login to ProjectWise using the ProjectWise button. Make sure to NOT enable the auto-login option as this will cause possible inconveniences in the future. The datasource used for trainings is Training and the Authentication is always set to Bentley IMS.

Browse	New File	ProjectWise
🖉 ProjectWise Log In		×
Datasource: Training	•	Log in
Authentication: Bentley IM	5 🔹	Cancel
User Name:		
Password:		
P Rememb	per me (use auto-login next	t time)
1 obdy		1.

• Once logged in, press the **New File** button, and save the new OBDX file called *TxDOT OBM Training.obdx* in the Bridge folder of the ProjectWise Training Work Area assigned to the user.

~1 ddes ⊜∑723-0-6	~		
B		Gd	Ø(
Dorden Dorden Dorden Dorden Completed	110	Save Document As	3
- Condition		General	10.00
Geometry Substructure		Folder	Save
Superstructure		Selec	A Save to disk.
Construction Schedule		Name: TxDOT 06M Training obdx	Cancel
Extranels (C) Estimates (C) Context (C) Context		Ple Name: TxDOT OBM Training obdx	
B. 201 Macher Design Files Dif Macher Design Files Dif Macher Design Files Dif Photos B. 201 Plan Review Dif Photos		Format: Forma	
Supporting Documents		Application: Department:	_
S - Childres S - Childres S - 27 6 - Construction S - 27 - Project Management			-

• Once the file is saved, select the **Standalone Workflow**.



• Select the Add Standalone Group icon.



• Use a name that describes the type of work that is going to be stored in the group. For this training use **Precast Bridge Training**.



• Click the OpenBridge Modeler Button to run the application.

Create a New OpenBridge Modeler File

When working in ProjectWise the workspace and workset is setup automatically, the section can be ignored, and the user can proceed to create a new OBM file or to open an OBM file. For this training we will ignore the workspace and workset and use the new file button because the training is stored in ProjectWise.

If OBM is open, close and re-open **OpenBridge Modeler** either by pressing the **OpenBridge Modeler** button in OBD or by double clicking the **OpenBridge Modeler** icon in the desktop or start
 menu.



Icon in OpenBridge Designer



2. When prompted, login to ProjectWise, the datasource used for trainings is Training and the Authentication is always set to Bentley IMS.

🎢 ProjectWise	Log In		×
Datasource:	Training ~		Log in
Authentication:	Bentley IMS 🗸 🗸	•	<u>C</u> ancel
<u>U</u> ser Name:			
Password:			
	<u>R</u> emember me (use auto-login ne	ext time)	

 Once OBM is loaded, ignore the WorkSpace and the WorkSet area. Press the New File to create a new OBM file.



- 4. During the file creation verify that the TxDOT_BridgeSeed3d.dgn seed file is selected and save the file to the correct path as shown below.
 - File creation method: **No Wizard**
 - Browse to Documents\25 CHS\Design Projects\XX-BRG300\4 Design\Bridge\Bridge X\
 - Verify that the *Seed* is

Documents_Resources\ClientWorkspaces\TxDOT\TxDOTConnect10.12\Organizat ion-Civil\TXDOT_Bridge\OpenBridge Modeler\Seed\TxDOT_BridgeSeed3d.dgn

- Key-in the new file name **Bridge_Model_01.dgn**.
- Set the application to **OpenBridge Modeler**
- When prompted accept the reload of the workspace.

∕ New X	New	×
Document Creation Wizards	General Folder Bridge X - Change Document Name: Bridge_Model_01.dgn Bescription: TXDOT OBM Training - One Piece at a time	OK Cancel Apply
🖌 Alan X	Eile Name: Bridge_Model_01.dgn	
OpenBidge Modeler must be restarted to load the new configuration. Do you want to restart now?	Application: Department: OpenBridge Modeler Source Document: TxDOT_BridgeSeed3d.dgn	
yrs yrs	Seed Import	

Create a Bridge with Concrete Superstructure

1. Once the file is created, proceed to attach the geometry files and terrain file as references. These files will be used in the creation of the new bridge.

Note: Only the horizontal and vertical alignments are required to create a bridge, but this training will also utilize terrain files to refine substructure footings, excavation geometries, and rip rap.

• Attach horizontal and vertical alignments:

3D Corridor Modeling\Geometry\US281_GEOM.dgn

Note: As instructed by DES750, the terrain should be attached to the geometry file and made active there for the strip elevations to work, there is no need to attach the terrain as separate file.

- Optional Attachment Edge of Pavements: 3D Corridor Modeling \Geometry \US281_EOP.dgn
- Optional Attachment Superelevation shapes: **3D Corridor**

Modeling \Geometry \US281_SUP.dgn

- Attachment Options:
 - Model Name: **Default**
 - Orientation: *Coincident World*
 - Detail Scale: *Full Scale 1:1*
 - Live Nesting: 2

Model: De	fault	•							
Description: M	acter Model								
Description: M									
Orientation:									
View	Description								
Coincident	Aligned with Master File								
Coincident - W	orld Global Origin aligned with Master File								
Standard Views	1		Referen	ces (6	of 8 unique, 6 displayed)				×
Saved Views (n	one) aries (none)	The second se	de Der	-					
Named Board	anes (none)	1	100			2 2 10 10	-		
		E	• E	*		ED ch 2" (1)	>>> Hite Mode: B	oundaries *	
		Sk	1 1	3	File Name	Model	Description	Logical	Orienta
					PW_WORKDIR:d0348598/US281_EOP.dgn	Default	Master Model		Coinci
Detail Sc	ale: Full Size 1 = 1				PW_WORKDR:d0348598/US281_GEOM.dgn PW_WORKDR:d0348598/US281_GEOM.dgn	Default	Master Model		Coinci
Sc <u>a</u> le (Master:R	ef): 1.000000000 : 1.00000000	1			right and a state of the second state of the s	Lease	Martin Model		COND
Named Gro	up: 👻								
Revisi	on: 👻								
Le	vel:								
Nested Attachme	nts: Live Nesting Vesting Dep	th: 2							
Display Overrig	des: Allow 👻								
New Level Disp	av: Use MS REF NEWLEVELDISPLAY Cor	Sci	le 1.000		00 1 1.00000000	Retation			
Global LineStyle Sc.	ale: Master	OF	Let X	-	Y				
Synchronize Vi	ew: Volume Only	Ci Di	play Ou	G.	LL 元 곳 옷 네 바 우 네 스 마 읍 Ne s New Level Display	ited Attachments:	*.	Nesting Depth:	
		-	10,000		a service restriction of the	device e			

Once all files have been attached, press the *Fit View* icon to fit the view around all attachments. Also, click *File* > *Save Settings* to automatically see the project extents when opening the file.



- 3. We need to set the GeoCoordinate system of the OBM file to match the GeoCoordinate definition of the reference files. To do so use the **Search Ribbon**.
 - Key in: *Coordinate*
 - Select from the results: Coordinate System
 - In the dialog use the *From File* icon
 - Navigate to **3D Corridor Modeling \Geometry \US281_GEOM.dgn**
 - Select the appropriate Coordinate Systems and press OK.
 - Once the correct Coordinate System is selected (shown below) close the window.

Caudderadu (30 + As DOVI + Obeuaud Annuale Ann	
libbon (5)	
💋 Auxiliary Coordinates	
Coordinate System	
T Label Coordinates	Celect Models
🚰 Export Coordinates	Tare 20/20 Name Description CCC Name CCC Description
🚰 Import Coordinates	Open Participation Occuration Occuration <th< td=""></th<>
🖶 Geographic Coordinate System 😑 🗆 🗙	
Current Geographic Coordinate System Name <nov Description:</nov 	<u>OK</u> Cancel
Source Vertical Datum:	
🕽 Geographic Coordinate System 🛛 — 🖂 🗙	
i 😂 📌 📽 🔐 🔐 🐱	
Current Geographic Coordinate System	
Name: MOD-SP4204 Feet	
Description: NAD 1983 StatePlane Texas South Central F	
Source: ESRI PRJ [ArcGIS]	
Vertical Datum: NAV/D88	

4. This dataset is used for other trainings in TxDOT, for this OBM training we will be focusing on the US281 Southbound and Northbound Main Lanes Overpass bridge.



- 5. Enable the Terrain contours.
 - Select the green boundary of the terrain.
 - Open the properties dialog box.



Note: The properties dialog box is used constantly in this training, it is recommended to dock the dialog box around the working area. This is done by clicking and dragging the Properties dialog, then choosing which side of the screen to dock to. This is shown below.



• In the properties dialog box, locate the **Reference** section.



• In the Reference section, change the **Override Symbology** to **Yes** and the **Override Template** to **Terrain Existing Contours**.

	 Properties A Construction A Construction
	化 Kelements (1)
	🖌 🦾 Terrain Model: SH46_Existing_Terrain
	> 🏷 Calculated Features
	Source Features
	General · ^
110 N. 18 A.S	Information 🔹
$\uparrow \mu $ $D \to D \to D$	Edge Method
	Calculated Features Display
0	Source Features Display
	Reference A
们们们们的问题。	Override Template Terrain LExisting_Contours Override Symbology Yes
	Feature
HH H LEASE	Feature Definition Existing Boundary
前自己的感激激之音	Feature Name SH46_Existing_Terrain
HE KANGE D	
Reference	*
Override Template	(None)
Override Symbology	⊡ ·· Survey
	- Terrain
Feature	···· Existing_Triangles
Feature Definition	
Feature Name	Existing_Boundary
Extended	
LAtenueu	
Model	Manage Templates
Last Modified	



6. Create the Bridge placeholder by selecting the *Add Bridge* button.



- Description: **US281 Southbound Mainlane**
- Structure Number: 15-046-0-0253-03-052 [This is the NBI Number]
- Requires Road Alignment: **False**
- Use Road Alignment For Stationing: False
- Unit Name: **Unit 1**
- Unit Description: 215.00' Prestr. Conc. I-Beam Unit (45'-125'-45')
- Unit Bridge Type: Beam Slab (P/S or RC Concrete Girders)
- Feature Definition: **Bridge_decorations**
- Name Prefix: **US281_SBML**
- Select the alignment for the US281 SBML, then accept by pressing the left mouse button anywhere in the screen.

/o Add Bridge	- D	×	
Main		^	
Description	US281 Southbound Manlane		
Structure Number	15-046-0-0253-03-052		
Requires Road Alignment			
Use Road Alignment For Stationing			
Unit		•	Core MIL (2007) Anton Martine Martine Martine Martine Martine Martine Martine (ML) (2011)
Name	Unit1		Ner 1 (PC) FORMORI & SCHOOL &
Description	215.00 Prestr. Conc. I Girder (451-1251-45)		
Bridge Type	Beam Stab (P/S or RC Concrete Girdens)	v	
Feature		•	
Feature Definition	Bidge_decorations	×	
Name Prefix	US281_S8ML		

• After the bridge placeholder is created, verify it appears in the project explorer. The user can review the entered information by selecting the bridge or the unit in the explorer, the information will appear in the properties dialog box.





Note: To rename the bridge or unit, the user needs to right-click the element from the explorer and select **Rename**. Other information can be changed in the properties dialog box while the element is selected. When more than one unit or bridge exist in the file the user needs to make that unit or bridge active to make changes. Bridges and units can be made active by right clicking on the unit or bridge and selecting **Make Active**.

7. Set the terrain as active terrain for the bridge using the *Terrain* button.



• Click on any part of the terrain boundary of the file to accept. Once the terrain has been made active it will also appear under the bridge name in the project explorer.



Note: If the terrain name does not appear, close and reopen the explorer to refresh the contents.

Additionally, set the terrain active to the civil features using the available civil tools in OBM.
 Select the terrain boundary to accept.



 Next, we need to add the SupportLines. SupportLines define the locations of the start/end of the bridge and the substructure abutments/bents. Return to the Home tab, press the down arrow next to the *Place* button in the SupportLine section and select the *Multi* tool.



- Skew Angle: -10°00'00"
- Length: 70 [this is for the support line]
- Start Station: **14+18.00**
- End Station: 16+33.00
- Number of SupportLines: 4
- This will require 3 clicks, 1 for start station, 1 for skew, and 1 for end station.



In the Place Multi SupportLines dialog

- Change the support line names to reflect the type of support (e.g. Abutment #, Bent #)
- Change the span lengths as shown in the image below
- Span 1: **45'**
- Span 2: **125'**
- Span 3: 45'

	#	Name	Station	Angle	Span Length	Length	Horizontal O.,
	1	Abutment1	14+18.00	-10°00'00"	0.0000	70.0000	0.0000
	2	Bent2	14+63.00	-10°00'00"	45.0000	70.0000	0.0000
٠	3	Bent3	15+88.00	-10°00'00"	125.0000	70.0000	0.0000
	4	Abutment4	16+33.00	-10°00'00"	45.0000	70.0000	0.0000
							_

• Press **OK** once all changes are completed. Press the right button of the mouse to end the place multi support line tool.



Knowledge Tip: If the support lines need to be modified, press the Modify button of the SupportLine section of the ribbon.



Knowledge Tip: If the user needs to insert a span, this can be done by adding a support line in between the existing supports lines using the **Place > Middle Point** tool from the SupportLine section of the ribbon.



Knowledge Tip: A bridge can also be created with the **Add Multi-Units** button, this will allow the user to place a new bridge and define multiple types of units and spans. This tool merges the **Add Bridge** and **Place Support lines** into one.



- User needs to provide Bridge Description, Bridge Name Prefix, Start Station*
- User needs to know the span lengths, beam types, skew angles.

*The station input does not work. The user will have to eyeball the start station then use the *Move SupportLine* tool to move the bridge to the correct station.

Description	US201 Rombound Natione					
Requires Road Alignment	0					
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E Start Station	10-40.04	Andre Manual 148	Lation .			and the second sec
Feature			(vata)			er interne Creek for
esture Definition	Bulge_decordions	Unit Name	Unit Type	SLLengen	Skew Argre	Spare (L1, r2(0)2, L1 or L1+r2*52+L1)
ane Ports	1/5201_NBML	040	News Step (HS or RC Con.,	20.0	00100-001	40,123,45
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CpenBridge Modeler Here Civil Civil B Civil Explorer Civil	· · · · · · · · · · · · · · · · · · ·	+ X to 1 to and Drawings t import * Bridge Wizard Add Bridge 9	♥ 🚔 ♥ View Collabora (Add Unit & Ø Terral (Asignment ₩ Add 1 Move	fe Help n Multi-Units	wr/\mb-us-p IMPACT1 ⊁ Place * ⊁ Move ₩ Move	OK Cenal

9. Once the **SupportLines** have been placed, the next step is to place the deck.

Note: If multiple units exist in the bridge, the placement of any bridge element can only be

performed on the active unit. The active unit appears with a green icon **P**^{Unit1} in the project explorer.

• Press the **Place Deck** button in the **Superstructure** section.



- In the **Place Deck** dialog box.
 - Template Name: Standard Templates \TxDOT Decks \Bridge Deck [
 - Add Constraints: True
 - Analytical Deck: *True*
 - Deck Material: Tx Deck [
 - Deck Breakbacks: **0 [zero]**
 - Name Prefix: MainDeck-Unit1

Note: Deck breakbacks are only needed for skews greater than 15° and usually the start and end values are set to 2.000.

 Select the first and last SupportLines, a single click per support line. Be sure that the support line gets highlighted. Click one more time to accept and the Variable Constraints window will open.





 Four columns are shown on the left side of the dialog: variable name, active, default, and errors.

Variable	Active	Default	Errors
LT_Slope_Lane1		0.0200	
LT_Width_Lane1		-13.0000	
Rotation By Angle*		00°00'00"	
Rotation By Slope*		0.0000	
RT_Slope_Lane1		-0.0200	
RT_Width_Lane1		13.0000	
Thickness		-0.7083	

- The default column shows the values that were used to create the template, these fields cannot be changed.
- To modify the template, select the variable name, then toggle the active check mark. The right side of the dialog will show a table.

Variables				14+18.00-16+33.0	0 B/d	ge Deck	0.9	pe Lane	1 Defaul	t = 0.0200						
Variable	Active	Default	trees	C Expanded V	ies i	• Grid	Ven									
U.Singe,Level		8.0200														
J_Width_Lane1	102	-13.0000		Add Section N	Mode	Support	tire.		0.0000	* From	Abutment1			+	× Delete	Selected
Rotation By Angle*		00'00'00'														
Rotation By Slope"		0.0000														
RT_Slope_Lane1		-0.0200		Location Dans	Relat	lve .	Sec.	Seat 2		Ind Distance	leterval .	Start	End		Sec. March	
U_Width_Lane1		13.0000		corners the	Local	tion	· · · ·	20011		Cing Cratance	Length	Value	Valu	•		
Inickness		-0.7063														

- To add rows to the table the user needs to press the green plus sign \blacksquare .
- Use the information below to define the following variation constraints.
 - o LT_Width_Lane1: -23 [Start to End]
 - o RT_Slope_Lane1: +2% [0.02][Start to End]
 - o RT_Width_Lane1: +19 [Start to End]

3.000000 Add Section Mode: SupportLine 0.0000 * from Abutment1 * * * * * * * * * * * * * * * * * * *	BRP=	ÐG		BRI_UG1 BRI_BG2	
Rotation By Angle* 00'00'00' RT_Slope_Lane1 0.0000 RT_Slope_Lane1 0.0000 RT_Slope_Lane1 0.0000 RT_Slope_Lane1 0.0000 Rtation By Slope*	U_Width_Lane1	2	-13.0000	Add Section Mode Supportine = 0.0000 * From Abstraev1 = 💠	X Delete Se
Retation By Stope* 0.0000 Copy To Manuble RT_Stope_Lane1 ✓ 0.0000 Retative From Start Distance Interval Start Long th Value Transition RT_Wideh_Lane1 ✓ 0.0000 SupportLine 0.0000 Advamment RF=REAR Interval Start End Value	Rotation By Angle	1	00100.001	And an and a second sec	
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Prockness -0.7083 Suspective 0.0000 Abutment1 14 - 10.00 P1 1000 -20.0000	RT_Width_Lane1	1	13.0000	Location Figure Location From Start Contained Intercontained Length Value Value	
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Click **OK** to apply the changes and close the Variable Constraints window.

Mode: Supp riable Supp Ratic re Relat Static	ortLine ortLine By Span n							
SupportLi	ne Mode us	ses the S	upportLine	selected in	the <i>Froi</i>	n field a	s the sta	art limit, if
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Mode: Supp	ortLine "	30	' From	Abutment1		Ŧ	+	
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Mode: Ra	tio By Span	* 0.3						
			sss ratio o	f Abutment1	- Bent2	Ŧ	+	
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Note: This Beams and Station Me Mode: Stat Note: Any The start a image bell Bent3).	option is r d Cross fra ode uses a tion portion of t and end va ow shows a	not recom ames. station t the deck lues are a slope tr	nmended to o determine 14+33.00 before the the values t ansitioning	f Abutment1 be used fo e where a s starting sta hat the use from -2% to	- Bent2 or decks, ection of ation will er needs o +2% or	this is u the vari the using to provid aly in Spa	the def de. For e an 2 (Be	sed in Il start. <i>Fault value</i> example, th nt2 –
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Note: If a row was added by mistake, simply select the row (highlighted in blue) and press

the **Delete Selected** × Delete Selected . If the deck variables need to be modified, select the

deck and in the properties press the **SELECT to Edit** button [**Constraint** field.

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Name	MainDeck-Unit 1
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State Element Number	12
NBI Element Number	12
Syncld	1cae36c8-8e03-48fa-bba5-0
Feature	*
Feature Definition	Deck
Deck	*
Name	MainDeck-Unit 1
Description	
Template Name	Bridge Deck
Analytical Deck	True
Start Station Offset	0.0000'
End Station Offset	0.0000'
Horizontal Offset	0.0000'
Vertical Offset	0.0000'
Template	SELECT to Edit
Chord Tolerance	0.3281'
Max Dist Between Section	3.2808'
Variable Constraint	SELECT to Edit
Point Control	SELECT to Edit
Top Surface Area	9033.5612 Sq.'

Knowledge Tip: The cross slopes and deck width can also be applied by using the ORD elements such as edge of pavement lines and superelevation shapes when available.

• To apply the cross slope using a superelevation shape, use the **Assign Superelevation** tool.

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5	Pince Field	Galera .	n - 🖍	and a	· Distant	
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• The user will click on the cyan boundary of the superelevation shapes, then reset to accept selection. Once the superelevation shape is selected, the user will need to click on the deck element to apply it and a superelevation table will appear, press OK to accept the changes.

-11.0 1.000 1.000 here 0.07,1 -11.0 0.000 0.000 here 0.07,0	HLUF,A = 9ame - 9.000 0. = 9.010 10. 0.00 0.00 here - 0.07,1 HLUF,A = 9am - 0.001 0. = 9.010 0.00 here - 0.07,1	-			a traite	Oter	Post	-	Set Setor	End Salar	Sel See	Erd State	Store Detail	Tenglate P
-13.00 0.0200 Balan 007_3	(80,007,8) \$4600 0. (14018) \$400.00 0.000 1400 1400 1400 1400 1400 14	10,007,0	J	1 24			0.		16-10.00	10-33.00	0.008	0.0200	Satur	009,1
and a contract of the second se		10,007,7	A	10.04		20.0088	GL	1	14x18.00	16+33.30	0.008	0.0200	Bature	80F.8

• If a warning appears, simply click yes to continue.



• To apply the deck width using point controls, select the deck and in the properties, dialog locate the *Deck* section, in that section find the *Point Control* and press the

button to edit [

Deck	^
Name	Deck
Description	
Template Name	Bridge Deck
Analytical Deck	True
Start Station Offset	0.0000'
End Station Offset	0.0000'
Horizontal Offset	0.0000'
Vertical Offset	0.0000'
Template	SELECT to Edit
Chord Tolerance	0.3281
Max Dist Between Se	3.2808'
Variable Constraint	SELECT to Edit
Point Control	SELECT to Edit
Top Garriago Area	3033.3012.34.

 In the point control dialog, the user can control the different points of the deck with elements created in ORD or using the civil tools in OBM. The points can be control horizontally, vertically, or both. To add a point control, select the direction from the drop-down menu, then click the *Select* button to identify the plan element in the screen. Once identified the plan element name will appear in the Path column.

Port Name	Drection		Path	
CL.	Nore	1		
COP_R	- Hotorital		RdExF_58_12	1
8RLUG2	None	1		1
8PI_UG1	None			
8R_UG	None	4		
807.1	Serve	1		

• When the user finishes making the selection press the *Apply* button to apply all changes and then press *Close* to close the dialog box.

10. After the deck is placed press the right-click button to end the deck placement tool, the next step is to place the beam layout. To do this press in the *Beam Layout* button, and then identify the limits of the deck using the **SupportLines**, like what was done in the step before.



Input the following values into the Beam Layout window:

- Span 1 [Abutment1 Bent2]
 - Number of Beams: 6
 - Edge Distance: **3.000**
 - Equal Edge Distance: *True*
 - Same Beam Start/End Values: False
 - Click Apply.
 - Beam Start SL Offset("): 3.000
 - Beam Start Skew Ends: True
 - Beam End SL Offset("): -3.000
 - Beam End Skew Ends: False
- Span 2 [Bent2 Bent3]
 - Number of Beams: **8**
 - Edge Distance: **3.000**
 - Equal Edge Distance: *True*
 - Same Beam Start/End Values: **False**
 - Click Apply.
 - Beam Start SL Offset("): 3.000
 - Beam Start Skew Ends: False
 - Beam End SL Offset("): -3.000
 - Beam End Skew Ends: False
- Span 3 [Bent3 Abutment4]
 - Number of Beams: 6
 - Edge Distance: **3.000**
 - Equal Edge Distance: True
 - Same Beam Start/End Values: **False**
 - Click Apply.
 - Beam Start SL Offset("): 3.000
 - Beam Start Skew Ends: False
 - Beam End SL Offset("): -3.000
 - Beam End Skew Ends: True
| ipans | | C+ | nais | | | | | | | | | | | | | |
|------------------|-------------------|----|--------------|---------------|-------------|---------------|------------|----------------------|-----------|---------------|-----------|----------------------|-------|---------------|-----------|------------|
| Default Span Abu | utment1 - Bent2 * | | unber Of Bea | ni 6 C | | | | Edge D | () sonate | 3.0000 | Apply | 🗧 Şiqual Edge Distan | ίŧ. | | | |
| Set At To Defau | uit . | | Same Beam | ters End Vela | es 🗉 AA | anced Bearing | Definition | | | | | | | | | |
| Show Overhang | g Lengths () | | | | 86/ | M START | | | 86/ | M END | | 80 | ERENC | t | | |
| Span | Use
Default | | | | | | | | | | | | | | | |
| Abutmant? - Be | | | Beam # Na | ne Boos | g () Method | SLOthet (1 | Skee Ends | Spacing ()
0.0000 | Method | 5L Offset (*) | Skew Ends | Spacing Reference | Beam | Aux Alignment | Use Chord | Beam Lengt |
| Bent2 - Bent3 | | | 1 84 | -1 10000 | Normal | 1,0000 | | 1.0000 | Normal | -1.0000 | | Left Deck Edge | | | | |
| Bent3 - Abutme | entik | | 2 Bei | -2 7,2000 | Normal | 3.0000 | * | 7.2000 | Normal | -3.0000 | | Another Beam | 1 | | × | 44,5000 |
| | | | J Bei | m-3 7.2000 | Normal | 3.0000 | × | 7.2000 | Normal | -3.0000 | | Another Beam | 2 | | * | 44,3000 |
| | | | i lei | -4 7.2000 | Normal | 3.0000 | 8 | 7.2000 | Normal | -3.0000 | | Another Beam | 3 | | * | 44:3000 |
| | | | 5 Ber | m-5 7.2000 | Normal | 3.0000 | 8 | 7.2000 | Normal | -1.0000 | | Another Beam | 4 | | × | 44,5000 |
| | | | i Ber | m-# -3.0000 | Normal | 3.0000 | ~ | -3.0000 | Normal | -3-0000 | | Right Deck Edge | | | 4 | 44,5000 |

• Once completed press *Validate* to verify the input and *Save* to save the beam layout.



Knowledge Tip: If different spans have the same beam layout, you can save time inputting your data with two methods:

1. Define your data for one span, then set it as the Default Span using the drop down on the left of the Beam Layout window. Check on Set All To Default option to apply the default Beam Layout data to any other span with the Use Default option enabled.

Def	fault Span Abutme	nt1 - Bent2	Ŧ							
~	Set All To Default									
	Show Overhang Ler	igths (')								
	Span	Use Default								
>	Abutment1 - Bent2									
	Bent2 - Bent3									
	Bent3 - Abutment4									

2. Define your data for one span, then select all with Ctrl+right click. Copy the data with Ctrl+C, select another span, then paste the data with Ctrl+V.

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Note: If you add additional beams, select the data input box for any column and press Enter to apply that value to all of the rows.

Default Spa	an Abutme	ent1 - Bent2	*		Number Of	Beams	8 🗘		
Set All	To Default				Same Be	eam Start/	End Values	Advance	d Bearing Defini
Show (Overhang Le	ngths (')						BEAM	START
Span		Use							
Abutm	ent1 - Bent2	Default			Beam #	Name	Spacing (') 0.0000	Method Normal *	SL Offset (") 3.0000
> Bent2 -	- Bent3				> 1	Beam-L	3.0000	Normal	3.0000
Bent3	- Abutment4				2	Beam-2	5.1429	Normal	3.0000
					3	Beam-3	5.1429	Normal	3.0000
					4	Beam-4	5.1429	Normal	3.0000
					5	Beam-5	5.1429	Normal	3.0000
					6	Beam-6	5.1429	Normal	0.0000
					7	Beam-7	5.1429	Normal	0.0000
					8	Beam-R	-3.0000	Normal	3.0000
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Note: If the beam layout needs to be modified, select the beam layout and in the properties press the **SELECT to Edit** button [____] next to the **Pattern** field.

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😡 File	*			
🕘 OpenBridge Model	^			
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Bridge(US281_S8ML) **				
> 🖌 Line: S8_US281		Selection		*
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🔺 🗹 🭞 Unit1 :: Beam Slab Concrete-Girder	rs Bridge **	Beam Layout		*
> Secks		Bridge Structure #	15-046-0-0253-03-052	
🖌 🗹 🧮 Beam Layouts		Name	BeamLayout	
🛩 🧮 BeamLayout		Pattern	SELECT to Edit	

Knowledge Tip: For beams that require multiple bearing pads the user will need to define the multiple pads in the **Beam Layout** dialog box.



• The user will need to provide the number of bearing pads required, and the spacing in between their center lines of the pads.

	BEA	RINGS	
Number Required	Spacing (')	Transverse Offset (')	Long Offset (')
1		0.0000	0.0000
1		0.0000	0.0000
1		0.0000	0.0000
1		0.0000	0.0000
1		0.0000	0.0000
1	0.0000	0.0000	0.0000

The user can also match the beam report generated by BGS, the user can change the **Method** to **Along Skew**, and the **Spacing Reference** for the first and last beams will be set to **Alignment**.

 BGS reports the location of the first beam in relation to the alignment along the CL of the bent, regardless of skew. The user can take this value and enter it as a negative if located to the left of the alignment looking upstation or positive if located to the right of the alignment looking upstation to the beam 1 spacing field.

ISTANCE	80	BENT	ND. ST#	1 (N 36 48 TION LINE AND MAN SPAC.	AR. OR BEAM 1	anci r	26.000 L							
shut	1	BCAR	1	(C.L. BENT) 8.000	D 89 4	N 5 5 4		Beam #	Name	Spacing ()	Method	St. Offset (*) 3.0000	Skew Ends	Spacing Reference
		BCAP.	5	8,000	89.4	5 4		<i>\$</i> ;	Beam-L	-26.0000	Along Skew *	3,0000	2	Algement
		BE AM	1	8,000	89 4	5 4			Beam-2	7,2000	Normal	3.0000	×	Another Beam
		1014	4	52,000					Beam-3	7.2900	Normal	3.0000	×	Another Beam

The last beam spacing will be the TOTAL minus the distance to beam 1. (i.e. 32.000 – 26.000 = 6.000) and this will be entered as a negative if located to the left of the alignment looking upstation or positive if located to the right of the alignment looking upstation.

4	Beam-4	7.9013	Normal	3.0000	v	Another Beam
5	Beam-R	6.0000	Along Skew *	3.0000	✓	Alignment

For the rest of the beam spacings, the user can enter the spacings as reported by BGS.
 In OBM it only allows to enter the spacings of the interior beams, with respect to the previous beam, so the last spacing reported in BGS will be omitted.

Beam #	Name	Spacing (*)	Method	SL Offset (*) 3.0000	Skew Ends	Spacing Reference	Beam
t	Beam-L	-26.0000	Along Skew	3.0000	V	Alignment	
2	Beam-2	8.0000	Along Skew	3.0000	~	Another Beam	1
3	Beam-3	8.0000	Along Skew	3.0000	~	Another Beam	2
4	Beam-4	8.0000	Along Skew	3.0000	2	Another Beam	3
	Ream.R	6,0000	Along Gase	8,0000	4	Minnmant	

11. Once the beam layout is placed the next step is to place the beams. Press the **Place Beam** button.



- Custom: True
- Use Beam Rotation: False [Only required for non-plumb beams]
- Click on the beam layout created in the previous step, then one more left click is required to accept the selection.

🋵 Place Beam	- 🗆	×
Default Type		*
Custom		
Orientation		*
Use Beam Rotation		
Build Order		*
Build Order	1	
Feature		*
Feature Definition	Girder	\sim
Name Prefix	Beam Group	
Follow Deck E	dges	*
Follow Left Deck Edge		
Follow Right Deck Ed	ge 🗌	

In the **Beam Definition** dialog box.

- Beam Type: *Custom*
- Haunch Start: 3.5"
- Haunch End: 3.5"
- Start Template: Beams \Standard Sections \TxDOT \Tx Girders \Tx54
- Different End Template: False
- Material: *Tx I-Girder*
- Apply To All Beams: True [Located at bottom left corner of dialog]
- Press the OK button to accept the beam definition.

-	look	1000	
Annual Contractor	Anne fan ganter - Reach Hell () Bane fan ganter - Reach Hell () Bine fan er fan ganter () Bine fan er fan ganter ()	Nation Regil	
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			-
-			
5	* Gamera Dadard		
And Designed			

Note: If the beams need to be modified or reviewed, select the beam group and in the properties press the **SELECT to Edit** button [] next to the **Beam Definition** field.



12. The next step is to place the substructure, we will start with the interior bents and then the abutments. To start press the *Place Pier* button of the **Substructure** section.



- Template Name: MultiColumn\TxDOT\Interior Bent for TxGirder and Similar [___]
- Cap Length Adjustment: **Deck and Aligned**
- Cap Material: **Tx Interior Bent Cap** [
- Column Material: *Tx Column* [
- Footing Material: *Tx Drilled Shaft* [___]
- Name Prefix: **Bent2**
- Select the support line for the interior Bent #2 (be sure it gets highlighted), then reset (right-click) to accept selection. An additional left click is required to accept the elevation constraint selection as "No".

🔏 Place Pier	-		×		
Solid Placement			*		
Template Name	MultiColumn	\Interior E	Ber		
Integral					
Horizontal Offset	0.0000			Build Order	*
Cap Length Adjustment	Deck And A	Vigned	\sim	Pier Cap Build Order	1
Edit Elevation Constraints				Column Build Order	1
Material			*	Footing Build Order	1
Cap Material	Tx Interior B	ent Cap	_	Concrete Pad Build Order	1
Column Material	Tx Column			Pile Build Order	1
Footing Material	Tx Drilled St	naft		Feature	^
Concrete Pad Material				Feature Definition	Abutment_concrete_piles
Pile Material				Name Prefix	Bent2



- This bent does not require additional changes, but if the deck had a crown, we would change the bent cap to match the crown.
- Repeat these steps for the Interior Bent #3, just change the name prefix to reflect the bent number.



Knowledge Tip: Column lengths, drill shaft lengths, footing, ear walls, and footing piles are all controlled in the template's variable constraints. To access the variable constraints, select the bent and open the **Properties** dialog, then select the **SELECT to Edit** [] of **Substructure Template.** The user can also control the column lengths by selecting the **SELECT to Edit** [] of **Elevation Constraints**, in this section the user can also change how the top slope of the cap is drawn: level, parallel to the deck, or crowned.

One important thing to mention is that the column spacing is calculated from the nearest column when the **Auto Spacing** option is selected in the template, this works fine for 3 columns, but for anything greater than 3 columns it is recommended to manually enter the spacings in inches.

13. The next step is to add the abutments, to start press on the **Place Abutment** button of the

Substructure section.



- Template Name: PileCap\TxDOT\Abut for TxGirders and similar with DS up to 15 deg skew /
- Apply Skew To Solids: True
- Conform BackWall With Deck Top: True
- Edit Elevation Constraints: False
- Orientation: Start
- Cap Length Adjustment: **Deck and Aligned**
- Cap Material: **Tx Abutment** [
- Pile Material: *Tx Drilled Shaft [*____]
- Name Prefix: **Abutment1**
- Select the first support line (be sure it gets highlighted), then reset (right click) to accept selection. An additional left click is required to accept the elevation constraint selection as "No".

R Place Abutment	R (0) 3	×				
Solid Placement		*				
Template Name	PleCap Abut for TxGed	-				
Integral						
Horizontal Offset	0.0000					
Longitudinal Offset	0.0000					
Apply Skew To Solids						
Conform BackIviall Ivith Deck Top			Build Order			^
Edit Bevation Constraints			Pier Cap Build Order		1	
Ovientation	Start.	÷	Column Build Order		1	
Cap Length Adjustment	Deck And Aligned	v	Footing Build Order		1	
Haterial		^	Concrete Pad Build O	rder	1	
Cap Material	Tx Abutment	-	Pile Build Order		1	
Column Material	1.00	-				
Footing Material		-	Feature			^
Concrete Pad Material		-	Feature Definition		Abutment_concrete_pile	~
Pile Material	Tx Driled Shaft		Name Prefix		Abutment1	

• Once the abutment is placed select the abutment, and in the properties press the **SELECT**

to Edit [] in the Substructure Template field.

- Back Wall Depth: 70" [Bearing Seat (1.25") +Pad (2.75") +Beam (54") + Haunch (3.5") +Deck (8.5")]
- Back Wall Vertical Offset: 70"

Ca	p Cheek Walls Piles	
*		
>	SupportLine Alignment	Abutment Cent
	Cap Length (')	26.0000
	Pile Cap Depth (")	30.0000
	Pile Cap Width (")	42.0000
	Back Wall Depth (")	70.0000
	Back Wall Width (")	12.0000
	Back Wall Horizontal Offset (")	9.0000
	Back Wall Vertical Offset (")	70.0000

• In the **Piles** tab press the **Pattern Layout** and change the number of columns to **4**, then press the **Generate Piles**, then press **OK** to accept the change.



• Press **OK** again to accept all changes to the Abutment 1.

Knowledge Tip: The drilled shaft spacings are calculated based on the abutment length, when the abutment is placed on a skew, it is recommended to enter the correct abutment length to see the drilled shaft spacings in the **Pile Layout** dialog box. In addition, when the tip elevations are different per drilled shaft the user needs to toggle the **Manual** checkmark to enter the pile length of the individual piles. The Longitudinal and Transverse angles are used when the piles are battered, and the angles can be changed from degrees to ratio by changing the **Angle Display** option.

Back to the properties section, account for an approach slab atop the abutment backwall by changing the BackWall Vertical Offset From Deck Top to -..13 (13") or -1.08333'.
 Note: [dot dot is a shortcut to the sub units in this case inches]

Substructure Placement Rule	
Elevation Constraints	SELECT to Edit
Substructure Template	SELECT to Edit
Apply Skew To Solids	True
Sonform Baskh fall h fill Bask Top	-
BackWall Vertical Offset From Deck Top	-1.0833'
hibord	E diama
Horizontal Offset	-2.0308'
Longitudinal Offset	0.0000'
Cap Length Adjustment	Deck And Aligne

Note: Similar as all previous bridge elements if things need to be changed the user can access all geometry and elevation constraints via the properties dialog box.

14. Next, we will place the abutment 1 wingwalls using the Place Wingwall button from the

Substructure section.



- Place Left Wingwall: True
- Template Name: Wingwall \TxDOT \ Wingwall with Cap and DS [___]
- Orientation: *Normal/Skewed*
- Vertical Offset: ..70 [70" = 5.8333']
- Align with Abutment: **False**
- Transverse Offset: 0.7500
- Align with FFBW: *True*
- Parallel to Alignment: *True*
- Use Slope from Profile: False
- Place Right Wingwall: True
- Vertical Offset: ...78.5 [78.5" = 6.5417']
- Align with Abutment: False
- Transverse Offset: 0.2700
- Align with FFBW: *True*
- Parallel to Alignment: *True*
- Use Slope from Profile: False
- Wingwall Material: *Tx Abutment [*___]
- Footing Material: *Tx Abutment* [
- Pile Material: *Tx Drilled Shaft* []
- Name Prefix: *Abut1-Wingwall1*

Left Wingwall Pla	cement 🔺	Right Wingwall P	lacement 🔺	Material	*
Place Left Wingwall	\checkmark	Place Right Wingwall		Wingwall Material	Tx Abutment
Template Name	StandardWingWall\Wir	Template Name	StandardWingWall\Wir	Footing Material	Tx Abutment
Orientation	Normal/Skewed 🗸	Orientation	Normal/Skewed 🗸	Pile Material	Tx Drilled Shaft
Vertical Offset	5.8333	Vertical Offset	6.5417	Build Order	
Align With Abutment		Align With Abutment			**
Transverse Offset	0.7500	Transverse Offset	0.2700	Wingwall Build Order	1
Align With FFBW	\checkmark	Align With FFBW		Footing Build Order	1
Parallel To Alignment	\checkmark	Parallel To Alignment		Pile Build Order	1
Use Slope From Profile		Use Slope From Profile		Feature	*
Adjust Height to Backwall		Adjust Height to Backwall		Feature Definition	Wingwall_concrete_pile
Compute Length		Compute Length		Name Prefix	Abut 1-Wingwall 1

• Select Abutment 1, left click to accept and place, then right click to end operation/reset.

Once the wingwall is placed select the wingwall, and in the properties press the SELECT to

Edit [] in the **Wingwall Template** field.

•

In the Wingwall tab change the *Height* to *5.8333 or ... 70"* and the *Length* to *18* [3 * 5.8333]



• In the **Footing** tab change the **Footing Length** to **18**.

Wingwall Footings	
Default Footing Definition	
Footing Type: Rectangular Isolated	•
*	
Footing Length (')	18.0000
Footing Height (")	30.0000
Footing Width (')	2.0000

Note: The wingwall and footing get clipped automatically to avoid overlapping with the abutment.

 In the Piles tab press the Pattern Layout and change the Left Margin to 162 [18 x 12 x 0.75] and the Right Margin to 54 [18 x 12 x 0.25], then press the Generate Piles, then press OK to accept the change.



- Press **OK** to accept all changes to the wingwall.
- Repeat the steps on the other wingwall.

Knowledge Tip: Like the abutment pile layout, the piles for the wingwall can be controlled individually when the **Manual** checkmark is enabled. Everything else works the same way as in the pile layout dialog of the abutments.

 Back to the properties section, adjust the *Transverse Offset* to a value to aligns the wingwall closer to the edge of the abutment.

Note: This offset is often miscalculated in abutments with a skew, so adjustment is required.



- Once done making the adjustments to the first wingwall repeat the steps on the second wingwall. Some adjustment will be required with the offset values.
- 15. For abutment 4 we will use a parametric cell to illustrate the differences between using a template vs a parametric cell. To start press the *Place Custom Abutment* button in the **Substructure** section.



- Cell: Abut for TxGirders and Similar with DS []
- Active Angle: -00°00'00.00001" [This slight angle defines which direction the abutment is pointing for the start or end of the bridge, Positive (+) Start, Negative (-) End]
- Cap Length Adjustment: Aligned
- Ignore Support Line Skew: *True*
- Cap Material: *Tx Abutment [*___]
- Footing Material: *Tx Footings* []
- Pile Material: Tx Drilled Shaft []
- Name Prefix: Abutment4

🔏 Place Custom Abut	. – 🗆 ×	Material	*
Solid Placement	^	Cap Material	Tx Abutment
Cell	Abut for TxGirders and $1 \dots$	Footing Material	Tx Footings
Туре	Parametric	Pile Material	Tx Drilled Shaft
Active Angle	-00°00'00''		
X-Scale	1.0000	Build Order	*
Y-Scale	1.0000	Pier Cap Build Order	1
Z-Scale	1.0000	Column Build Order	1
Horizontal Offset	0.0000	Footing Build Order	1
Vertical Offset	0.0000	Pile Build Order	1
SupportLine Offset	0.0000		
Cap Length Adjustment	Aligned 🗸	Feature	*
Ignore Support Line Skew	\checkmark	Feature Definition	Abutment_concrete_piles
Analytical Properties		Name Prefix	Abutment4

- Select the support line for Abutment #4, then press once again anywhere to accept the selection and place the abutment.
- Now that the parametric cell is placed, we will adjust the geometry of the custom abutment to fit the bridge. Select the abutment, then navigate to **Selection** in the OpenBridge Model hierarchy.
 - 🔺 🗹 😴 Supports
 - 👂 🗹 😴 Pier1
 - ک 🖌 🗹 Pier2
 - 🔺 🗹 🧊 C Abutment 4
 - 🔺 🖌 😴 Custom
 - ▲ 🗹 😼 1
- Locate the **Variables** section in the properties and modify them.
 - Skew Angle: -10
 - Left Cross Slope (%): -1.5894 [using analyze point to find elevations at CL and Edge of Deck {(1167.54-1167.18)/(23*Cos(10))}*100]
 - Right Cross Slope (%): **1.5894**
 - Roadway Width: **40**
 - o Backwall Height: 5.0074 or ..60.0888
 - Abut DS Overhang: 3'
 - Abut DS Qty: 4
 - Wingwall Length: 18
 - All other variables should remain unchanged.

Variables		*
Skew Angle	-10°00'00.00"	
Left Cross Slop	-1.5894	
Right Cross Sk	1.5894	
Roadway Width	40.0000'	
Abutment Cap I	2.5000'	
Abutment Cap \	3.5000'	
Backwall Heigh	5.0074'	
Backwall Thick	1.0000'	
Abut DS Overh	3.0000'	
Abut DS Diame	3.0000'	
Abut DS Length	15.0000'	
Abut DS Qty	4	
Approach Slab	True	
Approach Slab	1.0833'	
Wingwall Lengt	18.0000'	
Wingwall Width	1.0000'	
Wingwall Cap V	2.0000'	
Wingwall DS Di	1.5000'	
Wingwall DS Le	15.0000'	
Cantilevered W	False	
Wingwall DS Q	1	

Note: Allow a few seconds to let the parametric cells take the new changes before making another variable change. Left and Right are in relation to the front face of backwall, not the alignment.

Note: If the abutment appears in the wrong direction, navigate to the custom abutment in the hierarchy of the explorer, and then go to the **Rule Property** section in the properties dialog box. Adjust the following values.

- ✓ S[®] Supports
 ▷ ✓ J C Abutment4
 - Active Angle: **180** [if necessary to correct the longitudinal abutment orientation]
- 16. Once the parametric cell is place, we will proceed to add the bearing pads and bearing seats. We will do this using the *Place Bearing* tool from the **Substructure** section.



- The information used for the bearing pad and bearing seats comes from a combination of the standard drawings IGEB [Table of Bearing Pad Dimensions] and BIG-40 [Bearing Seat Details].
 - Bearing Type: *Cube*
 - Cube Width, W: 1.75 [21"]
 - Cube Depth, D: 0.666 [8"]
 - Cube Height: 0.2292 [2.75"]
 - Orientation: *Girder*
 - Has Pad or Plate: *False*
 - Has Bearing Seats: *True*
 - Seat Min. Thickness: 0.095 [1.15" Min thickness is measured at the edge of seat]
 - Seat D1: 0.75 [fwd dimension from bearing line to edge of cap]

- Seat D2: 1 [bk dimension from bearing line to cap cl]
- Seat W1: 1.5 [half bearing seat width]
- Seat W2: 1.5 [half bearing seat width]
- Seat Orientation: *Girder*
- Back Offset: -1.000 [-1 x Cos (Bent Angle) for Interior Bents] (0 for start abutment)
- Ahead Offset: **1.000 [1 x Cos (Bent Angle) for Interior Bents] (0 for end** *abutment)*

Note: These are set both to 0 when a single seat and pad is required on the support, like is needed for continuous steel beams.

- Pad or Plate Material: *Miscellaneous > Neoprene Bearing Pads [___]*
- Bearing Seat Material: Tx Bearing Seat [



• Once all settings have been defined the user can select all the support lines to which the settings entered apply. Press the right mouse button then the left mouse button to finish placement.

Note: The Back and Ahead offsets are different for Abutments and Bents, see the applicable Elastomeric Bearing standard for additional information.

17. Once all the abutments, bearing pads and bearing seats are in place the next step is to place the approach slabs. We will do this using the tools in the **Approach Slab** section.



- Using the *Place Approach Ref Line* tool, we will place the reference line that indicates the end of the approach slab on both ends of the bridge. Before starting this command make sure Accu-draw is activated.
 - Skew Angle: 0
 - Length: **100**
 - Location: Start

 First, click the Place Approach Ref Line tool and then hover the mouse over the snap intersection point of the inside of the wingwall and the SupportLine1 at the start of the bridge.



Next press the O (letter) key on the keyboard to set the origin for Accu-draw. Then press R and then E. Then click a point further along the wingwall to set the angle of the Accu-draw.



 Finally, Type in -20 for the Y value in the Accu-draw menu. This is the required distance for the shorter end of a skewed approach slab per TxDOT Standards. Next click in the window three times, once to confirm the 20' offset, once to place it, once to confirm the 100' length of the Approach Reference Line.



- Use the **Place Approach Slab** tool to place the approach slab element between the abutment support line and approach slab reference line.
 - Location: Start
 - Template Name: Standard Templates \TxDOT Decks \Approach Slab [-]
 - Add Constraints: *True*
 - Sleeper Slab: False
 - Approach Slab Material Name: Tx Approach Slab

Optional

- If the approach slab is placed on top of the wingwalls, the user can enable the option
 Sync with Deck and the approach slab will match the width of the deck and the breakbacks if any.
- Press anywhere in the screen to accept all inputs and to place the approach slab.

Approach Slab	*
Location	Start 🗸
Sync With Deck	
Template Name	Approach Slab
Start Station Offset	0.0000
End Station Offset	0.0000
Horizontal Offset	0.0000
Start Vertical Offset	0.0000
End Vertical Offset	0.0000
Add Constraints	
Chord Tolerance	0.1000
Max Dist Between Sections	3.2808
Sleeper Slab	
Approach Slab Breakba	cks 👻
Material	*
Approach Slab Material Name	Tx Approach Slab

- In the **Variable Constraint** dialog box, change the Left and Right widths as indicated below:
 - LT_Width_Lane1: Start = -22; End = -22
 - RT_Width_Lane1: Start = 18; End = 18
 - RT_Slope_Lane1: Start = 0.02; End = 0.02

Variable	Active	Default	Errors	C Expanded V		d View						
LT_Singe_Lane1		0.0200										
17, Wilden, Lane I	2	12.0000		Add Section N	Ander Supp	ortLine + 0.000	From	Approach Reference	a line 👘	+	X Delete 5	elected
Rotation By Angle*	100	00100.001										
Rotation By Slope*		0.0000		Copy To Variab	sle							
RT_Slope_Late1		-8.0290		Inclusion Dates	Relative	too .	Start The Second	End Printeres	Interval	Start	End	Provide and
RT_Width_Lane1	2	12.0000		rocation type	Location	From	Start Distance	The Destance	Length	Value	Value	Transcope
Thickness		+1.0633		* Supportine	0.0000	Approach Reference Line	12+31:04	14+10.00	Distant	-22.0000	-22.0000	Linear

variable in	Active	Default	Errors	C Expanded V	en . 66	d View						
LT_Slope_Lane1		0.0200										
U,Width_Lane1 9	4	-12.0000		Add Section N	lode: Supp	ortLine = 0.0000	· From J	lpproach Referenc	e Line -	+	× Delete 1	idented :
Rotation By Angle"		00'00'00"										
Rotation By Slope"		0.0000		Copy To Varial	Se .							
RT_Slope_Lave1		-0.0200		Investion Deser	Relative	loom.	Start Distance	East Distance	Interval	Start	End	Same
KT_Webs_Lane1	*	12.0000		cocación rype	Location		Josef Londonce	End Granasce	Length	Value	Value	
Thickness 1	13	-1.0833	-	Supportune	0.0000	Approach Reference Line	11+11.04	38+18.00	24,0101	18.0000	18.0000	Linear

Variable	Active	Default	Errors	Expanded Vi	ew # 0n	d View						
LT_Slope_Lane1		0.0200										
UT_Width_Lane1	8	-12.0000		Add Section N	lode: Suppr	ortline * 0.000	0 From	Approach Reference	e Line 👘 👘	+	X Delete	Selected :
Rotation By Angle*		00'00'00'		-								
Rotation By Slope*		0.0000		Copy To Variab	let -							
RT_Stope_Lave1		-0.0200		Location Tons	Relative	from	Start Distance	East Distance	Interval	Start	Ind	Translation
RT_Width_Lane1	*	12,0000	1	corner tibe	Location		poer i presidence	Con concesso	Length	Value	Value	
Dickness		-1.0833		D Supportine	6.0000	Approach Reference Line	12+12:04	14+15.00	24.0147	0.0290	0.0200	Linear

- Press **OK** to accept all changes.
- **Note:** Users can adjust the Cross Section Distance value with the slide bar at the bottom of the window. Shown below.

- Use the **Place Sleeper Slab** to place the sleeper slab under the approach slab.
 - Place Start Sleeper Slab: True
 - Template Name: *Sleeper Slab* *TxDOT* \ *5 Foot Sleeper [*]
 - Conform with Approach Bottom: *True*
 - Sleeper Length Adjustment: *Approach Slab and Aligned*
 - Place End Sleeper Slab: False
 - Material Name: *Tx Sleeper Slab*
 - Click anywhere in the screen to accept settings, and then press again to place sleeper slab.

C Place Sleeper Slab	- 🗆	×	Placement of End Sleeper	Slab	*
Placement of Start Sleeper S	Slab	*	Place End Sleeper Slab		
Place Start Sleeper Slab			Vertical Offset From Slab Bottom	0.0000	
Template Name	5 Foot Sleeper		Material		*
Horizontal Offset	0.0000		Material Name	Tx Sleeper Slab	
Longitudinal Offset	0.0000				
Conform Back Wall With Approach Top			Build Order		^
Conform With Approach Bottom			Build Order	1	
Edit Elevation Constraints			Feature		*
Sleeper Length Adjustment	Approach Slab and Aligned	~	Feature Definition	Sleeper Slab	\sim
Apply Skew To Solids			Name Prefix	Sleeper Slab	

18. Repeat all steps in step 17 to place the approach slab at the end of the bridge. The approach reference line and the approach slab will both need **End** instead of **Start** in the settings boxes to be properly placed. Also, -20' offset will be positive 20' at the end of the bridge.

19. Once the approach slabs are completed, it is time to place the needed traffic barriers. We will use the **Place Barrier** button from the **Accessory** section.

- In the dialog box
 - Template Name: Barriers \TxDOT _Rails with Solid Walls \SSTR_R [
 - Barrier Material: *Miscellaneous > Traffic Barrier [*]
 - Pay Unit: *Linear Unit*
- **Left** click on the main slab to select the deck to place the barrier, then **Right** click anywhere in the model to complete the selection, finally **Left** click to accept placement.
- In the **Path Selection** dialog box, press the **Select Guideline from List** button.
- Select the **EOP_R** from the list as the placement guide for the barrier.
- Press **OK** to accept path, then press **OK** again to finish placement.

- Repeat steps for the left side and on the other slabs using the appropriate barrier template.
 For approach slabs a *Horizontal Offset* of -1 or 1 is required if the approach slab is inside the wingwalls.
- Multiple slabs within the same unit can be selected, for example the user can select the 2 approach slabs to place the left or right barriers at the same time.
- 20. This concludes the creation of the Southbound bridge model with a concrete superstructure.

Some final notes:

Build Order: This variable appears on all elements placed and is used for RM Bridge to create the construction stages when the engineer plans on doing the analysis of the bridge there. There is no other purpose for it in OBM, so no Build Order values were adjusted during the previous steps of this training manual.

Materials: Like *Build Order*, the material is used when the engineer is planning to transfer the model to RM for analysis. In addition, the material is used to define the unit of measure for an element and

the cost per unit of measure. When using OBM to generate reports, it is important to set the correct material to every element. More about the material creation will be covered in the libraries section of this manual.

Labels: All text labels are controlled by the annotation scale used, the annotation scale can be changed in the *Reports and Drawings* tab.

Exercise **#1** - Create the Bridge model for the Northbound Main lanes.

Save a copy of the file used up to this stage. This is done by navigating to **File > Save As**, select **No Wizard** then provide the following information.

- Name: *Exercise_01.dgn*.
- Description: **Precast Concrete Exercise #1**

Using the acquired knowledge so far create the model for the Northbound Main Lanes bridge in the new file using the following information.

- Bridge Name: **US281 Northbound Mainlane**
- Bridge Type: Beam Slab (P/S or RC Concrete Girders)
- NBI: **15-046-0-0253-03-053**
- Start Station: **14+35.06**
- End Station: **16+50.06**
- 3 Spans: **45 125 45**
- Left Width: -19
- Right Width: 23
- Left Cross Slope: -0.02
- Right Cross Slope: -0.02
- All other information is the same as the Southbound bridge.
- Once the exercise is complete return to the **Bridge_Model_01.dgn** file to continue training.

Note: It is optional to use the Edge of pavements provided and the superelevation shapes provided. Also, it is optional to use parametric cells for the abutments.

This concludes the creation of the concrete girder bridge models.

Create a Bridge with Steel Superstructure

This section will focus on the steel part of OBM, all other elements are the same as the previous section. Steps that are repeated such as the Add Bridge, Support Lines, Supports, Bearing seats, Wingwalls, etc. will not be covered in depth as it was done before, only the required information for the tool is provided in each step.

- 1. Continuing in the *Bridge_Model_01.dgn* file.
- 2. Create a new bridge with the following information.
 - Bridge Name: **US281 Northbound Mainlane**
 - NBI: 15-046-0-0253-03-053
 - Requires Road Alignment: False
 - Use Road Alignment For Stationing: False
 - Unit Name: Unit 1
 - Description: 215.00' Steel Beam Unit (45'-125'-45')
 - Bridge Type: Beam Slab (Steel Girders)
 - Name Prefix: **US281_NBML**
 - Select the Northbound alignment.
- 3. Place the support lines with the following information.
 - Skew Angle: -10°00'00"
 - Length: **70**
 - Start Station: **14+35.06**
 - End Station: 16+50.06
 - Number of Support Lines: 4
 - 3 Spans: 45' 125' 45'
- 4. Place the deck with the following information.
 - Template Name: Standard Templates \TxDOT Decks \Bridge Deck []
 - Add Constraints: False
 - Analytical Deck: *True*
 - Deck Material: **Tx Deck [**]
 - Deck Breakbacks: **0 [zero]**
 - Name Prefix: MainDeck-Unit1
 - Left Width: -19
 - Right Width: 23
 - Left Cross Slope: -0.02
 - Right Cross Slope: -0.02

Hint: Use the superelevation shapes and edge of pavement lines. Refer to Knowledge Tip on page 33.

- 5. Place the beam layout with the following information.
 - Left Overhang: 3.0'
 - Right Overhang: -3.0'
 - Number of Beams Span 1 and Span 3: 6
 - Number of Beams Span 2: 5
 - BEAM START SL Offset: 3"
 - BEAM END SL Offset: -3"
 - Skew Ends: Only Beam Start at Abutment and Beam End at Abutment
- 6. Place the beams on the beam layout using the following information.
 - Built-Up: *False*
 - Start Cut Orientation: Vertical
 - End Cut Orientation: Vertical
 - Name Prefix: *SteelBeams*

🔏 Place Bea	- 🗆	×
Default Type		*
Built-Up		
Orientation		*
Start Cut Orientation	Vertical	\sim
End Cut Orientation	Vertical	\sim
Build Order		*
Build Order	1	
Feature		*
Feature Definition	Girder	\checkmark
Name Prefix	SteelBeams	

- For Span 1 and Span3 we will use the same type of beam and same haunch.
 - Beam Template: Rolled Shapes \AISC14-W \W40X149
 - o Beam Min Haunch: 2.05"
 - Material: Rolled Wide Flange Sections
 - Setup the first beam of the first span.

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• Use the **Beam Copy** tool [Beam Copy] to copy the beam to the rest of the span and Span 3.

Nove Left Supe 1	Ides Middle Same
D 🔀 Abutt - Bert2	
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[2] Seam-R	

T Place Beam

- Continuing in the **Beam Definition** dialog box, select the first beam of Span 2.
 - Beam Type: Built-Up
 - Section: *Top Flange*
 - Beam Min Haunch: 2.0"
 - We will add 3 Rows
 - Row 1:
 - Location Type: Head
 - Relative Location: 0
 - Thickness: 0.75"
 - Start Width: 14"
 - Variation: None
 - Material: Straight Plate Girders
 - Row 2:
 - Location Type: *Head*
 - Relative Location: 24.75'
 - Thickness: 1"
 - Start Width: 14"
 - Variation: None
 - Material: Straight Plate Girders
 - Row 3:
 - Location Type: Tail
 - Relative Location: -24.75
 - Thickness: 0.75"
 - Start Width: 14"
 - Variation: None
 - Material: Straight Plate Girders

Beam Type Bai	n-Cy		Section (B)	p Flange	1.0	are Minimur	Naunch ()	2.0000									
+ + + ×	Delete 💉	Delete I	4 10	t ib tear	Capy												
Location Type	Relative Location	from	Start Location (7)	End Location C	Start Distance C)	Section Length	Thickness (*)	Start Width (*)	Variation	End Width (*)	Haunch Left Extension (*)	Haunch Right Extension	Haunch Left Edge Type	Haunch Right Edge Type	Fallen Deck Edge	Deck Edge Vertical Other C	Material
Head	0.0000		54-7238	13+0124	0.0000	24/300	0.7500	14.0000	Nore		0.0000	0.0000	Normal	Normal			Straight plate girders
Head	24,7500		15+02.28	13+7128	247528	15,0400	1.0000	14.0000	None		0.0000	0.0000	Normal	Normal			Straight plate girders
54	-24.7900		13+17,18	10-0138	84.75.25	34,7900	0.7900	14.0000	Nore		0.0000	0.0000	Normal	Normal			Straight plate pides.

- Select all rows in the table created using *CTRL+A* in your keyboard and copy the table using *CTRL+C*, then change the **Section** to **Bottom Flange**.
- Select the first row and paste the table using **CTRL+V**.

Beam Type	Bui	t-Up		Section 8	lottom Flange		Beam Minimur	m Haunch (")	2.0000			
+ Add	×	Delete	× Delete /	ui 🕹 sa	art 🕤 Bean	n Copy						
Locatio Type	m	Relative	From	Start Location (')	End Location (')	Start Distance	Section Length	Thickness (*)	Start Width (*)	Variation	End Width (")	Material
> Head		0.0000		14+77,49	15+02.24	0.0000	24.7500	0.7500	14.0000	None	10.000	Straight plate girders
Head		24.7500		15+02.24	15+77.24	24.7500	75.0000	1.0000	14.0000	None	14.0000	Straight plate girders
Tail		-24.7500		15+77.24	16+01.99	99.7500	24,7500	0.7500	14.0000	None		Straight plate girders

• After pasting the table, update the Material to be Straight Plate Girders.

- Once the rows get updated, change the Section to Web and create 5 total rows using the Add button.
 - Row 1:
 - Location Type: Head
 - Relative Location: **0**
 - Thickness: 1"
 - Start Height: 36.7"
 - Variation: None
 - Material: *Straight Plate Girders*
 - \circ Row 2:
 - Location Type: *Head*
 - Relative Location: 4.75
 - Thickness: 1"
 - Start Height: 36.7"
 - Variation: *Linear*
 - End Height: 54"
 - Material: Straight Plate Girders
 - Row 3:
 - Location Type: *Head*
 - Relative Location: 9.75
 - Thickness: 1"
 - Start Height: 54"
 - Variation: None
 - Material: Straight Plate Girders
 - Row 4:
 - Location Type: Tail
 - Relative Location: -9.75
 - Thickness: 1"
 - Start Height: 54"
 - Variation: *Linear*
 - End Height: 36.7"
 - Material: Straight Plate Girders
 - Row 5:
 - Location Type: Tail
 - Relative Location: -4.75
 - Thickness: 1"
 - Start Height: 36.7"
 - Variation: None
 - Material: Straight Plate Girders
 - To see the profile of the beam, press on the up arrow next to **Drawing Disabled**.

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Use the *Beam Copy* tool [^C Beam Copy] to copy the beam to the rest of the span.
 Select the spans or beams in the dialog box and press the *Copy By Ratio* button.

• Once all the beams have been defined, press the **OK** button to accept the beam definition.

Knowledge Tip: OBM also supports cover plates for top and bottom for I-Beams. In addition, OBM can also model Tub Girders. The same process used in the Built-Up girder in the previous section is used to built-up the tub girder. *In tub girder the haunch is individually controlled at each top flange.* Min. Haunch ("): 4.0000 Left Right Common hearsth thickness -Specify chanter S 1.1 . 1 2 Left Extension ("): 0.0000 Left Extension ("): 0.0000 Right Extension ("): 0.0000 Right Extension ("): 0.0000 Right distance in fange edge Left Edge Type: Normal + Left Edge Type: Normal Right Edge Type: Normal * Right Edge Type: No Follow Deck Edge Deck Edge Vertical Offset (Tt In tub girders the input is limited for Web, Top, and Bottom flanges. Bentley has not yet developed close plates, or internal diaphragms. faurch Members Anther Webs + Suggested Bottom Offset for selected row web alignment is 1 ion Mode Head * 1712-13, 🕂 Add 🗙 Delete Selected 💒 Delete All 🌆 Beam Copy Syme Relative from Out Location Ind Location Distance Length Thickness Start End Height Variation Height Mar · Drawings Cross Section Dist. 6.0000 2- 2- 1 2+ 2+ A 4 - 2 8 B 2 1 1 1 A 4 - 97 (0) H 11

 Once the beams are in place, we will be adding stiffeners using the *Place Stiffeners* tool from the Superstructure section.

Note: The **Place Stiffeners** tool is used to place stiffeners that are not accompanied by a cross frame, or additional stiffeners at cross frame locations.

- Select the beam group placed in the previous step. And click anywhere in the model to accept the selection.
- The **Place Stiffeners** dialog box will open, then there are several tools in this dialog as described below.
 - **Add** This tool will add single row to the table.
 - **Insert** This tool will insert a single row to the table in between existing rows.

- **Delete** This tool deletes the selected row.
- **Delete All** This tool will delete all rows.
- *Wizard* This tool creates multiple rows for stiffeners equally spaced.
- **Copy** Copies all the stiffeners defined in the beam to another beam.
- Using the **Wizard** place 3 equally spaced stiffeners on Span 1 and Span 3.
 - Number of Stiffeners: **3**
 - Stiffener: TxDOT Brng 16" ¾ x 7.5"
 - Side of Web: **Both**
 - o Start
 - Beam Start: True
 - Offset: 0.5
 - o End
 - Beam End: True
 - Offset: 0.5

Number Of Stiffeners	3 ‡ ate	qual spacing	
Stiffener	Side Of Web	Location Type	Align
TxDOT Brng 16" 3 🕤	Both	Absolute ~	Vertical ~
Start		End	
 Beam Start 		Beam End	
Cross-Frame	1 ~	Cross-Frame	1 ~
Offset ('):	0.5000	Offset ('):	0.5000

- Press the *Generate* button to create the stiffener rows, and then press *Close* to close the wizard.
- Use the *Copy* tool to copy the stiffeners to all beams in Span 1 and Span 3. Select the spans or beams in the dialog box and press the *Copy By Ratio* button.

Copy Stilleners		- u x
Select All	Select None	
D 🛃 Abut1 - Bent2		
Beam-L		
R Beam-2		
Beam-3		
Beam-4		
Beam-5		
Beam-R		
B Bent2 - Bent3		
E 🛃 Bent3 - Abut4		
P Beam-L		
Beam-2		
Beam-3		
C Beam-4		
Beam-5		
Beam-R		
10000 C 100		
	Copy	Copy By Ratio

- Select the first beam on Span 2, and using the *Wizard* add 5 stiffeners.
 - Number of Stiffeners: **5**
 - Stiffener: 6 x 0.5
 - Side of Web: **Both**
 - o Start
 - Beam Start: True
 - Offset: 10
 - o End
 - Beam End: True
 - Offset: 10

Number Of Stiffeners	51.	t equal spacing		
Stiffener	Side Of Web	Location Type	Align	
6x05 *	Both	* Absolute	- Vertical	
Start		End		
Eearn Start		* Deard	ind	
Cos-frame		Cross-F	fame	
Offset ():	10.0000	Offset ():	10.0000	

- Press the *Generate* button to create the stiffener rows, and then press *Close* to close the wizard.
- Using the *Add* and *Insert* tools, add single stiffeners at the start and at the end of the beam.
 - Select the first row and press *Insert* two times.
 - Modify the first two rows as follows.
 - Start Location or Ratio: 4'
 - Side Of Web: One Left and One Right
 - Stiffener: *TxDOT Brng 16" ¾ x 7.5"*
 - Select the last row and press *Add* two times.
 - Modify the last two rows as follows.
 - Start Location or Ratio: 120'
 - Side Of Web: One Left and One Right
 - Stiffener: TxDOT Brng 16" 3/4 x 7.5"

to and the second s	Columb.								
pravna	Letters								
3 SupportLine1 - SupportLine2	+ Add	+ Inset	t 🗙 Delete 🖌	Celete All	A Ward	Copy			
 SupportLine2 - SupportLine3 		Incode a Name	Barthandra and all a	ELA CALINA	Photos Trees Tree (7)		and the second se	Distance From Bulleton (7)	Cores Barrow
Beart-L		Location type	Start cocation of natio ()	SHORE OF MICO	unitance more top ()	ringe	Summer	Destance from Bottom ()	Cross Frank
Seam-2	1	Absolute	4.0000	Left	0.0000	Vertical	5007 Brig 16" 3/4 x 7.5	0.0000	
face 1	2	Absolute	4.0000	Right	0.0000	Ventical	1x007 8mg 16" 3/4 x 7.5	0.0000	
00000	0	Absolute	27,4167	Left	0.0000	Vertical	640.5	0.0000	
Stan-4	4	Absolute	27.4167	Right	0.0000	Vertical	643	0.0000	
- Bears A	5	Absolute	44,8333	Left	0.0000	Vertical	640.5	0.0000	
> Supportine3 - Supportine4		Absolute	44,8333	Right	0.0000	Vertical	6x0.5	0.0000	
	7	Absolute	62,2500	Left	0.0000	Vertical	6x0.5	0.0000	
		Absolute	62.2500	Right	0.0000	Vertical	6x0.5	0.0000	
		Absolute	79.6667	Left	0.0000	Vertical	640.5	0.0000	
	10	Absolute	79.6667	Right	0.0000	Vertical	640.5	0.0000	
	22	Absolute	97.0833	Left	0.0000	Vertical	643	0.0000	
	52	Absolute	97.0833	Right	0.0000	Vertical	640.5	0.0000	
	13	Absolute	120.0000	Lett	0.0000	Vertical	5007 Brig 16' 3/4 x 7.5	0.0000	
	2 14	Abushate	120,0000	Right	0.0000	Vertical	5001 Brig 16" 54 x 7.5	0.0000	

Once all stiffeners have been added use the *Copy* tool to copy the stiffeners to all beams in span 2. Select the spans or beams in the dialog box and press the *Copy By Ratio* button.
 Note: Copy By Ratio button does not carry over the Stiffener type. That will need to be updated after copying.

🎢 Copy Stiffeners		-		×
Select All	Select None			
🕀 🗌 Abut1 - Bent2				
🖃 🗹 Bent2 - Bent3				
Beam-L				
✓ Beam-2				
Beam-3				
Beam-4				
Beam-R				
🕀 📃 Bent3 - Abut4				
	Сору		Copy By	Ratio

 Press the Validate button to preview the stiffener locations, and press SAVE to accept all and place the stiffeners.

8. Next, we will add the cross frames using the *Place Cross Frames* tool from the **Superstructure** section.

- Click on the beam group to start the placement of the cross frames. Then click anywhere in the screen.
- Like the stiffeners, the tools available can add or delete individual rows or add or delete multiple rows.
- Using the *Wizard*, we will add the cross frames to the beam bays in all spans.
 - The cross-frame wizard provides more options for placement. The user can place
 One-by-One or by Bulk Locations.

Note: In the One-By-One tab the user can enter a distance, and a location from

where the distance is being measured.

Bulk Loc	ations One-By-One							
Distan	ce ('): 0.0000							
From:	om: Previous Cross-Frame							
	Previous Cross-Frame							
	Beam Start							
	Beam End							
Specified Cross-Frame								
	SupportLine							

Note: In the **Bulk Locations** tab, the user can provide the number of locations, or use spacings to identify the locations.

- If the user choses to just select the number of locations, the cross frames will be equally spaced.
- If the user wants more control on the spacing, use the spacing option. The spacings can be grouped and can be spaced delimited.
 - e.g. 2@10′ 3@5′ 10′ 2@2.5′
- Unlike the stiffeners, the cross-frame wizard allows the placement of the cross frames to the selected bay or to all bays.
- Use the *Bulk Locations* tab in the Place Cross Frames tool to populate the cross frames.
 - For the locations use:
 - Number of Locations: 4
 - Apply to: **All Bays**.

Number Of Locations	Spacing (')	Apply To:
4 🗘	L1 2@L2	Current Bay I All Bays

- The user needs to provide the start and end location for the placement.
- For start and end information use:
 - From SupportLine: Abut1
 - From Offset: 1.00'
 - To SupportLine: Bent2
 - To Offset: -1.00

From		10			
SupportLine:	Abut1	*	SupportLine:	Bent2	*
Offset ('):	1.0000		Offset ('):	-1.0000	

- For the cross-frame information:
 - Position Lock: Normal to Left Beam
 - Align: Vertical
 - Direction: **Upstation**
 - Left Stiffener: TxDOT Brng 16" ¾ x 7.5"
 - Cross-Frame: TxDOT W40
 - Right Stiffener: TxDOT Brng 16" ¾ x 7.5"

Position Lock		Align		Direction	
Normal To Left Beam	Ŧ	Vertical	*	Upstation	*
Left Stiffener		Cross-Frame		Right Stiffener	
TxDOT Brng 16" 3/4 x 7.5	*	TxDOT W40	*	TxDOT Brng 16" 3/4 x 7.5	*
			_		

- Press the *Generate* button to create the cross-frame rows, and then press *Close* to close the wizard.
- Verify that all bays in Span 1 got the cross-frames.
- Use the *Copy* tool, to copy the cross-frames to all bays in span 3. Select the spans or beams in the dialog box and press the *Copy By Ratio* button.

 Use the *Validate* button to preview the locations in the drawing. This will also check for conflicts with previously placed cross-frames or stiffeners.

- Open the *Cross-Frame Placement* dialog box then select the first bay of the second span.
- Use the wizard to place the cross-frames:
 - Placement method: **Bulk Location**
 - Number of Locations: 6
 - Apply to: *Current Bay*
 - From SupportLine: Bent2
 - From Offset: 9
 - To SupportLine: Bent3
 - To Offset: 9
 - Position Lock: *Normal to Left Beam*
 - Align: **Vertical**
 - Direction: **Upstation**
 - Left Stiffener: 6 x 0.5
 - Cross-Frame: X Frame_3
 - Right Stiffener: 6 x 0.5

Cross-Frame Location Wizard X									
Bulk Locations One-By-One									
Number O	f Locations 6 🗘		Spacing (') 1 2@L2	Apply To: Current Bay All Bays					
From				То					
SupportLine:	Bent2		Ŧ	SupportLine:	Bent3 *				
Offset ('): 9.0000				Offset ('):	9.0000				
Position Lock		_	Align		Direction				
Normal To Left	Beam	*	Vertical	*	Upstation 🔹				
Left Stiffener			Cross-Frame		Right Stiffener				
6x0.5		*	X Frame_3	Ψ.	6x0.5 *				
					Generate Close				

- Press the *Generate* button to create the cross-frame rows, and then press *Close* to close the wizard.
- Add 2 frames manually using the *Add* button. The frame will be added at the end of the table.
 - Position Lock: *Normal to Left Beam*
 - Left Location: **3** AND **122**
 - Cross-Frame: TxDOT W40
 - Orientation: **Upstation**
 - Align: Vertical
 - Left Stiffener: *TxDOT Brng 16" ¾ x 7.5"*
 - Right Stiffener: **TxDOT Brng 16" 34 x 7.5"**

1	Normal To Left Beam	3.0000	TxDOT W40	Upstation	Vertical	TxDOT Brng 16" 3/4 x 7.5	TxDOT Brng 16" 3/4 x 7.5
2	Normal To Left Beam	122.0000	TxDOT W40	Upstation	Vertical	TxDOT Brng 16" 3/4 x 7.5	TxDOT Brng 16" 3/4 x 7.5

 Use the *Copy* tool to copy the cross-frames to all bays of Span 2. Select the spans or beams in the dialog box and press the *Copy By Ratio* button.

 Use the *Validate* button to preview the locations in the drawing. This will also check for conflicts with previously placed cross-frames or stiffeners. Then press *Save* to accept all cross-frame locations.

Note: If the user wants more control over where the cross-frames are placed, the distances can be changed after creating the rows with the bulk locations of the wizard or create one-by-one using the wizard. The bulk locations and the one-by-one in the wizard cannot be used in combination, it is either one or the other.

9. We will now place field splices only in the longer span using the *Place Field Splices* tool from the Superstructure section. Splices are usually controlled by length and weight of the segments. The engineer should consider transportation restrictions to determine if splices are needed.

- Click on the beam group to start the placement of the cross frames. Then click anywhere in the screen.
- In the **Place Field Splices** dialog box, select the first beam of the Span 2.

- Input the following values:
 - Template: *Field Splice_0*
 - Mode: *SupportLine*
 - Type **65.5'** in the text input
 - From: **Bent2**
 - Press the *Add* button to add the new splice

	Add Section T	emplate Field	d Splice_0	•			
1	Mode: Support	Line 🔻	65.	5	' From Bent2	-	🕂 Add
	🕂 Add At Beam	Breaks	🗙 Dele	te Selected	$\mathbf{x}^{\mathbf{X}}$ Delete All	Сору	
	Location Type	Relative Location	From	Start Distance	Field Splice Pattern		
>	SupportLine	65.5000	Bent2	15+42.74	Field Splice_0		

 Use the *Copy* tool to copy the cross-frames to all beams of Span 2. Select the spans or beams in the dialog box and press the *Copy* button.

🖉 Copy Field Splices 🛛 -	_		×						
Select All Select None									
Abut1 - Bent2									
🖃 🗹 Bent2 - Bent3									
Beam-L									
Beam-2	Beam-2								
✓ Beam-3									
Beam-4									
Beam-R									
🕀 📃 Bent3 - Abut4									
		Сору							

Use the *Validate* button to preview the locations in the drawing, then press *Save* to accept all field splice locations.

Note: If more than one splice is needed the user can enter spaces similar to how spaces are entered for the Cross-Frames, but in splices the user cannot use the "@" command to group spacing. The spacing entered must be in relation to the mode selected.

,	Add Section Te	mplate Field S	plice_0	* Mode:	SupportLine 🔹	15 60 115	' From Bent2	- 🕂 Add	
+ ⁺ Add At Beam Breaks X Delete Selected X Delete All									
	Location Type	Relative Location	From	Start Distance	Field Splice Pattern				
	SupportLine	15.0000	Bent2	14+98.53	Field Splice_0				
	SupportLine	60.0000	Bent2	15+43.53	Field Splice_0				
	SupportLine	115.0000	Bent2	15+98.53	Field Splice_0				
Note: Field splice used for this exercise is too large for our beam, we will cover how to create new splice plates in the library section, for now just ignore the issue. When we update the template used, the drawing will also update.



10. Finally, we will place the shear studs using the *Place Shear Studs* located in the **Superstructure** section.



- Click on the beam group to start the placement of the shear studs, then click anywhere in the screen.
- In the **Shear Studs Placement** dialog box, select the first beam of the Span 1.
- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: **Distance**
 - Start Location: 1
 - End Location: 3
 - Longitudinal Spacing: 0.5
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: 3
 - Transverse Spacing: 3.5



- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: **Distance**
 - Start Location: 3.5
 - End Location: 40.5
 - Longitudinal Spacing: 1.5
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: **3**
 - Transverse Spacing: 3.5

#	Location Type	Start Location (') or Ratio	End Location (') or Ratio	Longitudinal Spacing (')	Shear Stud	Number per Row	Transverse Spacing ("
1	Distance	1.0000	3.0000	0.5000	H4L - 0.25x2.67 "	3	3.5000
2	Distance	3.5000	40.5000	1.5000	H4L - 0.25x2.67 "	3	3.5000

- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: **Distance**
 - Start Location: 41
 - End Location: 44
 - Longitudinal Spacing: 0.5
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: 3
 - Transverse Spacing: 3.5

	Location Type	Start Location (') or Ratio	End Location (*) or Ratio	Longitudinal Spacing (7)	Shear Stud	Number per Row	Transverse Spacing (")
1	Distance	1.0000	3.0000	0.5000	H4L - 0.25x2.67 *	3	3.5000
2	Distance .	3.5000	40.5000	1.5000	H4L - 0.25x2.67 *	3	3.5000
2 3	Distance	41.0000	44.0000	0.5000	H4L - 0.25x2.67*	3	3.5000

Use the *Copy* tool to copy the shear studs to all beams of Span 1 and Span 3. Select the spans or beams in the dialog box and press the *Copy* button.



- In the **Shear Studs Placement** dialog box, select the first beam of Span 2.
- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: **Distance**
 - Start Location: 1
 - End Location: 3.5
 - Longitudinal Spacing: **0.5**
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: 3
 - Transverse Spacing: 3.5

#	Location Type	Start Location (') or Ratio	End Location (') or Ratio	Longitudinal Spacing (')	Shear Stud	Number per Row	Transverse Spacing (")
1	Distance	1.0000	3.5000	0.5000	H4L - 0.25x2.67 "	3	3.5000

- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: Distance
 - Start Location: 4
 - End Location: 121
 - Longitudinal Spacing: 1.5
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: **3**
 - Transverse Spacing: 3.5

#	Location Type	Start Location (') or Ratio	End Location (') or Ratio	Longitudinal Spacing (')	Shear Stud	Number per Row	Transverse Spacing (")
1	Distance	1.0000	3.5000	0.5000	H4L - 0.25x2.67 "	3	3.5000
2	Distance	4.0000	121.0000	1.5000	H4L - 0.25x2.67 "	3	3.5000

- Press the **Add** button to add a new row to define the shear stud placement.
 - Location Type: **Distance**
 - Start Location: 121.5
 - End Location: **123.5**
 - Longitudinal Spacing: 0.5
 - Shear Stud: H4L 0.25 x 2.67"
 - Number per Row: 3
 - Transverse Spacing: 3.5

	#	Location Type	Start Location (') or Ratio	End Location (') or Ratio	Longitudinal Spacing (')	Shear Stud	Number per Row	Transverse Spacing (")
	1	Distance	1.0000	3.5000	0.5000	H4L - 0.25x2.67 "	3	3.5000
	2	Distance	4.0000	121.0000	1.5000	H4L - 0.25x2.67 "	3	3.5000
>	3	Distance	121.5000	123.5000	0.5000	H4L - 0.25x2.67 "	3	3.5000

 Use the *Copy* tool to copy the shear studs to all beams of Span 2. Select the spans or beams in the dialog box and press the *Copy* button.



- Use the *Validate* button to preview the locations in the drawing. Then press *Save* to accept all shear stud locations.
- To see the shear studs in the 3D view the user will need to turn off the deck either using the level display or using the explorer.



• After placing all steel elements, everything left to do is repeated from the previous section.

11. Place Interior Bents.

- Template Name: MultiColumn\TxDOT\Interior Bent for Steel Beams [___]
- Cap Length Adjustment: Deck and Aligned
- Cap Material: **Tx Interior Bent Cap** [
- Column Material: *Tx Column* []
- Footing Material: Tx Drilled Shaft []
- Name Prefix for SupportLine2: **Bent2**
- Name Prefix for SupportLine3: Bent3

- 12. Place Abutments at both ends of the bridge.
 - Template Name: PileCap\TxDOT\Abut for Steel Beams with DS up to 15 deg skew [
 7
 - Apply Skew To Solids: True
 - Conform BackWall With Deck Top: True
 - Edit Elevation Constraints: False
 - Orientation: Start for Abutment 1 [End for Abutment4]
 - Cap Length Adjustment: Deck and Aligned
 - Cap Material: **Tx Abutment**
 - Pile Material: **Tx Drilled Shaft** [
 - Name Prefix for SupportLine1: Abutment1
 - Name Prefix for SupportLine4: *Abutment4*

Note: Update the Backwall Vertical Offset from Deck top in the properties to be 13", also update the Backwall Depth and Backwall Vertical Offset to be 48.95" in the Template settings as it was done before.

13. Place wingwalls on the left and right of each abutment and make the needed adjustments to align

them correctly. Place Wingwall

- Template Name: Wingwall \TxDOT \ Wingwall with Cap and DS []
- Orientation: Normal/Skewed
- Vertical Offset: 4.0725 [Left], 3.1025 [Right] (Swap values for Abutment 4)
- Align with Abutment: False
- Transverse Offset: 0.75 [Left], 0.27 [Right] (Swap values for Abutment 4)
- Align with FFBW: *True*
- Parallel to Alignment: True
- Use Slope from Profile: True
- Place Right Wingwall: True [Use the exact same settings as above]
- Wingwall Material: *Tx Abutment* [
- Footing Material: Tx Abutment []
- Pile Material: *Tx Drilled Shaft* [
- Name Prefix for SupportLine1: *Abut1-Wingwall1*
- Name Prefix for SupportLine4: Abut4-Wingwall1

Note: Since left and right wingwalls were enabled, the software will automatically number them Abut1-Wingwall1 & Abut-Wingwall2. Adjust the template to have a wingwall height of 4.0725'.

- 14. Place bearing pads and bearing seats. Select each SupportLine.
 - Bearing Type: *Cube*
 - Cube Width, W: **1.333 [16"]**
 - Cube Depth, D: 0.666 [8"]
 - Cube Height: 0.2292 [2.75"]
 - Orientation: *Girder*
 - Has Bearing Seats: *True*
 - Seat Min. Thickness: 0.095 [1.15" Min thickness is measured at the edge of seat]
 - Seat D1: 0.6666 [fwd dimension from bearing line to edge of cap]
 - Seat D2: 0.7083 [bk dimension from bearing line to cap cl]
 - Seat W1: 1.166 [half bearing seat width]
 - Seat W2: 1.166 [half bearing seat width]
 - Seat Orientation: *Girder*
 - Back Offset: -0.7083 [0 for Abutment 1]
 - Ahead Offset: 0.7083 [0 for Abutment 4]
 - Pad or Plate Material: *Miscellaneous > Neoprene Bearing Pads [____]*
 - Bearing Seat Material: *Tx Bearing Seat* []
- 15. Place approach slabs, and sleeper slabs (see step 17 in previous section)
- 16. Finally, place the traffic barrier. See step 19 of previous section and use the templates below for left and right barriers.
 - Template Name: Barriers TxDOT Rails with Posts (Use for Typ Sections) C223_R [
 - Template Name: Barriers TxDOT Rails with Posts (Use for Typ Sections) C223_L [
 7
- 17. This concludes the creation of the bridge with a steel superstructure. Practice creating this same bridge on your own in the **Exercise_01.dgn**.
- 18. Close all open sessions of OpenBridge Modeler, but keep OpenBridge Designer open if it is being used.

Creating a Precast Bridge Model – Using the Bridge Wizard

This section will repeat several steps from the previous section, this is mostly to setup a new standalone group for a new bridge model that will be created using the Bridge Wizard in OBM. After completing exercise one, the user can close OBM and return to the OBD folder page.

Create a New OpenBridge Designer file.

If OpenBridge Designer is not getting used, please skip to page 78 to start with OpenBridge Modeler.

1. With **OpenBridge Designer** still open and with the **Standalone** option selected, select the **Add Standalone Group** icon.

🗖 TxDOT OBM Training.obdx - OpenBridge Designer CE	
File 🐲	
Standalone File Groups	
BIM Workflow Standalone	
 Standalone Group : Precast Bridge Training 	
Bridge_Model_01.dgn	

 Use a name that describes the type of work that is going to be stored in the group. For this training use Precast Bridge Wizard Training.



Create a New OpenBridge Modeler file.

OBM will ask the user again to login to ProjectWise as it did before, and the same steps as before will be used to create a new dgn file.

1. Open **OpenBridge Modeler** either by pressing the **OpenBridge Modeler** button in OBD or by pressing the **OpenBridge Modeler** icon in the desktop or start menu.





Icon in OpenBridge Designer

Icon in Desktop (Standalone OBM)

2. When prompted, login to ProjectWise again using the same datasource and authentication used in OBD.

Datasource:	Training	~ [Log in
Authentication:	Bentley IMS	~	Cancel
User Name:			
Password:			
	Remember me (use aut	o-login next tin	ne)

3. Once OBM is loaded, ignore the WorkSpace and the WorkSet area. Press the New File to create a new OBM file.



- 4. During the file creation verify that the seed file selected is correct and save the file to the correct path as shown below.
 - File creation method: No Wizard •

Browse to Documents \25 - CHS \Design Projects \XX-BRG300 \4 - Design \Bridge \Bridge X\

Note: The XX in the project name will be replaced by the user's first and last name.

- Verify that the *Seed* is *Documents_Standards\Configuration\Organization-Civil\TXDOT_Bridge\OpenBridge Modeler\Seed\TxDOT_BridgeSeed3d.dgn*
- Key-in the new file name **Bridge_Model_02.dgn**.
- Set the application to **OpenBridge Modeler**
- When prompted accept the reload of the workspace.

/ New X	New	×
Document Creation Wizards	General Folder Bridge X - Change Document Name: Bridge_Model_02.dgn Gescription: TxDOT OBM Training - Bridge Wizard Ele Name: Bridge_Model_02.dgn	<u>Q</u> K <u>C</u> ancel <u>A</u> pply
OpenMidge Modeler must be restarted to load the new configuration. Bo you want to restart new? Yes <u>No</u>	Agplication: Department: OpenBridge Modeler <none> Source Document: TxDOT_BridgeSeed3d.dgn - TxDOT_BridgeSeed3d.dgn Seed Import</none>	

Creating a Bridge with Concrete Superstructure – Using the Bridge Wizard

- 1. Once the file is created, proceed to attach the geometry files as it was done in the previous section.
- 2. Once all files have been attached. Press the *Fit View* icon to fit the view around all attachments.



- 3. We need to set the GeoCoordinate system of the OBM file to match the GeoCoordinate definition of the reference files as it was done in the previous section.
- 4. This dataset is used for other trainings in TxDOT, we will use the Southbound main lane as in the previous section.
- Once the file has been setup with all the references and the contours, we are ready to create the new bridge using the *Bridge Wizard* tool located in the **Bridge Setup** section.



Note: Very important, DO NOT PRESS ENTER while using the wizard, PRESS TAB.

- Click on the alignment once to identify the alignment to be used, then click again to select a random station. Once a random station is selected use the keyboard to enter the information below.
- Bridge Name: **US281 Southbound Mainlane**
- Bridge Type: Beam Slab (P/S or RC Concrete Girders)
- Alignment: **SB_US281**
- Bridge Start Station: 14+18.00
- Custom Deck
- Deck Width: 42'
- Deck Thickness: 8.5" (0.7083')
- Spans: **45 125 45**

- Support Skew Angles: -10 degrees
- Beam Spacing: **7@6'**
- Beam Template: Beams \Standard Sections \TxDOT \Tx Girders \Tx54 [
- Abutment Template: Pile Cap\TxDOT\Abut for TxGirders and Similar with DS up to
 15 deg skew []
- Pier Template: Multi Column \ TxDOT \ Interior Bent with Footing [
- Left Barrier Template: TxDOT _Rails with Solid Walls \SSTR_L []
- Right Barrier Template: TxDOT_Rails with Solid Walls\SSTR_R [

🌈 Bridge Wizard		×
Geometry Materials		
Bridge Name	US281 Southbound Mainlane	
Bridge Type	Beam Slab (P/S or RC Concrete Girders)	*
Alignment	SB_US281	*
Bridge Start Station	14+18.00	
 Alignment Advanced C 	ptions	
Deck Template	Slab w/ constraints	
Custom Deck		_
Deck Width(')	42.0000	
Deck Thickness(')	0.7083	
Spans	45 125 45	
Support Skew Angles	-10°00'00"	
Beam Spacing	7@6	
Beam Template	Tx54	
Abutment Template	Abut for TxGirders and Similar with DS up	
 Pier Template 	Interior Bent with Footing	
 Left Barrier Template 	SSTR_L	
 Right Barrier Template 	SSTR_R	
	OK Cancel	

Note: As mentioned before, entering the materials is important when generating reports, click on the **Materials** tab, and set them as follows. [

- Deck: Concrete \ Tx Deck
- Barrier: *Miscellaneous* \ *Traffic Barrier*
- Beam: Concrete \Tx I-Girder
- Grout Pad/Bevel Plate: Miscellaneous \Neoprene Bearing Pads
- Bearing: *Miscellaneous* *Neoprene Bearing Pads*
- Bearing Seat: *Concrete* *Tx Bearing Seat*
- Cap: Concrete \Tx Interior Bent Cap

- Column: Concrete \Tx Column
- Footing: *Concrete\Tx Footings*
- Pile: Concrete \Tx Drilled Shafts
- Cap: Concrete \ Tx Abutment
- Footing: *Concrete**Tx Footings*
- Pile: Concrete \Tx Drilled Shaft

🌌 Bridge W	/izard		×			
Geometry	Materials					
	Deck:	Tx Deck				
	Barrier:	Traffic Barrier				
	Beam:	Tx I-Girder				
	Bearing					
Grout Pad/B	evel Plate:	Neoprene Bearing Pads				
	Bearing:	Neoprene Bearing Pads				
Bea	aring Seat:	Tx Bearing Seat				
		Pier				
	Cap:	Tx Interior Bent Cap				
	Column:	Tx Column				
	Footing:	Tx Footings				
	Pile:	Tx Drilled Shaft				
		Abutment				
	Cap:	Tx Abutment				
	Footing:	Tx Footings				
	Pile:	Tx Drilled Shaft				

 Once all bridge variables are defined and the optional materials are defined, the user can now press Enter, or OK in the dialog box.

Note: Give some time for OBM to create the Bridge, the greater number of beams the longer the wizard can take.

- 7. Once the bridge model has been created the following items need to be revised. Refer to the previous sections of this manual for detailed instructions and input values.
 - Make the Terrain Active.
 - Civil Tab > Terrain Model > Set Active Terrain

- Home Tab > Bridge Setup > Terrain
- Deck adjustments.
 - Change the deck name to **MainDeck-Unit1**.
 - Use *Point Control* to change the left and right edge of the deck to match the edge of pavement lines (blue lines).
 - Use **Assign Superelevation** to apply cross slope to the deck.
- Beam and Beam Layout adjustments.
 - Apply Beam skew ends.
 - Change the Beam haunch to 3.5".
- Support Lines
 - Change the names of the support lines to reflect the name of the support (e.g. Abutment1, Bent2, etc).
- Supports
 - Rename the supports as needed to reflect the correct support name (e.g. Abutment1, Bent2, etc).
 - Apply Skew to solids for both Abutments.
 - $_{\odot}$ $\,$ Conform backwall with deck top Offset on both Abutments.
- Bearing Pad and Bearing Seat adjustments.
 - Pad Size and orientation
 - Seat size and orientation
- Wingwalls need to be placed.
- Approach Slabs need to be placed.

This concludes the creation of the concrete Southbound bridge model using the Bridge Wizard.



Placing excavation around footings

This section will guide the user on how to place excavation models on footings, this tool can be used on Interior Bents and Abutments that contain sub-elements classified as footing. This section will also guide the user on how to obtain the quantities for the excavation volume.

- Update the elevation constraints of the Interior Bents so that the footing starts 1' below the active terrain. To do so, select both bents in the Explorer and in the Properties select *Elevation Constraints.* In the Elevation Constraints dialog select the *Footing* tab and use the following information.
 - From DTM
 - Value: -1.0 [This is measured at the CL of column, it needs to be adjusted to ensure square footings are at least 1 ft below ground on all corners]
 - Click Apply to All
 - Click **OK** to close the dialog box.

Fro	om DTM	oting • -1.0	000	Apply To All		
	ID	Constrained	Mode	Value		
>	1	~	From DTM	-1.0000		
	2	~	From DTM	-1.0000		
	3	~	From DTM	-1.0000		
3 M From DTM -1.0000						
No	te: Refer	ence is top of	footing elevat	ion.		

2. Use the *Place Excavation* tool from the Home > Substructure section.



- Terrain Model: SH46_Existing_Terrain [Select from drop down]
- Horizontal Offset: 3'
- Vertical Sheeting: *False*
- Corner Sweep Angle: 5 degrees
- Side Slope: 2:1
- Bottom Vertical offset: 1'
- Bottom Horizontal offset: 1'
- Combined Excavation: True [To combine excavation of all footings in one bent]
- Cut Material: Miscellaneous \Excavation []

• Click on the Interior Bent #2 and Interior Bent #3 then click reset (Right Click) to accept the selection, finally click anywhere to start processing the excavation.

🔏 Excavation Vo	- 🗆 X
Main	*
Terrain Model	SH46_Existing_Terrair 🗸
Horizontal Offset	3.0000
Vertical Sheeting	
Corner Sweep Angle	05°00'00''
Side Slope	2:1
Bottom Vertical Offset	1.0000
Bottom Horiz. Offset	1.0000
Bottom Slope	0.33333333333333333333333
Combined Excavation	
Material	*
Cut Material	Excavation
Feature	*
Feature Definition	Earthworks 🗸
Name Prefix	EC

3. The excavation details can be seen using the combination of explorer and the properties dialog. The user will find the excavation details in the 1st footing of the support element.



- The user cannot make changes of the parameters once the excavation is created. If the excavation is not what the user expected, it will need to be deleted and created again.
- To delete the excavation the user can right click on the excavation in the explorer dialog and click delete.



Exercise #2 – Create the Northbound Main Lane using the Wizard.

Save this file as *Exercise_02.dgn* and using the acquired knowledge use the bridge wizard to create the model for the Northbound Main Lanes bridge with the following information.

- Bridge Name: **US281 Northbound Mainlane**
- Bridge Type: Beam Slab (P/S or RC Concrete Girders)
- Alignment: **NB_US281**
- Start Station: **14+36.00**
- End Station: **16+51.00**
- All other information is the same as the Southbound bridge.
- Once completed return to the **Bridge_Model_02.dgn**.

This concludes the creation of the concrete girder bridge models using the Bridge Wizard.

Creating a Bridge with Steel Superstructure – Using the Bridge Wizard

This section will focus on the steel part of OBM, all other elements are the same as the previous section. Steps will be repeated for the Bridge, Support Lines, Supports, Bearing seats, Wingwalls, etc.

- 1. Continuing in the *Bridge_Model_02.dgn* file.
- We will now create a steel superstructure bridge using the *Bridge Wizard* tool located in the Bridge Setup section.



Note: Very important, DO NOT PRESS ENTER while using the wizard, PRESS TAB.

- Click on the alignment once to identify the alignment to be used, then click again to select a random station. Once a random station is selected use the keyboard to enter the information below.
- Bridge Name: US281 Northbound Mainlane
- Bridge Type: Beam Slab (Steel Girders)
- Alignment: NB_US281
- Bridge Start Station: 14+36.00
- Custom Deck
- Deck Width: 42'
- Deck Thickness: 8.5" (0.7083')
- Spans: 45 125 45
- Support Skew Angles: -10 degrees
- Beam Spacing: 7@6'
- Built-up Beam: **Enable**
- Depth: 54"
- Thickness (Web): 1"
- Width: 14"
- Thickness (Flanges): 0.75"

Note: In the bridge wizard the user cannot add variations to the built-up beam as it was done in the previous steel bridge.

- Abutment Template: Pile Cap \TxDOT \Abut for Steel Beams with DS up to 15 deg skew[
]
- Pier Template: Multi Column \TxDOT \ Interior Bent for Steel Beams [
- Left Barrier Template: TxDOT\Rails with Posts (Use for Typ Sections) \C223_L [
- Right Barrier Template: TxDOT\Rails with Posts (Use for Typ Sections) \C223_R [

🖉 Bridge Wizard 🛛 🕹					\times	
Geometry	Materials					
Bridge Name		US281 Northbound Mainline				
Bridge Typ	Bridge Type		ab (Steel Gird	lers)		*
Alignment		NB_US28	81			Ŧ
Bridge Star	t Station	14+36.00)			
🗸 Alignm	ent Advanced C	ptions				
🔵 Deck Te	emplate	Slab w/ o	onstraints			
Custom	Custom Deck					
	Deck Width(ft)					
Deck Thickness(ft)		0.7083				
Spans	Spans		45 125 45			
Support Sk	ew Angles	-10°00'00"				
Beam Space	ing	7@6				
🔵 Beam T	emplate					
Built-up	Beam					
Web			Flanges			
Depth	54.0000		Width	14.000	00	
Thickness	1.0000		Thickness	0.7500)	
✓ Abutment	Template	Abut for Steel Beams with DS up to 15 deg				
Pier Templa	ate	Interior Bent for Steel Beams				
 Left Barrier 	Template	C223_L				
🗹 Right Barri	er Template	C223_R				
			OK		Cancel	

Note: As mentioned before, entering materials is important when generating reports, click on the **Materials** tab, and set them as follows. [

- Deck: Concrete \ Tx Deck
- Barrier: *Miscellaneous**Traffic Barrier*
- Beam: Steel\Straight Plate Girder
- Grout Pad/Bevel Plate: Miscellaneous \ Neoprene Bearing Pads
- Bearing: Miscellaneous \ Neoprene Bearing Pads
- Bearing Seat: Concrete \Tx Bearing Seat
- Cap: Concrete \Tx Interior Bent Cap
- Column: Concrete \Tx Column

- Footing: *Concrete\Tx Footings*
- Pile: Concrete \Tx Drilled Shafts
- Cap: Concrete \Tx Abutment
- Footing: *Concrete\Tx Footings*
- Pile: Concrete \Tx Drilled Shaft

🌌 Bridge Wizar	d		×			
Geometry Ma	aterials					
	Deck:	Tx Deck				
B	arrier:	Traffic Barrier				
E	Beam:	Straight plate girders				
		Bearing				
Grout Pad/Bevel	Plate:	Neoprene Bearing Pads				
Be	aring:	Neoprene Bearing Pads				
Bearing Seat:		Tx Bearing Seat				
		Pier				
	Cap:	Tx Interior Bent Cap				
Co	lumn:	Tx Column				
For	oting:	Tx Footings				
	Pile:	Tx Drilled Shaft				
	Abutment					
	Cap:	Tx Abutment				
For	oting:	Tx Footings				
	Pile:	Tx Drilled Shaft				

3. Once all bridge variables are defined and the optional materials are defined, the user can now return to the geometry tab and click **Enter**, or **OK** in the dialog box.

Note: Give some time for OBM to create the Bridge, the greater number of beams the longer the wizard can take.

- 4. Once the bridge model has been created the following items need to be revised, using the previous section as guidance the user can complete the needed adjustments.
 - Make the Terrain Active.
 - Civil Tab > Terrain Model > Set Active Terrain
 - Home Tab > Bridge Setup > Terrain
 - Deck adjustments.
 - Change the deck name to **MainDeck-Unit1**.

- Use *Point Control* to change the left and right edge of the deck to match the edge of pavement lines (blue lines).
- Use *Assign Superelevation* to apply cross slope to the deck.
- Stiffeners, Shear Studs, Cross-Frames, and Field splices need to be added.
- Beam and Beam Layout adjustments.
 - Apply Beam skew ends.
 - Change the Beam haunch to 3.5".
- Support Lines
 - Change the names of the support lines to reflect the name of the support (e.g. Abutment1, Bent2, etc).
- Supports
 - Rename the supports as needed to reflect the correct support name (e.g. Abutment1, Bent2, etc).
 - Apply Skew to solids for both Abutments.
 - Conform backwall with deck top Offset on both Abutments.
- Bearing Pad and Bearing Seat adjustments.
 - Pad Size and orientation
 - Seat size and orientation
- Wingwalls need to be placed.
- Approach Slabs need to be placed.



This concludes the creation of the steel bridge model using the Bridge Wizard.

Placing Linear Templates in OBM

This section of the training will cover how to apply linear templates created in ORD Template Library. The process of placing Linear Templates in OBM is the same as in ORD, the only difference is that geometry (e.g. Horizontal and Vertical alignments) created in OBM cannot be modified in ORD. While this section only covers the linear templates for RipRap, the concept is the same for retaining walls. This section will only place RipRap on a single abutment, however, the steps can be applied to connect two abutments with a single RipRap.

Placing Riprap in OBM

In this section we will be creating the riprap around one bridge abutment using the tools located in the *Civil* tab.

File	Home	Chill	Unities	Repo	ts and Drawing	gs View
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- 1. Open the Bridge_Model_01.dgn file. (Via OBD or Standalone OBM)
- To begin, zoom in near the abutment. Turn off references as needed, select a contour line, and set the terrain override symbology to No, or change override template to *Existing Boundary* if needed.



Note: The user may need to turn off the deck and the beams to better access the abutment, this can be done in the **Level Display** dialog by turning off levels **OBM_Deck**, **OBM_Haunch**, **OBM_Barriers** and **OBM_GirderConcrete**. Alternatively, the display of individual bridge elements can also be turned off by unchecking the item in the OpenBridge Model tab of the **Explorer** window.

Trend Congray - Frend 1		-
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Explorer	
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1 28	7 Units
	🗹 👕 Unit1 :: Beam Slab Concrete-Girders Bridge **
	> 🗌 😣 Decks
3	Beam Layouts
3	Beam Groups
	Tub Girder Groups
	Concrete Diaphragms

3. Using the civil tools, place a line tracing the front of the abutment cap. Use *Complex By PI* tool located in the Civil > Horizontal > Complex Geometry section.



- 1. Set the parameters of the civil line as follows
 - Radius: O'
 - Back Transition Type: None
 - Ahead Transition Type: None
 - Feature Definition: *Linear/Miscellaneous/Draft DNC*
 - Name: Riprap Abutment <Number>

la Comple	>	< 16	Compl.	- 0	×
			Parameter	÷	*
			Radius	0.00007	-
□ Radius	0.0000'		Back Trans	ition	*
		Typ		Spenal	(ý
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туре	None	✓ Met	bod	Length	4
		Len	2th	0.0000	
		_	Feature		*
Feature Definition	Draft_DNC	✓ Feet	ure Definition	Dut DNC	Y
Name	Riprap Abutment 1	Nam		Rprap Abutme	nt 1

2. Place the civil line tracing around the outside edge of the abutment cap and wingwalls following the order of the arrow.



- 4. Now we will create a profile along this line that will help us define the riprap edge.
 - Open a new view window for the profile by selecting the plan element, then either:
 - Select the **Open Profile Model** tool located in the **Vertical** section.



Or click and hold the right mouse button anywhere in the screen, then select
 View Control > 2 Views Plan/Profile from the pop-up menu.



3. Select **OK** to Create a Dynamic Profile View.



- 4. Follow the prompts to click on the line created, then click in the view other than the plan view.
 - Click on Plan Element
 - o Click on View
- 5. The view will fit and will show the active terrain. We must now create a 3D cut to display the abutment in the profile view.



 The default exaggeration of all profile views is always set to 10, the user can change the exaggeration in the view attributes tab of the view used for the profile. For this exercise we will set it to 1.



 Turn all levels back ON, then use the *Create 3D Cut* tool to create a clip of the profile.

View 4, Profile	- DNC1		
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 \circ $\;$ Click in the profile view once to accept method of clipping.



• Create a box around the existing ground, large enough to fit the abutment height.



If all the elements of the abutment and wingwall do not show up, change the horizontal offset of the 3D clip from the line in the properties dialog. Select the box border, change the offset to +/-0.1, then click the *Refresh 3D Cut* button to update the profile view. Adjust the offset until both ends of the wingwall are displayed.



- 6. Now we will draw a profile line to define the top edge of the riprap.
- Based on the TxDOT CADD Bridge standard drawings CRR and SRR, the riprap starts 9" below the cap for beam/slab type of bridges and 1'-6" for slab span, box beams or slab beams. For this exercise, draw the line 9" below from each end of the cap.
- To snap to the abutment, the user needs to enable snaps in the reference.



 If Accu-draw is not already active, turn it on by pressing F11 on your keyboard or navigating to Home > Primary and selecting Toggle Accu-draw to turn on XY coordinatebased drafting tools. You can dock the XY input boxes to the bottom of your window.



 Place a line across the front of the abutment cap using the *Profile Line Between Points* located in the Civil > Vertical section.



Snap on the top left corner of the abutment in the profile view. Press O in the keyboard to set the origin, then type 0.75 in the Y field and O in the X field of Accu-draw. Press the left button on the mouse to place the start of the line.



- Repeat the same snapping process to end the line 9" below the right corner of the abutment; Press **O** in the keyboard to set the origin, then **V** to rotate Accu-draw to match the view, then type **0.75** in the Y field and **O** in the X field of Accu-draw. Press the left button on the mouse to place the end of the line.
- Note: If the end 9" offset isn't entering into Accu-draw correctly, Snap the end of the line to the top right corner of the abutment then use the Element Selection tool under Home > Selection to click on the line end and move it down by Y = -0.75.



 Once the line below the abutment cap is in place, we will draw the lines along the wingwalls using the previously created line as our start point and ending at 1 foot before the end of the wingwall at the top.



• **Note**: Use the Accu-draw shortcuts previously used.

- Repeat the same steps on the other side, at the other wingwall, drawing the lines from left to right.
- 7. Once all 3 lines have been created, use the **Profile Complex by Elements** tool located in the **Vertical** section to join the 3 lines as a single profile. Left click on each line, left click in the view, then right click to complete.



 Once the profile line is created, set it as the active profile using the *Set Active Profile* tool in the Vertical section

🖽 Open Profile Model	📐 Lines 🔻	🕼 Element Profiles 🔻
💰 Set Active Profile	👱 Curves 🔹	
Dr Creation *	T Complex Geometry *	
<u> </u>	Vertical	

• Click on the plan element first, then on the profile element.



 Once the profile is created, the user can close the profile view and we can start creating the riprap using an ORD Linear template. Select the *Apply Linear Template* tool located in the **Template** section.



- Lock To Start: True
- Lock to End: True
- Mirror: False
- Template: TxDOT Templates \Linear Templates \Bridge \Bridge Concrete RipRap_1 [
- All other settings can be changed if desired or leave as they are.

4	Apply Linear Template		х
	Parameters		•
	Lock To Start	8	
	Start Station	0.0000	
	Lock To End		
	End Station	0.0000	
	Exterior Corner Sweep Angle	05'00'00'	
	Meror	0	
	Refect		
	Template	TxDOT Templates'Unear Templates'Bridge Concrete RpRap_1	8
	Description		
	Feature		•
Fea	ture Definition	Design	Y
Nan	e .	Rprap_Abutment1_S8	

- Click on the line and profile created in the previous steps. This line represents the top of riprap.
- Click through the tentative menus to accept the inputs. Be sure the location of the riprap is in the correct direction, not overlapping approach slab.



Note: A rounded corner will be automatically created at the abutment cap. The radius of the corner is controlled by the riprap length, which can be defined with parametric constraints or point controls.

• Once all parameters are accepted the riprap will be drawn.



- 6. Once the riprap is placed, we can change different variables to adjust the riprap geometry as needed.
 - Select the riprap on the left or right and hover over the element for a second to reveal the tentative menu.



• From the tentative menu select the *Corridor Object* tools.



• In the **Corridor Objects** dialog box, under the **Parametric Constraints** section, click the **Add New** to add a new constraint.



- Lock To Start: *True*
- Lock To End: False
- Stop (End Station): **0+19.50**
- Constraint Label: *RipRap_Slope*
- Start Value: -50%
- End Value: -33.33%

Fi	Create Par	- 🗆	×
	Parameters		*
	Lock To Start	\checkmark	
\checkmark	Start	0+00.00	
	Lock To End		
\checkmark	Stop	0+19.50	
	Constraint Label	RipRap_Slope	\sim
	Start Value	-50.00%	
	Stop Value	-33.33%	

• Press multiple times in the screen to accept all parameters.

- In the **Corridor Objects** dialog box, add another constraint to change the slope on the other side of the abutment.
 - Start Station: **0+62.45**
 - Lock To End: True
 - Constraint Label: *RipRap_Slope*
 - Start Value: -33.33%
 - End Value: -50%

fi	Create Par	- 🗆	×
	Parameters		*
	Lock To Start		
\checkmark	Start	0+62.45	
	Lock To End	\checkmark	
\checkmark	Stop	0+82.20	
	Constraint Label	RipRap_Slope	\sim
	Start Value	-33.33%	
	Stop Value	-50.00%	

- Press multiple times in the screen to accept all parameters.
- In the Corridor Objects dialog box, add another constraint to change the thickness of the Riprap to 5".
 - Lock To Start: *True*
 - Lock To End: *True*
 - Constraint Label: *RipRap_Thickness*
 - Start Value: -0.4167
 - End Value: -0.4167

Se	Create Par	- 🗆 ×
	Parameters	*
	Lock To Start	\checkmark
\checkmark	Start	0+00.00
	Lock To End	\checkmark
\checkmark	Stop	0+76.20
	Constraint Label	RipRap_Thicknes
	Start Value	-0.4167
	Stop Value	-0.4167

• Press multiple times in the screen to accept all parameters.

Parametric Constraint	1.0	× 6.6 × 4	41								
Point Control		Constraint Label	Enabled	Start Value	Stop Value	Stat Sope	Step Store	Stat Angle	Stop Angle	Stat Station	End Station
	5	Holing Store in	Tue			40.005	-20.20%			0-00.00	0+18.50
sternal Reference		Reflag_Store	True			-33.33%	-50.001			0-42.45	0-42.20
Dipping Felerence		ReRay Techness	Tue	0.4167	0.4167					0-00.00	0-82.20

7. The RipRap quantities can be obtained, by selecting the riprap corridor and then navigating to *Components/Bridge_Riprap* in the properties dialog.

Properties 🔻 👎	×										
▲ ℅ Elements (1)											
🔺 ≤ Linear Template TxDOT Templates\											
Templates											
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Class Primary											
Template (None)											
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Feature	•										
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Feature Name Bridge_RipRap											
Civil Quantities	•										
Top Sloped Area 1685.2211 Sq.'											
Planar Area 1556.0277 Sg.											

This Concludes the placement of linear templates in OBM (placing riprap).



Users can also define the edge of a riprap template by drawing a shape with a civil line. To extend the riprap to this line, add a point control. Parameters ۸ Lock To Start \checkmark Start 0+00.00 Lock To End \checkmark Stop 0+82.20 Control Description RipRap Limits Point RipRap_Limit \sim Mode Horizontal \sim Control Type Linear Geometry 🗸 Corridor Objects - DNC2 Plan Element \sim 🕞 🗙 🖻 🖻 🐪 🖌 Use as Secondary Alignment Parametric Constraint Priority 1 Point Control Horizontal Offsets ٨ External Reference Start 0.0000 **Clipping Reference** Stop 0.0000

After defining the parameters for the point control, press multiple times in the screen to accept all parameters, and when prompted to **Locate Plan or Profile Element**, select the civil line representing the riprap limit and the riprap edge will update to follow that line. All riprap templates have the point named **RipRap_Limit** and can be used for point control.

Example of riprap before and after defining a point control for the **RipRap_Limit** (for information only):



Exercise #3 – Place the Riprap on Abutment #4

Repeat the steps above to place riprap on Abutment 4, using the following input:

- Riprap Thickness: **5**"
- Riprap Slope: 3:1 [-33.33% perpendicular to abutment] and 2:1 [-50% perpendicular to wingwalls]
- All other information needs to be determined during placement. Use the plan and 3D view to see where the riprap limits need to be placed.

This concludes the creation of riprap on the bridge model.

Generating Reports using the Bridge Model

In this section we will be generating different reports using the buttons located in the **Reports and Drawings** tab in the **Bridge Reporting** section. For this section the user can be in any of the files created so far.

Generating the Quantities Report

The quantity report will use the elements to create a cost and quantities report, the user can hide the cost if that part is not needed in the report. This report will not include any civil template placed in the model, such as the Riprap quantities. All tables created in these reports can be copied to paste them into Excel.

 Start the report creation by pressing the *Quantities Report* button located in the **Bridge** Reporting section in the *Reports and Drawings* tab.



• Select the Bridge, Unit and enable or disable the cost data.

Parameters		푸	\times
Selected Bridge	Active		•
Selected Unit		Ŧ	
Hide Unit/Co			

Press Submit to generate the report.

arameters									
Selected Bridge Active									
Selected Unit Active									
Hide Unit/Cost Date		Bridge Name Bridge Unit	US281 Sout	tbaound Main Slab Concret	ilane e-Girders Brid	ige			
	net [Subret]	Security days		м	laterials Qu	antity Repo	rt		
		Component Name	Component Type	Material Name	Material Type	Pay Unit	Unit Price	Quantity	Cost
		Deck1	Deck (Slab)	Sub	Concrete	Cubic Yard	0.00	225.004	0.00
		C.	Haunch	Slab	Concrete	Cubic Yard	0.00	26.403	0.00
		BeamSegment1	Beam (Tx54)	1-Girder	Concrete	UF	0.00	5424 500	0.00
And and an	W. F. A.				1			Total	0.00
Bridge Name: US281 1 V Bridge Unit: BU01 1 Superstructure	Souhtbaound Mainlane :: Beam Slab Concret Ouentities	Substructure Qu Component	Component	Material Name	Material Type	Pay Unit	Unit Price	Quartity	Cost
Substructure Q	uerotes	Name	Type						
Macellaheout C	Juantities	Abutment1	Cap	Abutment Dallad Shaft	Concrete	Cubic Yard	0.00	22.250	0.0
Grand Total			Eearing Seat	Interior Bent Cap	Concrete	Cubic Yard	0.00	0.298	0.0
		Piert	Cap	Interior Bent Cap	Concrete	Cubic Yard	0.00	18.953	0.0
			Columns	Column	Concrete	Cubic Yard	0.00	19.635	0.0
			Friday	Friday	Country	Partie March		45.564	0.00

Note: The cost unit comes from the material definition, the user has to modify the material and add a cost per unit.

 Use the tools available to print, change the orientation, add watermarks, and export the report.

544	Faranetars	Scale *	Margina	Creetation	ID 3.	et al	80 Thumbnails	Bookmarks	Ling Falls	22 ×	-	A MAR	Lat Lat	 Many Pages	D to mod	Q 200	() 2000 38	Paga Color	Hatermark	Elport Ta v	
mant	 int .		Farm	Cathon	1.00				Sec. 10						Zanna			From Do.	- Annalis	1.1	-

• When done, click *Close* button to exit the report tool.

Generating the Input Report

The input report is a great report that can be used to do a QA/QC of all the inputs used while creating the Bridge Model. The report can be separated by units and create one report per unit or combine all units and have a single report for one bridge. The report can also combine all bridges available in the file.

1. Start the report creation by pressing the *Input Report* button located in the **Bridge Reporting** section.



• Select the Bridge, Unit and Elements to report.

Parameters		± ×	
Selected Bridge	Active	*	
Selected Unit	Active		
Report Options	[AI]	-	
	Al 🖓		•
	Bridge Type an	d Geometry	
	SupportLines		
	✓ Decks		
	Approach Slabs		
	 Beam Layouts 		
	🕑 Beam Groups		
	Tub Cirder Gro	ups	

• Press *Submit* to generate the report.

Selected Bridge Active												
Selected Unit Active												
Report Options . Bridge Type and Geometry .	Bridge Name: US281	Bridge Name: US281 Souhtbaound Mainlane										
	Reides Halt DIM -	Dance Sinh Concepts Girders D	ddaa									
Contract Contract	bridge onic boot	Deam biab Concrete-Cirbers D	noge									
Reset	Bridge Type and Geory	fty:										
	Endpe Type	-33	Bean Blab (FIS or RC Concrete Gellers)									
	Shuchure Number											
	Requires Road Alignment		No									
	Road Alignment		Not Set									
	Use Roat Algement For 8	tationing	No									
	Endge Alignment		88,0328									
	Active Profile		88.0820									
 Jopat Robe Report Stripe Name: UCDRI SouthResend Marrie Bridge Vent BUES II Bown State Control 	ne R	Report										
andle title and desiredy	Report i lass											
Schönes Coses Index weben	Deport or I											
Deck Joput Naport	Status	14+14.00										
Balery Leyout Seput Report	Level D	100 10000										
Beart Group Input Report	Device	NUMPER AND										
Berrier Input Report	Ches.	timanor.										
3 Supports Input Report	Internet Office O	1.0000										
Bearings 3kput Report	Burnet and											
> Abutment Wingwalls Joput Report	and the second	Table Int										

• Use the tools available to print, change the orientation, add watermarks, and export the report.

1 500		natara Scal	Margers	- Creetation	ID 3.	ene ene	80 Thursbrails	Bookmarks	Ling Free	22 ×	Neres	A 100	► 11 20 10 10 10 10 10 10 10 10 10 10 10 10 10	 Many Pages	D An mod	Q 200	()]	Fagu Color	Referment	Elport Ta v		
-	Print		Farm	- Caller	1				Sec. 1						200			Dana Ba	- Annalis	1.0	-	

• When done, click *Close* button to exit the report tool.
Generating the Deck Elevation Report

The deck elevation report provides elevations on the deck based on the barriers, beams, or individual paths parallel to the alignment. The deck elevation reports can be saved for later use, so the user can create several different configurations to get the different elevation reports as needed.

1. Start the report creation by pressing the *Deck Report* button located in the **Bridge Reporting** section.



- Click on the start and the end support lines to create the report, for this example select the abutments support lines.
- In the **Deck Elevation Report** select the following
 - Report Name: *Elevation Report*
 - Report Type: Consolidated
 - Points Per Span: **11**
 - Add checkmarks to:
 - Left Deck Edge
 - Right Deck Edge
 - Beam Path

End SupportLine4 Cffset() 0.0000 Report Type Consolidated Transversal Lines Parallel to start support Points Per Span 11 Individual Paths Spacing Cmmont References Accessories Include Type Name Otfset()	
Report Type Consolidated Transversal Lines Parallel to start support Points Per Span 11 ° Individual Paths Spacing Transverse Accessories Include Type Name Othest(')	
Transversal Lines Parallel to start support Points Per Span 11 Common References Accessories Accessor	
Points Per Span 11 Individual Paths Spacing Accessories Accessories Name Othest(')	
Spacing Accessories Include Type Name Othert(7)	
Include Type Name Offset(')	
Include Type Name Offset(')	
Include Type Name Offset(')	
10 10 10 10 10 10 10 10 10 10 10 10 10 1	
Approved Automatic Automatics	
✓ Left Deck Edge Deck 1 0.0000	
Right Deck Edge Deck 1 0.0000	
Left Edge Borrier 1 0.0000	
Right Edge Barrier 7 0,0000	
Left Edge Servier2 0.0000	
E Right Edge Barrier2 0.0000	
E Beam Path BeamLayout 0,0000	

Press the *Generate* button to create the report, press the *Save and Close* to just save the

report for later access.

Deck Elevation Report (Parallel to start support)

							Spar	n 1 (')							
Location	Start Support Line	Start Bearing Line	1	2	3	4	5	6	7	8	9	10	11	End Bearing Line	End Support Line
Left Deck Edge with offset = 0.0000 (Deck1) P_5	1170.09 80	1170.08 36	1170.09 80	1170.02 11	1169.94 41	1169.86 72	1169.79 02	1169.71 32	1169.63 63	1169.55 93	1169.48 24	1169.40 54	1169.32 85	1169.32 85	1169.32 85
Beam Path with offset = 0.0000 (Deck1) Beam-L	1170.14 79	1170.13 34	1170.14 79	1170.07 09	1169.99 39	1169.91 70	1169.84 00	1169.76 31	1169.68 61	1169.60 92	1169.53 22	1169.45 52	1169.37 83	1169.37 83	1169.37 83

• Use the tools available to print, change the orientation, add watermarks, and export the report.



- When done, click *Close* button to exit the report tool.
- The saved report is in *Explorer*.



Generating the Beam Report

The beam report works like the beam report from BGS. The report provides beam grade, beam direction, true and projected lengths, and beam length between bearings. In addition, the report provides haunch thickness, haunch elevations, and beam elevations at top and bottom flanges.

1. Start the report creation by pressing the **Beam Report** button located in the **Bridge Reporting** section.



• The report will get created instantly. The user can select the number of points at where the elevations are reported. Our default value is 11, which provides 10 elevation points. Bridge Unit: BU01 :: Beam Slab Concrete-Girders Bridge

			Deam	Report			
Span	Beam	True Length (')	Projected Length (')	Bearing to Bearing ()	Beam Grade (%)	Direction	Rotation
SupportLine1 - SupportLine2	Beam-L	39.5065	39.5000	38.4769	-1.8150	75°45'33.13"	00°00'00"
	Beam-2	39.5065	39.5000	38.4769	-1.8203	75°45'33.13"	00°00'00"
	Beam-3	39.5066	39.5000	38.4769	-1.8256	75°45'33.13"	00°00'00"
	Beam-4	39.5066	39.5000	38.4769	-1.8309	75°45'33.13"	00°00'00"
	Beam-5	39.5067	39.5000	38.4769	-1.8362	75°45'33.13"	00°00'00"
	Beam-6	39.5067	39.5000	38.4769	-1.8415	75°45'33.13"	00°00'00"
	Beam-R	39.5067	39.5000	38.4769	-1.8468	75°45'33.13"	00°00'00"
SupportLine2 - SupportLine3	Beam-L	124.5248	124.5000	123.4769	-1.9947	75°45'33.13"	00°00'00"
	Beam-2	124.5248	124.5000	123.4769	-1.9953	75°45'33.13"	00°00'00"
	Beam-3	124.5248	124.5000	123.4769	-1.9960	75°45'33.13"	00°00'00"
	Beam-4	124.5248	124.5000	123.4769	-1.9965	75°45'33.13"	00°00'00"
	Beam-5	124.5248	124.5000	123.4769	-1.9971	75°45'33.13"	00°00'00"

Beam Report

Beam Elevations

Span Sup	portLine1 -	SupportLi	ne2									
				Locat	ions/ Beam	Elevations	Along Bea	m CL				
Beam Name	/Reference	0/10L	1/10L	2/10L	3/10L	4/10L	5/10L	6/10L	7/10L	8/10L	9/10L	10/10L
Beam-L		0.0000	3.8477	7.6954	11.5431	15.3907	19.2384	23.0861	26.9338	30.7815	34.6292	38.4769
	Beam Top	1170.5253	1170.4555	1170.3857	1170.3158	1170.2460	1170.1761	1170.1063	1170.0365	1169.9666	1169.8968	1169.8270
	Beam Bottom	1166.0246	1165.9548	1165.8849	1165.8151	1165.7452	1165.6754	1165.6056	1165.5357	1165.4659	1165.3961	1165.3262
Beam-2		0.0000	3.8477	7.6954	11.5431	15.3907	19.2384	23.0861	26.9338	30.7815	34.6292	38.4769
	Beam Top	1170.6271	1170.5571	1170.4870	1170.4170	1170.3470	1170.2769	1170.2069	1170.1368	1170.0668	1169.9968	1169.9267
	Beam Bottom	1166.1264	1166.0563	1165.9863	1165.9163	1165.8462	1165.7762	1165.7061	1165.6361	1165.5661	1165.4960	1165.4260
Beam-3		0.0000	3.8477	7.6954	11.5431	15.3907	19.2384	23.0861	26.9338	30.7815	34.6292	38.4769

Haunch Thickness

Span SupportLine1 - SupportLine2

			Loca	tions/ Haur	ich Thickne	ess Along B	eam				
Beam Name /Reference	0/10L	1/10L	2/10L	3/10L	4/10L	5/10L	6/10L	7/10L	8/10L	9/10L	10/10L
Beam-L	0.0000	3.8477	7.6954	11.5431	15.3907	19.2384	23.0861	26.9338	30.7815	34.6292	38.4769
Left	1.6396	1.6793	1.7103	1.7326	1.7462	1.7499	1.7461	1.7322	1.7103	1.6793	1.6396
Beam CL	1.9996	2.0393	2.0703	2.0926	2.1062	2.1099	2.1061	2.0922	2.0703	2.0393	1.9996
Right	2.3596	2.3993	2.4303	2.4526	2.4662	2.4699	2.4661	2.4522	2.4303	2.3993	2.3596
Beam-2	0.0000	3.8477	7.6954	11.5431	15.3907	19.2384	23.0861	26.9338	30.7815	34.6292	38.4769

 Use the tools available to print, change the orientation, add watermarks, and export the report.

544		Parameters	Scale *	Margana	-	ID.	et al	80 Thunbhals	accimants.	Ling Fals	22 A	-	A 112	1 H	1 4 4	Mary Pages	D An and	Q 200	()]) () () () () () () () () () () () () ()	Paga Color	maternart	Eport Ta v	
ment	Print			Fape	Setup	5		Sergeton						Zoom			Page Sa	depand	0	part.			

• When done, click *Close* button to exit the report tool.

Generating the Bearing Seat Report

Like the bearing seat elevation report from BGS, this report will create a report with elevations at the centerline of bearing seat. In addition, the report will provide thickness of the seat at each corner and the center.

 Start the report creation by pressing the *Bearing Seat Report* button located in the Bridge Reporting section.



• The report will get created instantly.

Bearing Seats and Grout Pads or Bevel Plates Report

US281 Souhtbaound Mainlane

Bearing Seats

LIEVATION								
Support Line Name	Bearing Line	Girder1(')	Girder2(')	Girder3(')	Girder4(')	Girder5(')	Girder6(')	Girder7(')
Abutment1	Ahead	Beam-L	Beam-2	Beam-3	Beam-4	Beam-5	Beam-6	Beam-R
		1165.7746	1165.8764	1165.9781	1166.0798	1166.1814	1166.2829	1166.3845
Pier1	Back	Beam-L	Beam-2	Beam-3	Beam-4	Beam-5	Beam-6	Beam-R
		1165.0762	1165.1760	1165.2757	1165.3753	1165.4749	1165.5744	1165.6739
	Ahead	Beam-L	Beam-2	Beam-3	Beam-4	Beam-5	Beam-6	Beam-R
		1165 0469	1165 1466	1165 2462	1165 3458	1165 4453	1165 5447	1165 6441

Bearing Seats and Grout Pads or Bevel Plates Report

	1	D1W2	0.2500	0.2502	0.2503	0.2503	0.2502	0.2501	0.2500
		D2W1	0.2918	0.2919	0.2920	0.2920	0.2919	0.2919	0.2917
		D2W2	0.2500	0.2502	0.2503	0.2503	0.2502	0.2501	0.2500
Pier1	Back		Beam-L	Beam-2	Beam-3	Beam-4	Beam-5	Beam-6	Beam-R
		D1W1	0.2841	0.2843	0.2843	0.2844	0.2843	0.2842	0.2841
		D1W2	0.3250	0.3251	0.3252	0.3252	0.3252	0.3251	0.3250
		D2W1	0.2841	0.2843	0.2843	0.2844	0.2843	0.2842	0.2841
		D2W2	0.3250	0.3251	0.3252	0.3252	0.3252	0.3251	0.3250
	Ahead		Beam-L	Beam-2	Beam-3	Beam-4	Beam-5	Beam-6	Beam-R

• Use the tools available to print, change the orientation, add watermarks, and export the report.

Sau Sau	Parametars	Sole -	Margina	Constitutes	ID 33.	At int	80 Thundrada	acolmarks.	LANS FREE	22 ×	-	A 11 20		Mary Pages	Q Joen Out	Q 2000	() 2007 38	Paga Color	Esternant	Elport Tav		
1.00									-						-					1	1.0	

• When done, click *Close* button to exit the report tool.

Generating the Camber Report

OBM is not a design application, so the camber values need to come from an analysis application. The user can copy the values from PGSuper and paste them into OBM. The camber report is very similar to the one generated by PGSuper. TxDOT prefers the use of PGSuper for Camber reports.

1. Start the report creation by pressing the *Camber Report* button located in the **Bridge Reporting** section.



- In the *Beam Camber and Deflections* dialog box, the user needs to enter the camber and deflection information.
- Once the data is entered, the user can use the *Copy Beam* to copy the information of one beam to all beams or individual beams.

Beam Copy	- 0	×
Select All Select None		
Beardings 1		
D 📓 Supportional - Supportional		
Bear-1		
Been-2		
Seam-3		
E ban-i		
D Seat-1		
Beati-6		
i fear-4		
E Supportional - Supportional		
Death-L		
Lo bear-2		
D Base 2		
C Degrad		
PC anter a		
C true i		
a Planet ind - Lound ind		
a Classes and a state		
	Crev	

- Press *Save* to save the camber and deflection information entered. Press *Generate* to create the camber report.
- In the report view the user can filter the report by span, beams, and number of points per beam. Once configured press the *Submit* button to create the report.

Parameters	□ Ŧ ×						
Beam Group	BeamGroup1 -						
Span	SupportLine1 - SupportL *						
Beam	Beam-L, Beam-2, Beam	Bridge: US281 Soul	htbaound Mainlane				
Points Per Span	11 1	Bridge Unit: BU01 :	: Beam Slab Concrete	-Girders Bridge			
		Group: BeamGroup	1				
	Reset Submit	Span: SupportLine1	- SupportLine2				
		<u>Beam: Beam-L</u> Input: Camber = 0.2510 '	', Self. Defl. = 0.1520 ", Add	'l. Defl. = 0.0750 "			
		Check Point	Dist. Along CL WPT-WPT ()	Final Deck Elevation ()	Screed Elevation ()	Girder Top Elevation (Erected) ()	Screed Ht. Above Girder ()
		1	0.0000	1171.5210	1171.5210	1170.5346	0.9864
		2	3.9500	1171.4528	1171.4460	1170.4704	0.9755
		3	7.9000	1171.3838	1171.3717	1170.4046	0.9671
		4	11.8500	1171.3141	1171.2982	1170.3371	0.9611
		5	15.8000	1171.2436	1171.2254	1170.2679	0.9575
		6	19.7500	1171.1723	1171.1534	1170.1971	0.9563

• Use the tools available to print, change the orientation, add watermarks, and export the report.

12 544	Parameters	Scale y	Margen	Boundary	ID Say	80 Ted	80 Thundrada	 Láng Falla	1 22	-	A 11		Many Pages	Q Joen GA	Q 200	(E) 2005 B	Fage Color	Indurnat	Eport Tav	

• When done, click *Close* button to exit the report tool.

Generating the Pier Report

The pier report provides elevations at top of cap at the edges of the cap, cap lengths, drilled shafts top and bottom elevations, drilled shaft lengths, column top and bottom elevations, and column lengths. This report is limited to OBM Templates and will not include pier information for parametric cells.

1. Start the report creation by pressing the *Pier Report* button located in the **Bridge Reporting** section.



• In the report view the user can filter the report by bridges, units, and piers. Once configured press the *Submit* button to create the report.

Parameters	0	1∓×							
Selected Bridge	e Active	•							
Selected Unit	Active								
Related Res	101301 0000 315 O		Bridge Name: US2	81 SBML					
selected Plet	05201_3091.1213.0	0 P +	Beldes Helt Off O	N Danata C.			and Black Comment	Oladam Baldan	
			Bridge Unit: 210.0	o Prestr. Ca	inc. I-bear	n Unit (40-120-40) :: D	earn blab Concret	e-Girdens Bridge	
	Repet S	Jindu	Abutment: Abutme	ont1					
	- because and beau		20	(ap				
			Station		14+18.00				
			Direction		N8514533.1	13°W			
			Cap Elevation Left ()		1165.5342				
			Cap Elevation Right ()		1158.2442				
			Cap Length ()		42.6479				
			S. Same		unonan	Pile	6		(*
			Pile #	Top Ex	wation ()	Bottom Elevation (1)	Length ()	Top X ()	Top Y ()
			1	116	1005	1133.1005	30.0000	2152950 4858	13840285.0186
			2	116	3.2927	1133.2927	30.0000	2152961.9835	13840284.1545
			3	116	1.4850	1133.4850	30 0000	2152973.5012	13840283 3105
		2012-0020	4	115	3.6773	1133.6773	30.0000	2152985.0188	13840282.4565
Document Ha	ip C	1 # X							
 Per Elevation 	ns Report		Pier: Bent2						
> Bridge N	ame: US201_SDML		Sec	(ap				
			Station		14-63.00				
			Direction		N85"45'33.	13'W			
			Cap Elevation Left ()		1164.7012				
			Cap Elevation Right (1)		1165.3953				
			Cap Length ()		42.6479				
					100401-000				
				Colu	mn #1				
			Top Left Elevation ()		1161.2414				
			Top Center Elevation ()	i	1161.2658	1			
			Top Right Elevation ()		1161.2903				
			Bottom Elevation ()		1152,2533				
			A second in						

• Use the tools available to print, change the orientation, add watermarks, and export the report.



• When done, click *Close* button to exit the report tool.

This concludes the bridge report generation section.

Creating and Manipulating Bridge Templates

Review of the available Libraries

TxDOT has created several template libraries, and material libraries that include elements to model a standard bridge. However, these libraries do not cover all possible cases and will need to be modified. The user can modify the templates once they have been placed, and any changes will remain within the Bridge Model file. Some libraries are dependent on other libraries like the Cross-Frame library depends on the Connection Plate library when the user wants to use connection plates in the cross frame.

Knowledge Tip: Currently the Template dialog boxes to open existing libraries or to save new libraries is not integrated with ProjectWise, so when creating new templates, it is recommended to copy all the template libraries located in **99** - *Project Standards\Bridge Templates* to somewhere in the network drive to share the library with others that can use it.

The material library needs to be updated per project per beam design. Create or copy beam materials so that the material reflects the f'c and f'ci for the design.

- 1. This example will modify the field splice template used in the steel bridge exercise. Make the US281_NBML bridge the active bridge before starting.
- Open the field splice library by clicking on the *Splices* button located in the Libraries section of the Utilities tab.



3. In the *Field Splice Library* dialog box, select the **Web** tab.



4. In the **Web** tab, note that there is no input for the plate dimension, instead, the plate is built by the offsets, spacings, and number of bolts provided.

5. Recall from section 2 that our web height for the beam was 54", the current number of rows makes the plate 66" tall, change the **Bolts Rows** from **11** to **8** and the plate size will be updated.

General	Web	Top Flange	Bottom Flange	General	Web	Top Flange	Bot
Top Clea	arance("):	3.0000	1	Top Cle	arance("):	3.0000	1
Horizontal	l Edge("):	3.0000	2	Horizonta	l Edge("):	3.0000	2
Cros	ssover("):	6.0000	3	Cro	ssover("):	6.0000	3
Column Sp	pacing("):	6.0000	4	Column S	pacing("):	6.0000	4
Vertical	l Edge("):	3.0000	5	Vertica	l Edge("):	3.0000	5
Row Sp	pacing("):	6.0000	6	Row S	pacing("):	6.0000	6
Plate Thio	ckness("):	1.0000		Plate Thi	ckness("):	1.0000	
Plate H	Height("):	65.9999		Plate	Height("):	47.9999	
Plate L	.ength("):	35.9999		Plate	Length("):	35.9999	
	Bolts				Bolts		
	Rows:	11 <			Rows:	8 <	<
C	Columns:	3	0		Columns	3	0

- 6. When the changes are complete press the *Save* button to close the dialog and accept all changes.
- 7. Because we modified the existing template, the bridge will be updated. If we look at the plate now, we will see that it now fits perfectly.



Creating a Deck Template

In this section we will be creating a deck meant to be used in phased construction or divided highway. The control point will be located outside the deck limits and the deck will be offset to the left or right.

1. Open *View 4* in the view control tool bar.



2. Press on the *Decks* button located in the Libraries in the Utilities tab.



 In the *Template Creation* dialog box, press the **Open** button to load the library store in your Network drive. (Libraries stored in ProjectWise cannot be modified at this moment).



4. Once the library is loaded, navigate to the TxDOT Decks folder.



5. Right click on the **TxDOT Decks** and select **Add Template**. Provide a name and description and

press OK.

- Name: LT Offset Deck
- Description: Training Deck



6. Click anywhere in the view 4 previously opened.

7. Once the **WP** appears in the view, use the block tool to place a block by the green point at the bottom of the view.



Once the block is drawn, press the *Import template from model* button located at the top of the view. Then press *Yes* in the dialog box to accept the import.



- 9. Back to the *Template Creation* dialog, we will rename the points of the deck.
 - P_0 > *Top_R*
 - P_1 > *Bott_R*
 - P_2 > **Bott_L**
 - P_3 > **Top_L**

Note: For every change the user must click **Save** to save the changes or point rename.

Points					
Name	Type1	Type2	Variable1	Variable2	
Bott_L					
Bott_R					
Top_L					
Top_R					

- 10. Once the point names have been updated, select the $\textit{Top}_\textit{L}$
 - In the **Point Constraints** section change
 - Mode: *Horizontal and Slope*
 - Horizontal Parent: **Top_R**
 - Horizontal Value: -13
 - Horizontal Variable: **DeckWidth**
 - Slope Parent: Working Point
 - Slope Value: 0.02
 - Slope Variable: DeckSlope
 - Click **Save** to accept the changes.

Edit Details				
Name T	op_L		Superelevation Flag	
Point Cons	straints			
	Mode	Horizontal + S	Slope	
	Constraint		Constraint	
Туре	Horizontal		Slope	
Parent	Top_R	\sim	Top_R	\sim
Value	-13.0000		0.0200	
Variable	DeckWidth	\sim	DeckSlope	\sim

- 11. Select the *Top_R* and in the **Point Constraints** section change:
 - Mode: Horizontal and Slope
 - Horizontal Parent: Working Point
 - Horizontal Value: -10
 - Horizontal Variable: **DeckOffset**
 - Slope Parent: Working Point
 - Slope Value: 0.02
 - Slope Variable: DeckSlope [Select from drop down list]
 - Click **Save** to accept the changes.

Name To	pp_R	Superelevation Flag
Point Con	straints	
	Mode Horiz	ontal + Slope
	Constraint	Constraint
Туре	Horizontal	Slope
Parent	Working Point	Working Point \sim
Value	-10.0000	0.0200
Variable	DeckOffset	∕ DeckSlope ∨

- 12. Select the *Bott_R* and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: Top_R
 - Horizontal Value: **0**
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: **Top_R**
 - Vertical Value: -0.7083 [8.5"]
 - Vertical Variable: DeckThickness
 - Click **Save** to accept the changes.

Edit Details			
Name Bo	ott_R	Superelevation	Flag
-Point Cons	straints		
	Mode Horiz	ontal + Vertical	
	Constraint	Constraint	
Туре	Horizontal	Vertical	
Parent	Top_R	V Top_R	\sim
Value	0.0000	-0.7083	
Variable	,	~ DeckThic	ckness v

13. Select the *Bott_L* and in the **Point Constraints** section change:

- Mode: Horizontal and Vertical
- Horizontal Parent: Top_L
- Horizontal Value: **0**
- Horizontal Variable: <Leave Blank>
- Vertical Parent: **Top_L**
- Vertical Value: -0.7083 [8.5"]
- Vertical Variable: DeckThickness [Select from drop down list]
- Click **Save** to accept the changes.

-Edit Deta	ils				
Name	Bott_L		Supe	erelevation Flag	
PointC	onstraints				
	Mode	Horizontal + \	/ertical		
	Constra	aint		Constraint	
Туре	Horizo	ontal		Vertical	
Parent	Top_	×		Top_L	\sim
Value	0.0000)		-0.7083	
Variable	e	\sim		DeckThickness	\sim

14. Once all variables have been created and all points are constrained, right click on the name of template, and select *Verify*. This will open a separate window where the user can test the variables and the new template.

Rename	Conset Deck		6 - VV	- 0
X Delete	回 乙 H T 5 1 T 1 1 1 1 H	1	Name	Value
Copy	104-XRH == 24		Detromet	0.0000
Mirror			Dark Thickness	0 2053
Edit Description			DeckWidth	-13 0000
Edit Geometry			DeckSlope	0.0200
		<u>م</u>		
		•		

- 15. The template is meant to be used as the left side of a divided highway or phase construction with a single alignment, to create the right side right click on the template name and select *Copy*, then select the newly copied template, right click on it, and select *Mirror*. The user will need to revise and verify that the mirrored template works properly before using it.
- 16. This concludes the creation of the deck template. The user can now close the *Template Creation* dialog box.

Note: The user will need to load the library from the network location in order to use any new template since these are not saved in ProjectWise.

Creating a Rail Template

In this section we will be creating a traffic barrier (T223). The control point will be located outside of the rail element since most rails in TxDOT get placed 1.5'' from the edge of the deck.

1. Open View 4 in the view control tool bar.



2. Press on the **Barriers** button located in the **Libraries** in the **Utilities** tab.



 In the *Template Creation* dialog box, press the **Open** button to load the library store in your Network drive. (Libraries stored in ProjectWise cannot be modified at this moment).



4. In the *Template Creation* dialog box navigate to the **Barriers/TxDOT** folder.



- 5. Right click on the **TxDOT** and select **Add Category**. Provide a name and press **OK**.
 - Name: *Training Barriers*

Barriers		
	Rename	
	Delete	ec
🗄 👘 VD 🗾	Add Category	
Hail Ira	Add Template	4
		×
	Category Training	y: g Barrier
		OK Cancel

6. Right click on the **Training Barriers** and select **Add Template**. Provide a name and description and press **OK**.

- Name: New T223 Barrier LT
- Description: Left T223 Barrier

Barriers Den FOOT ToDOT Rais web S Rais web S Rais web S Rais web S Rais web S Rais racks S Sdewaks	old Wal dts (Une Rename Delete Add Category			
	Add lemplate	5. .		×
Name	New T223 Barrier LT			
Description	Left T223 Barrier			
		ОК	Car	cel

- 7. Click anywhere in the view 4 previously opened.
- 8. Once the **WP** appears in the view, use the smart line tool to place a polygon by the green point at the bottom of the view. Trace a shape like the T223 barrier but does not need to be exact.



Note: The polygon does not need to be exact, it only needs the correct number of lines and vertices.

9. Once the polygon is drawn, press the *Import template from model* button located at the top of the view. Then press **Yes** in the dialog box to accept the import.



- 10. Back to the *Template Creation* dialog, we will rename the points of the deck.
 - P_0 > **Post_Bott_R**
 - P_1 > **Post_Top_R**
 - P_2 > **Barrier_Bott_R**
 - P_3 > **Barrier_Top_R**
 - P_4 > **Barrier_Top_L**
 - P_5 > **Barrier_Bott_L**
 - P_6 > *Post_Top_L*
 - P_7 > *Post_Bott_L*

Note: For every change the user must click *Save* to save the changes or point rename.

Points				
Name	Type1	Type2	Variable 1	Variable2
Barrier_Bott_L				
Barrier_Bott_R				
Barrier_Top_L				
Barrier_Top_R				
Post_Bott_L				
Post_Bott_R				
Post_Top_L				
Post_Top_R				

- 11. Now we will correct the rail dimensions to match the TxDOT standard size by adjusting the constraints of each point. Select the *Post_Bott_R* and in the **Point Constraints** section change:
 - Mode: *Horizontal and Vertical*
 - Horizontal Parent: Working Point
 - Horizontal Value: 0.125 [1.5"]
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: Working Point
 - Vertical Value: **0**
 - Vertical Variable: *Drain_Slot_H*
 - Click **Save** to accept the changes.

oint Con	straints	
	Mode Horizonta	al + Vertical
	Constraint	Constraint
уре	Horizontal	Vertical
Parent	Working Point $~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~$	Working Point $~~$ $~~$
/alue	1.5/12	0
/ariable	~	Drain_Slot_H 🗸

- 12. Select the *Post_Bott_L* and in the **Point Constraints** section change:
 - Mode: *Horizontal and Vertical*
 - Horizontal Parent: **Post_Bott_R**
 - Horizontal Value: 0.7916 [9.5"]
 - Horizontal Variable: **Post_Width**
 - Vertical Parent: **Post_Bott_R**
 - Vertical Value: **0**
 - Vertical Variable: <Leave Blank>
 - Click **Save** to accept the changes.

Edit Details		
Name Po	st_Bott_L	
-Point Cons	straints	
N	Node Horizontal + Vertical	
	Constraint	Constraint
Туре	Horizontal	Vertical
Parent	Post_Bott_R ~	Post_Bott_R ~
Value	9.5/12	0.0000
Variable	Post_Width ~	~

- 13. Select the **Post_Top_L** and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: **Post_Bott_L**
 - Horizontal Value: **0**
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: **Post_Top_R**
 - Vertical Value: **0**
 - Vertical Variable: <Leave Blank>
 - Click **Save** to accept the changes.

-Edit Details				
Name Po	ost_Top_L			
Point Con	straints			
	Mode	Horizontal + Ve	ertical	
	Constraint			Constraint
Туре	Horizontal			Vertical
Parent	Post_Bott_L	\sim		Post_Top_R ~
Value	0.0000			0
Variable		\sim		~

- 14. Select the **Post_Top_R** and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: Working Point
 - Horizontal Value: 0.125 [1.5"]
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: *Working Point*
 - Vertical Value: 1.0833 [1'-1"]
 - Vertical Variable: Post_Height
 - Click **Save** to accept the changes.

Edit Details						
Name Po	Name Post_Top_R					
Point Con	straints —					
	Mode	Horiz	ontal + Vertical			
	Constrai	nt		Constraint		
Туре	Horizo	ntal		Vertical		
Parent	Workin	ig Point	~	Working Point $~~$ \sim		
Value	0.1250			13/12		
Variable			~	Post_Height ~		

- 15. Select the *Barrier_Bott_R* and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: **Post_Top_R**
 - Horizontal Value: -0.125 [1.5"]
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: **Post_Top_R**
 - Vertical Value: **0**
 - Vertical Variable: <Leave Blank>
 - Corner Attributes Mode: *Chamfer*
 - Corner Attributes Distance: 0.0625 [3/4"]
 - Corner Attributes Variable: Chamfer
 - Click **Save** to accept the changes.

Edit Details						
Name B	arrier_Bott_R					<u> </u>
Point Cor	nstraints				Comer Attr	ributes
	Mode	Horizontal + Vert	ical		Mode	Chamfer \checkmark
	Constraint		Constraint		Distance	.75/12
Туре	Horizontal		Vertical		Variable	Chamfer
Parent	Post_Top_F	۲ ×	Post_Top_R	\sim		
Value	-1.5/12		0.0000			
Variable		\sim		~		
					Do No	ot Rotate

- 16. Select the *Barrier_Top_R* and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: **Barrier_Bott_R**
 - Horizontal Value: **0**
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: *Barrier_Bott_R*
 - Vertical Value: 1.5833 [1'-7"]
 - Vertical Variable: **Barrier_Height**
 - Corner Attributes Mode: Chamfer
 - Corner Attributes Distance: 0.0625 [3/4"]
 - Corner Attributes Variable: Chamfer
 - Click **Save** to accept the changes.

Name E	s Barrier_Top_R		1
Point Co	nstraints		Comer Attributes
	Mode Horizontal + V	'ertical	Mode Chamfer \checkmark
	Constraint	Constraint	Distance .75/12
Туре	Horizontal	Vertical	Variable Chamfer
Parent	Working Point \sim	Barrier_Bott_R ~	
Value	0.0000	19/12	
Variable	~	Barrier_Height ~	
			Rotation Do Not Rotate

17. Select the *Barrier_Top_L* and in the **Point Constraints** section change:

- Mode: Horizontal and Vertical
- Horizontal Parent: Barrier_Bott_L
- Horizontal Value: **0**
- Horizontal Variable: <Leave Blank>
- Vertical Parent: *Barrier_Top_R*
- Vertical Value: **0**
- Vertical Variable: <Leave Blank>
- Corner Attributes Mode: *Chamfer*
- Corner Attributes Distance: 0.0625 [3/4"]
- Corner Attributes Variable: *Chamfer*
- Click **Save** to accept the changes.

Edit Details	amier Top I		1
Point Con	straints		Comer Attributes
	Mode Horizontal + V	'ertical	Mode Chamfer \checkmark
	Constraint	Constraint	Distance .75/12
Туре	Horizontal	Vertical	Variable Chamfer
Parent	Barrier_Bott_L ~	Barrier_Top_R ~	
Value	0.0000	0.0000	
Variable	~	~	
			Rotation
			Do Not Rotate
			Save Cancel

- 18. Select the *Barrier_Bott_L* and in the **Point Constraints** section change:
 - Mode: Horizontal and Vertical
 - Horizontal Parent: Barrier_Bott_R
 - Horizontal Value: 1.2916 [1'-3.5"]
 - Horizontal Variable: Barrier_Width
 - Vertical Parent: *Barrier_Bott_R*
 - Vertical Value: 0
 - Vertical Variable: <Leave Blank>
 - Corner Attributes Mode: Chamfer
 - Corner Attributes Distance: 0.0625 [3/4"]
 - Corner Attributes Variable: Chamfer
 - Click **Save** to accept the changes.

Edit Details			
Name Ba	amier_Bott_L		<u>_</u>
Point Con	straints		Comer Attributes
	Mode Horizontal +	Vertical	Mode Chamfer \checkmark
	Constraint	Constraint	Distance .75/12
Туре	Horizontal	Vertical	Variable Chamfer
Parent	Barrier_Bott_R ~	Barrier_Bott_R ~	
Value	15.5/12	0	
Variable	Barrier_Width \checkmark	~	
			Rotation
			Do Not Rotate

19. Once all variables have been created and all points are constrained, right click on the name of template, and select *Verify*. This will open a separate window where the user can test the variables and the new template.



20. The template is meant to be used as the left side of a bridge, to create the right side right click on the template name and select *Copy*, then select the newly copied template, right click on it and select *Mirror* and rename the template so that it indicates is the right side.



21. This concludes the creation of the barrier template. The user can now close the **Template Creation** dialog box.

Knowledge Tip: For the barrier in this exercise, we use *Horizontal and Vertical* variables for placement. By doing this we can control the height of the rail and create drain slots of post gaps using the variable constraints dialog box.

The other option for placing barrier is using the **Horizontal and Elevation Provider** variables. The elevation provider places that point directly on top of the deck. However, this option does not allow to change the height of the point in relation to the deck. This option is great for Barriers that will never have Drain Slots or for Sidewalks.

Exercise #4 – Create a Sidewalk Template

This exercise can be completed in the active file. Repeat the steps for creating a rail template (above) to now create a new template for a sidewalk. Sidewalks can be created as a deck template or as a barrier template, for this example it will be created as a barrier template.

- 1. Navigate to **Utilities > Libraries** and select **Barriers** to open the **Template Creation** dialog.
- Since sidewalks are modeled longitudinally like a bridge rail, we will create a new template under the Barrier folder. Navigate to **Barrier** > **TxDOT**, right click to select **Add Category** and name the new folder **Training Sidewalks**.
- 3. Right click on this new **Training Sidewalks** folder and select **Add Template**.
 - Name: *LT Sidewalk*
 - Description: *Left Sidewalk*
 - Click OK
- 4. Repeating the process for the rail template, click in view 4, then use the smart line tool to trace the cross section of a sidewalk. For this training, draw a 6" thick, 10 ft wide sidewalk:



5. Select the **Import template from model** button then press **Yes** in the dialog.



- 6. Rename the points of the sidewalk, clicking **Save** to update each line:
 - P_0 > Sidewalk_Top_L
 - P_1 > Sidewalk_Top_R
 - P_2 > Sidewalk_Bott_R
 - P_3 > *Sidewalk_Bott_L*

Points				
Name	Type1	Type2	Variable 1	Variable2
Sidewalk_Bott_L				
Sidewalk_Bott_R				
Sidewalk_Top_L				
Sidewalk_Top_R				

BIDEWALK_TOP_L	\$1DEWALK_TOP_R
STARALK_BUTT_L	SIDEWALK_BOTT_R

7. Adjust the point constraints to attach the sidewalk bottom to the bridge deck, add a ¾" chamfer to the left top and left bottom corners of the sidewalk, and add a 2" fillet to the top right corner to represent the curb per TxDOT standard drawing BRSM. See Sidewalk_Top_R Point Constraints on how to adjust your toe offset.



- Select the *Sidewalk_Bott_L* and in the **Point Constraints** section change:
 - Mode: *Horizontal and Elevation Provider*
 - Horizontal Parent: Sidewalk_Top_L
 - Horizontal Value: 0
 - Horizontal Variable: <Leave Blank>
 - Elevation Provider: <Leave Blank>
 - o Corner Attributes Mode: Chamfer
 - Corner Attributes Distance: 0.75/12 [3/4"]
 - Corner Attributes Variable: Chamfer
 - Click **Save** to accept the changes

Edit Deta	ails					
Name	Sidewalk_E	Bott_L				1
Point C	onstraints				Comer Attr	ibutes
	Mode	Horizontal + Elevatio	on Provider		Mode	Chamfer \checkmark
	Constra	int	Constrain	t	Distance	0.0625
Туре	Horizo	ontal	Elevatio	n Provider	Variable	Chamfer
Parent	Sidewa	alk_Top_L 🗸 🗸	Working) Point 🗸 🗸		
Value	0.0000)	0.0000			
Variabl	e	~		~		
					- Rotation -	t Pototo
						I NOIGIE
						Save Cancel

- Select the *Sidewalk_Bot_R* and in the **Point Constraints** section change:
 - Mode: Horizontal and Elevation Provider
 - Horizontal Parent: *Sidewalk_Bott_L*
 - Horizontal Value: 10
 - Horizontal Variable: Sidewalk_Width
 - Elevation Provider: <Leave Blank>
 - Corner Attributes Mode: <Leave Blank>
 - Click **Save** to accept the changes

ame S	idewalk_Bott_R		1
Point Cor	nstraints		Comer Attributes
	Mode Horizontal + Eler	vation Provider	Mode None
	Constraint	Constraint	
Туре	Horizontal	Elevation Provider	
Parent	Sidewalk_Bott_L \sim	Working Point \sim	
Value	10.0000	0.0000	
Variable	Sidewalk_Width \lor	\sim	
			Rotation
			Do Not Rotate

- Select the Sidewalk_Top_L and in the Point Constraints section change:
 - o Mode: Horizontal and Vertical
 - o Horizontal Parent: Working Point
 - Horizontal Value: 0
 - Horizontal Variable: <Leave Blank>
 - Vertical Parent: *Sidewalk_Bott_L*
 - Vertical Value: 0.5
 - Vertical Variable: <Leave Blank>
 - o Corner Attributes Mode: Chamfer
 - Corner Attributes Distance: 0.75/12 [3/4"]
 - o Corner Attributes Variable: Chamfer
 - Click Save to accept the changes

-Edit Deta Name	ails Sidewalk_Top_L		1
Point C	Constraints		Comer Attributes
	Mode Horizontal + V	ertical	Mode Chamfer \checkmark
	Constraint	Constraint	Distance 0.0625
Туре	Horizontal	Vertical	Variable Chamfer
Parent	Working Point \sim	Sidewalk_Bott_L \sim	
Value	0.0000	0.5000	
Variab	le 🗸 🗸	~	
			Rotation
			Do Not Rotate
			Save Cancel

- Select the *Sidewalk_Top_R* and in the **Point Constraints** section change:
 - Mode: *Horizontal and Vertical*
 - Horizontal Parent: *Sidewalk_Bott_R*
 - Horizontal Value: -2/12 [2"]
 - Horizontal Variable: <*Leave Blank*>
 - Vertical Parent: *Sidewalk_Bott_L*
 - Vertical Value: 0.5
 - Vertical Variable: <Leave Blank>
 - Corner Attributes Mode: *Fillet*
 - Corner Attributes Distance: 2/12 [2"]
 - Corner Attributes Variable: *Fillet*
 - Click **Save** to accept the changes

Point Con	straints		Comer Attributes
	au dii ka		Conter Autobiles
	Mode Horizontal	+ Vertical	Mode Fillet
	Constraint	Constraint	Radius 0.1667
Туре	Horizontal	Vertical	Variable
Parent	Sidewalk_Bott_R \sim	Sidewalk_Bott_R \sim	
/alue	-0.1667	0.5000	
/ariable	~	~	
			Rotation
			Do Not Rotate

- Close the Template Creation dialog.
- 8. Place your new sidewalk template. Select the *Place Barrier* tool from Home > Accessory.
 - Template Name: *LT Sidewalk*
 - Name Prefix: *Sidewalk*

🔏 Place Barrier	_	×
Barrier		*
Template Name	LT Sidewalk	
Start Station Offset	0.0000	
End Station Offset	0.0000	
Horizontal Offset	0.0000	
Vertical Offset	0.0000	
Material		*
Barrier Material		
Pay Unit	Linear Unit	\sim
Solid Placement		*
Chord Tolerance	0.1000	
Max Dist Between Sections	16.4042	
T 1 1 1 1 1 1		
lemplate Orientation	Vertical	\sim
Start Cut Orientation	Vertical Follow Skew	~
Start Cut Orientation Start Cut Orientation End Cut Orientation	Vertical Follow Skew Follow Skew	>
Start Cut Orientation End Cut Orientation Build Order	Vertical Follow Skew Follow Skew	>
Start Cut Orientation End Cut Orientation Build Order Barrier Build Order	Vertical Follow Skew Follow Skew	
Start Cut Orientation End Cut Orientation Build Order Barrier Build Order Feature	Vertical Follow Skew Follow Skew	> > >
Start Cut Orientation Start Cut Orientation End Cut Orientation Build Order Barrier Build Order Feature Feature Definition	Vertical Follow Skew Follow Skew 1 Barrier	> > >

- Data point on the bridge deck in View 3, right click to reset, then data point again.
- Now we will define a line along the deck to be used as a reference for placing the sidewalk. In the Path Selection dialog, click **Select Guideline from List**



Since we want to place the left sidewalk along the left top edge of the deck, choose *EOP_L* then click *OK*.



- Click OK to close the Path Selection dialog and place the sidewalk.
- Example result:



9. Practice this exercise once more, this time creating a template named *RT Sidewalk* for the right sidewalk. Keep in mind the **Path Selection** places the element based on the position of the working point, so draw the cross section for the right sidewalk so that the WP will be at the top right corner.



This concludes the tutorial on creating and manipulating bridge templates.

Plan Production Tools

Bridge Layout

In this section we will create a bridge layout using the Plan Production tools within OBM, these tools are the same ones available in MicroStation and ORD. For Bridge Layouts, the process is the same as creating Plan and Profile sheets in ORD. We will create a plan boundary and a profile boundary.

Note: Creation of Bridge Layouts is not fully automated. Bridge Layouts are created with a combination of manually drawn elements and automatic 2D shapes gathered from the 3D models of the bridges.

 While in OBM, open the Completed Bridges.dgn located in the Bridge \Bridge x \Completed \ folder.

F	older		
	🖉 Completed Files	✓ ♦	Ĺ
	A D		
	Jocument		
	Name	File Name	
	Enter text here	Enter text here	
	✓ Gmpleted Bridges.dgn	Completed Bridges.dgn	
	٢	>	

2. Once the file opens, the required views will be already setup.

Note: The views were opened by performing a long right click and selecting

View Control > 3 Views/Plan/Profile/3D like what was done when the riprap was created to open the profile view of the abutments.



3. Add a 3D Cut to the profile view to display the bridge elements.



Note: Adjust the 3D Cut offset until the profile is showing what is needed, add additional 3D Cuts with different offsets as needed.

 Create the plan boundary using the *Place Name Boundary* tool located in the **Drawings** section of the **Reports and Drawings** tab.



- Press anywhere in the plan view to activate the view.
- Select the first icon at the top of the dialog.
- In the plan view select the **Southbound Alignment**.
- In the plan view select the start and end limits of your sheets, the sheet boundaries will show make sure you only get the needed boundaries to capture the bridge.
- Back to the **Place Boundary** dialog box.
 - Drawing Seed: Bridge Layout Plan
 - Detail Scale: 1"=20'
 - Name: *Layout Plan*
 - Start Station: **12+80.00**
 - End Station: **17+40.00**
 - Create Drawing: False
 - Boundary Chords: 20

here Named Boundary Civil Plan —				
	◚◸▥▧◜◜◜◸▯▯ぺ			
Drawing Seed:	Bridge Layout - Plan 👻			
Detail Scale:	1"=20' 🗸			
Name:	Layout Plan			
Description:				
Group:	(New) 🔻			
Name:	SB_US281			
Description:				
Start Location:	12+80.00	◀		
Stop Location:	17+40.00	▶		
Length:	230.000000	oo finites		
Left Offset:	50.000000			
Right Offset:	-50.000000	ee		
Overlap:	0.000000	ee		
Boundary Chords:	20			
	Create Drawing			
	Show Dialog			

Press again anywhere in the plan view to complete the creation of the boundaries.



 Create the profile boundary using the *Place Name Boundary* tool located in the **Drawings** section of the **Reports and Drawings** tab.



- Press anywhere in the profile view to activate the view.
- Select the third icon at the top of the dialog.
- In the profile view select the white profile line.
- Back to the **Place Boundary** dialog box.
- Drawing Seed: Bridge Layout Profile
- Detail Scale: 1"-20'
- Name: *Layout Profile*
- Method: From Plan Group
- Use Active Vertical: True
- Create Drawing: True
- Show Dialog: True

A Place Named Boundary	y Civil Profile	- 12	×
	AP	DIA	
Drawing Seed:	Bridge Layout - Profile	-	
Detail Scale:	1"=20	-	
Name	Layout Profile		
Description			
Methodi	From Plan Group	•	
Plan Group:	SB_US281	-	
Group:	(New)	-	
Name	Layout Profile		
Description	From Plan Group: 58_US281		
Vertical Exaggeration:	1.000000		
Available Profile Height	90.000000		-
D Top Clearance	0.000000		
Bottom Clearance	0.000000		
Elevation Datum Spacing:	10.000000		
Station Datum Spacing	40.000000		
Profile Shiftsi	Datum Stations		
	Use Terrains		
	Use Active Vertical		
	Whole Conduits Only		
	Create Drawing		
	Show Dialog		

- Press anywhere in the profile view to accept and create the boundaries, and the *Create Drawing* dialog will open.
- In the Plan side (Left)
 - View Name: *Bridge Layout Plan*
 - Drawing Model Name: Layout Plan 01
 - Enable the *Filename* field by checking the toggle.
 - Press the Create new Drawing file
 - Select No Wizard and press OK
 - Save the new file to folder 4 Design \Bridge \Bridge X \
 - File Name: *Layout Drawings.dgn*
 - Description: Drawing Models for Bridge Layout
 - Press Save to create file.

Folder		<u>S</u> ave
Bridge X	Select	Cance
Document		
Name:	Layout Drawings.dgn	
Description:	Drawing Models for Bridge Layout	
File Name:	Layout Drawings.dgn	
Format:	dgn Eormat	

- Scale: 1"=20'
- Annotation Group: Brg Plan 20Scl
- Sheet Model Name: Bridge Layout Sheet 01
- Enable the *Filename* field by checking the toggle.
 - Press the Create New Sheet File
 - Select No Wizard and press OK
 - Save the new file to folder 4 Design \Bridge \Bridge X \
 - File Name: Layout Sheets.dgn
 - Description: Sheet Models for Bridge Layout
 - Press Save to create file.

Folder				<u>S</u> ave
Bridge X			Select	Cancel
Document				
Name:	Layout Sheets.dgn			
Description:	Sheet Models for Bridge	Layout		
File Name:	Layout Sheets.dgn			
Format:	dgn		Eormat	

- Scale: Full Scale 1 =1
- Detail Scale: 1"=20'
- In the Profile side (Right)
 - View Name: *Bridge Layout Profile*
 - Drawing Model Name: *Layout Profile 01*
 - Enable the *Filename* field by checking the toggle.
 - Press the Browse Drawing file
 - Open the previously created file: Layout Drawings.dgn
 - Scale: 1"=20'
 - Annotation Group: Brg Profile 20Scl
 - Sheet Model Name: Bridge Layout Sheet 01
 - Scale: Full Scale 1 =1
 - Detail Scale: 1"=20'

a (ireate Drawing								×
	Mod	e Plan and Profile							
	One Sheet Per Dg	n (0					
	View Name	Bridge Leyout Plan			View N	lame	Bridge Layout Profile		
	Drawing Seed	Bridge Leyout - Plan *			Drawing	Seed	Bridge Layout - Profile .	•	
	View Type:	Civil Plan			View	lype.	Civil Profile		
	Discipline	Bridge			Disci	plee	Bridge		
	Purpose	Plan View			Put		Profile View		
		Drawing Model					Drawing Model		
	Model Name	Layout Plan 01			Model N	lame	Leyout Profile 01		
	Seed Model:	%DOT_BridgeLayout-Sheet-Definition.dg			Seed M	Andelt	%DOT_BridgeLayout-Sheet-Definition.d	9	
	Filename	Layout Drawings.dgn	🗢 📭	14	E File	name	Leyout Drawings.dgn		a 14
	4	1'=20 -				4	1'+20'	3	
	Annotation Group:	Brg Plan 205d			Annotation G	inoup	Brg Profile 205cl	3	
		Sheet Model					Sheet Model		
	Model Name	Bridge Leyout Sheet 01			Model N	Varne:	Bridge Layout Sheet 01		
	Seed Model	%DOT_BridgeLayout-Sheet-Definition.dg			Seed M	Audel:	%DOT_BridgeLayout-Sheet-Definition.d	a].	
	Filename	Layout Sheets.dgn	•	12	E Fierar	name:	(Active File)		0.12
	Sheets	(New) *			5	heets	(New) -	•	
	<u>A</u>	Full Size 1 = 1 +				4	Full Size 1 = 1	•	
	Drawing Boundary:	Bridge Leyout - Plan 👻			Drawing Bour	ndaryr	Bridge Layout - Profile .	•	
	Detail Scale :	1"=20" -			Detail 5	Scale	1"=20" (By Named Boundary)	•	
		Add To Sheet Index							
		Make Sheet Coincident							
		🖉 Open Model							
							QK	Ca	ncel

- Press **OK** to create the sheets and drawings.
- The process may take some time depending on the number of sheets getting created and at times the process will ask the users to *Update Server Copy* or to *Check In* files in ProjectWise.
- When the process is done it will open on the Sheet model file, on the last sheet of the process.



- Return to the *Completed Bridges.dgn* to create the **Typical** section drawing.
- Create the typical section boundary using the *Place Name Boundary* tool located in the Drawings section of the **Reports and Drawings** tab.



- Press anywhere in the plan view to activate the view.
- Select the fourth icon at the top of the dialog.
- In the plan view select the **Southbound Alignment**.
- In the plan view select the start and end locations for the sections.
- Back to the **Place Boundary** dialog box.
- Drawing Seed: Bridge Layout Transverse
- Detail Scale: **1"-20'**
- Name: **SB_US281-Section**
- Start Station: **15+00**
- End Station: **15+00**
- Top Clearance: 5
- Bottom Clearance: 5
- Create Drawing: True
- Show Dialog: True

All PL	ice Named Boundary	y Civil Cross Section - 🗆)
		APES/PDDA	
	Drawing Seed:	Bridge Layout - Transverse ·	1
	Detail Scale:	1°=20′	
	Group:	(New) -	
	Name	SB_US281-Section	
	Description	0	
	Start Location:	15+00.00	1
	Stop Location:	15+00.00	-
	Left Offset:	-50.000000	1 =
	Right Offset:	50.000000	1 -
	Interval:	100.000000	1 -
Ve	ertical Exaggeration:	1.000000	
	Top Clearance:	5.000000	
	Bottom Clearance:	5.000000	
Elevat	ion Datum Spacing:	10.000000	
	Event Point List:	(None) -	
		Include Event Points Only	
		Include Control Points	
		Backward Facing	
		Create Drawing	
		Show Dialog	

- Press anywhere in the plan view to create the boundary, and the *Create Drawing* dialog will open.
 - View Name: Bridge Layout Section
 - Drawing Model Name: Layout Section 01
 - Enable the *Filename* field by checking the toggle.
 - Press the Browse Drawing file
 - Open the previously created file: Layout Drawings.dgn
 - Scale: 1"=20'
 - Sheet Model Name: Bridge Layout Sheet 03
 - \circ Enable the *Filename* field by checking the toggle.
 - Press the Browse Sheet file
 - Open the previously created file: *Layout Sheets.dgn*
 - Sheets: Bridge Layout Sheet 01
 - Scale: Full Scale 1 =1
 - Detail Scale: 1"=20'

Create Drawing		×			
Med Crie Sheet Per Dy View Name: Drawing Seed: View Type: Discipline: Purpose:	e Cross Section Indge Layout Section Bridge Layout - Tensorere Cold Cross Section Bridge Tensorerse Section		Model Name: Seed Model Filename: Sheets	Sheet Model Create Sheet Model Bridge Layout Sheet 03 Ts:DOT, BridgeLayout-Sheet Definition dg Layout Sheets dgn Bridge Layout Sheet 01 Frid Steel = 1 Frid	• 14
Model Name Seed Model: Filename Association Group	Drawing Model Layout Section 01 hDDT_BridgeLayout-Sheet-Definition.dg Layout Drawings.dgn 1°=20 • •	• 0	Detail Scale :	yeenny 1°±20 Add To Sheet Index Make Sheet Coincident ⊘ Open Model ØK	Cancel

• The section drawing will get referenced into the sheet selected, in this case **Bridge Layout Sheet 01**.

Note: If the bridge varies on the number of beams per span, the user needs to create more sections to reflect the spans and number of beams.



- 7. Once all drawings are created, all annotations and additional drafting will be done in the Drawing models.
- Refer to the Bridge Detailing Guide and the Bridge OBM Workflow documents to finish the detailing of the Bridge Layout. This concludes the Bridge Layout section.
 Note: The scale used in the example turned out to be too small, in production the user needs to make the decision that best fits their needs for the scale and if the typical section needs its own sheet.

Superstructure Drawings

In this section we will create superstructure drawings using a combination of the previously used **Place** Named Boundary tools. This example will create the span sheet, the same steps can be followed to create the framing plan. This example will not fully annotate the drawings, for that the user will need to refer to the Bridge Detailing Guide and the Bridge OBM Workflow documents.

1. Create the plan boundary using the *Place Name Boundary* tool located in the **Drawings** section of the Reports and Drawings tab.



- Press anywhere in the plan view to activate the view. ٠
- Select the first icon at the top of the dialog. •
- In the plan view select the **Southbound Alignment**. •
- In the plan view select the start and end limits of your sheets, for these sheets the approach • slabs do not need to be included.

- Back to the **Place Boundary** dialog box. .
- Drawing Seed: Bridge Details Plan •
- Detail Scale: 1"-20' •
- Name: Span Sheet Plan
- Start Station: 14+11.00 •
- End Station: 16+41.00
- Create Drawing: True •

🔏 Place Named B	oundary Civil Plan —	\times
	◚掉▥▧◞◢ਲ਼◻▯ݕ	
Drawing Seed:	Bridge Details - Plan 🔹	
Detail Scale:	1"=20' 🔹	
Name:	Span Sheet Plan	
Description:		
Group:	(New) 🔻	
Name:	Span Sheet Plan	
Description:		
Start Location:	14+11.00	◀
Stop Location:	16+41.00	▶
Length:	230.000000	00 111111
Left Offset:	-50.000000	00 Initai
Right Offset:	50.000000	•••
Overlap:	0.000000	00 1771778
Boundary Chords:	10	
	Create Drawing	
	Show Dialog	

Press again anywhere in the plan view to create the boundaries. •
- 2. In the **Create Drawing** dialog:
 - View Name: Span Sheet Plan 01
 - Drawing Model Name: Span Sheet Plan 01
 - Enable the *Filename* field by checking the toggle.
 - Press the Create New Drawing File
 - Select **No Wizard** and press **OK**
 - Save the new file to folder **4 Design \Bridge \Bridge X**
 - File Name: Span Sheet Drawings.dgn
 - Description: **Drawing Models for Span Sheets**
 - Press *Save* to create file.
 - Scale: 1"=20'
 - Sheet Model Name: 215.00 Prestr. Conc. I Girder Unit Sheet 01
 - Enable the *Filename* field by checking the toggle.
 - Press the Create New Sheet File
 - Select *No Wizard* and press *OK*
 - Save the new file to folder **4 Design \Bridge \Bridge X**
 - File Name: *Span Sheets.dgn*
 - o Description: Sheet Models for Span Sheets
 - Press *Save* to create file.
 - Scale: *Full Scale* 1 = 1
 - Detail Scale: **1**"=**20**'

🖉 Create Drawing	×	Sł	heet Model	
	_	Model Name: 1	15.00 Prestr. Conc. I Girder Unit Sheet 01	
	•	Seed Model: T	TxDOT_BridgeLayout-Sheet-Definition.dg	
One sneet Per Ugn:		Filename: S	Span Sheets.dgn	😑 📭
View Name: Span Sheet Plan 01		Sheets: (1	New) 🔻	
Drawing Seed: Bridge Details - Plan	•	A F	ull Size 1 = 1	
View Type: Civil Plan	•	Drawing Boundary: (I	New) 🔻	
Discipline: Bridge		Detail Scale : 1	"=20' •	
Purpose: Plan View] Add To Sheet Index 🛛 📴	
Drawing Model			Make Sheet Coincident	
Model Name: Span Sheet Plan 01] Open Model	
Seed Model: TxDOT_BridgeLayout-Sheet-Definition.	dg		<u>O</u> K	Cancel
Filename: Span Sheet Drawings.dgn	😑 📮			
A 1"=20'	•			
Annotation Group: None	\sim			

- Press **OK** to create and open the sheets, the process will request the user to update and check in files in ProjectWise as it creates the different models.
- All annotations, element manipulations and additional drafting will be done in the Drawing models of the span sheet. It is always recommended to minimize the amount of "live" data placed in the sheet models.

- Return to the *Completed Bridges.dgn* to create the transverse section for the span sheets. The process will be like the creation of the plan view. We will create another cross section named boundary for the span sheet.
- Create the transverse section boundary using the *Place Name Boundary* too located in the Drawings section of the **Reports and Drawings** tab.



- Press anywhere in the plan view to activate the view.
- Select the fourth icon at the top of the dialog.
- In the plan view select the **Southbound Alignment**.
- Back to the **Place Boundary** dialog box.
- Drawing Seed: Bridge Details Transverse
- Detail Scale: 1/4"=1'-0"
- Name: Span Sheet Transverse
- Start Station: 15+50.16 [Using mouse click around this station]
- End Station: 15+50.16 [Do not move the mouse and press again]
- Left Offset: -29.0
- Right Offset: 25.0
- Top Clearance: 5
- Bottom Clearance: 5
- Create Drawing: True
- Show Dialog: True

Place Named Boundary	Civil Cross Section —	\times
Drawing Seed:	Bridge Details - Transverse 🔹	
Detail Scale:	1/4"=1'-0" 👻	
Group:	(New) 👻	
Name:	Span Sheet - Transverse-1	
Description:		
Start Location:	15+50.16	◀
Stop Location:	15+50.16	▶
Left Offset:	-29.000000	oo
Right Offset:	25.000000	ee
Interval:	100.000000	ee
Vertical Exaggeration:	1.000000	
Top Clearance:	5.000000	
Bottom Clearance:	5.000000	
Elevation Datum Spacing:	5.000000	
Event Point List:	(None) 👻	
	Include Event Points Only	
	Include Control Points	
	Backward Facing	
	Create Drawing	

- In the **Create Drawing** dialog.
- View Name: Span Sheet Transverse 01
- Drawing Seed: Bridge Details Transverse

- Drawing Model Name: Span Sheet Transverse 01
- Enable the *Filename* field by checking the toggle.
 - Press the **Browse Drawing file**
 - Open the previously created file: Span Sheet Drawings.dgn
- Scale: ¼" = 1'-0"
- Sheet Model Name: 215.00 Prestr. Conc. I Girder Unit Sheet 02
- Enable the *Filename* field by checking the toggle.
 - Press the **Browse Drawing file**
 - Open the previously created file: *Span Sheets.dgn*
 - o Sheets: 215.00 Prestr. Conc. I Girder Unit Sheet 01
- Scale: Full Scale 1 = 1
- Detail Scale: 1/4" = 1'-0"

Create Drawing		×		Sheet Model	
Ma One Sheet Per D	de: Cross Section		Model Name:	15.00 Prestr. Conc. I Girder Unit Sheet 02	
			Seed Model: Filename:	Span Sheets don	
View Name	Span Sheet Transverse 01		Sheets:	215.00 Prestr. Conc. I Girder Unit Sheet 👻	
Drawing Seed	Bridge Details - Transverse 👻		A	Full Size 1 = 1 💌	
View Type	Civil Cross Section		Drawing Boundary:	Bridge Details - Transverse 🔹	
Discipline Purpose	Bridge Transverse Section		Detail Scale :	1/4"=1'-0" •	
	Drawing Model			Make Sheet Coincident	
Model Name	Span Sheet Transverse 01			Open Model	
Seed Model	TxDOT_BridgeLayout-Sheet-Definition.dg			ОК	Cancel
Filename	: Span Sheet Drawings.dgn 😑	4			
<u>A</u>	1/4"=1'-0" •				
Annotation Group	None				

- Press **OK** to create and open the sheets, the process will request the user to update and check in files in ProjectWise as it creates the different models.
- If for some reason the selected scales are not held, simply change the scale of the reference files. The scales will still need to be adjusted to fit the space and the needs of the user.
- Like before, the drawing model needs to be used for all annotations and additional drafting.



- Repeat steps 1 and 2 to create the drawing and sheet model files for the framing plan, change the view, drawing model, drawing model file, sheet model, and sheet model file names to reflect framing plan.
- This concludes the creation of the superstructure drawings.

Substructure Drawings

In this section we will create substructure drawings using a combination of the substructure OBM tools and the Drawing Callout tools. This example will create the bent sheet, but the same concept can be applied to create the abutment sheet. This example will not fully detail and annotate the drawings, for that the user will need to refer to the **Bridge Detailing Guide** and the **Bridge OBM Workflow** documents.

Note: If the user is using Pro-Concrete to detail all structural reinforcing the drawing/sheet creation should be performed from the Pro-Concrete Model, for this example we are not using Pro-Concrete, so we are using the OBM Bridge model for the drawing/sheet creation.

 First, we need to set the *TxDOT Symbols* as our default detailing symbols. To do so navigate to the Drawing task, then select the *Annotate* tab and press on the "Open Dialog" icon of the *Detailing* section.



In the Detailing Symbol Styles dialog box select the *TxDOT_Symbols* then press the Activate button. Once active the style will be preceded by a green checkmark indicating that the style is active. Close the dialog box once the style is activated.



3. Return to the **OpenBridge Modeler** task and setup the OBM drawing settings using the **Settings** tool located in the **Drawings** section of the **Reports and Drawings** tab.



- 4. In the *Drawings: Dynamic View Settings* dialog box.
 - Auto Dimensions: **False**
 - Clip: False
 - Auto Fit: *False*
 - Unit System: **English**
 - Hidden Style Name: _TxDOT_Bridge_Substructure
 - Dimension Style Name: _TxDOT_Brg-Fract-Dim
 - Dual Dimension Style Name: _TxDOT_Brg-Fract-Dim-2Lines

- Title Text Style Name: _TxDOT_Brg_Main-Title-Text
- Drawing Seed Model: _TxDOT_Bridge_Substructure
- Pier Reference Copies: All Off
- Click **OK** to accept all settings and close the dialog.

🌌 Drawings: Dynamic View Settir	ıgs			×
General				
	Auto Dimensions	Pier Reference Copies		
	Clip	Тор		
	Auto Fit	Right		
Hidden Style Name	_TxDOT_Bridge_Substructure	Bottom		
Unit Dependent Data Set		Left		
Unit System	English	Back		
Dimension Style Name	_TxDOT_Brg-Fract-Dim	 Elevation 		
Dual Dimension Style Name	_TxDOT_Brg-Fract-Dim-2Lines 💌			
Title Text Style Name	_TxDOT_Brg_Main-Title-Text			
Drawing Seed Model	_TxDOT_Bridge_Substructure			
		ОК	Cance	el

Note: The reason why TxDOT toggles off the options mentioned, is because these tend to label items that we do not usually label and the effort to delete the annotations and recreate the labeling is the same as if the annotation were never there. In addition, the reason why the only view created is the elevation is because TxDOT likes to keep each view in its own drawing model, OBM will create all views in the same drawing model if the reference copies are enabled.

5. Once all settings are setup, press on the **Substructure** tool in the **Drawing** section to start the drawing creation workflow.



6. Click on the *Interior Bent No. 2* OBM element. Then press once again anywhere in the screen to accept the location of the element boundary.



- 7. In the Create Drawing dialog
 - Name: Interior Bent No 2 Elevation
 - Drawing Model Name: Interior Bent Elevation
 - Enable the *Filename* field by checking the toggle.
 - Press the Create New Drawing File
 - Select *No Wizard* and press *OK*

- Save the new file to folder **4 Design \Bridge \Bridge X **
- File Name: *Bent Drawings.dgn*
- Description: Drawing Models for Bent Sheets
- Press *Save* to create file.
- Scale: 1⁄4" =1'-0"
- Sheet Model Name: *Interior Bent No. 2*
- Enable the *Filename* field by checking the toggle.
 - Press the Create New Sheet File
 - Select *No Wizard* and press *OK*
 - Save the new file to folder **4 Design \Bridge \Bridge X **
 - File Name: *Bent Sheets.dgn*
 - Description: Sheet Models for Bent Sheets
 - Press *Save* to create file.
- Scale: Full Scale 1 = 1
- Detail Scale: ¼"=1'-0"

Create Drawing	×
Name: Interior Bent No 2 Elevation	
Drawing Seed: _TxDOT_Bridge_Substructure	-
View Type: Section	
Discipline: Bridge	
Purpose: Substructure	
Create Drawing Model	
Seed Model: TxDOT_BridgeDetails_Sheet_Definition	n.dgnlil
Filename: Bent Drawings.dgn	😑 📮
A 1/4"=1'-0"	•
Visible Edges: Dynamic	•
Create Sheet Model	
Seed Model: TxDOT_BridgeDetails_Sheet_Definition	n.dgnlil
Filename: Bent Sheets.dgn	😑 📮
Sheets: (New)	•
Full Size 1 = 1	-
Drawing Boundary: (New)	-
Detail Scale : 1/4"=1'-0"	•
Add To Sheet Index	ي
Make Sheet Coincident	
Replicate Drawing in Sheet File	
Open Model	
<u>о</u> к	Cancel

- Press **OK** to create the drawing and sheet files and models.
- Like in the layouts, and span sheets the additional detailing and annotations will be done in the drawing models.



- 8. Open the **Bent Drawings.dgn**, we will create the section view for the bent in this file.
- Once the file is open, navigate to the Drawing task, then select the Drawing Aids tab and enable Accu-draw by pressing on the Toggle Accu-draw tool in the Accu-draw section.



10. Now navigate to the **Drawing** task, then select the **Annotate** tab and press on the **Section Callout** tool in the **Detailing** section.



- 11. In the Place Section Callout dialog
 - Drawing Seed: _TxDOT_Bridge_Section_Cut

Note: _TxDOT_Section will also work, it has the same settings this seed comes from the MicroStation configuration. If the user opens this drawing with MicroStation the _TxDOT_Bridge seeds will not be available.

- Height: *From View*
- Create Drawing: *True*



12. Place the section callout in between the columns starting from the top and drawing to the bottom, be sure the section is "looking" to the left side of the bent.



- 13. In the Create Drawing dialog box
 - Name: Interior Bent Section A-A
 - Be sure the *Filename* toggle is set to *False* or *Untoggled*
 - Scale: 1⁄4″ =1′-0″
 - Create Sheet Model: False
 - Press **OK** to create the drawing model within the same file.

Creat	te Drawing			×		Create Sheet Mode	el		
			1		Seed Model	TxDOT_BridgeDetails_	Sheet_Definition.dg	hil	
	Name	Interior Bent Section A-A			 Filename: 	Bent Sheets.dgn		0	5 13
	Drawing Seed:	_TkDOT_Bridge_Section_Cut *			Sheets:	(New)		Ŧ	
	View Type:	Section			<u>^</u>	Full Size 1 = 1		-	
	Discipline	Bridge			Drawing Boundary:	(New)		Ψ	
	Purpose	Section View			Detail Scale :	3/8"=1'-0"		*	
		Create Drawing Model				Add To Sheet Inde	×	19	20
	Seed Model:	TxDOT_BridgeDetails_Sheet_Definition.dgnlif				Make Sheet Coinci	ident		
	Filename:	(Active File)	m	B		Replicate Drawing	in Sheet File		
	<u>A</u>	1/4"=1'-0" -		1000		Open Model			
	Visible Edges:	Dynamic *				1	~	1000	and a

14. Once the section drawing has been created return to the elevation model, so we can create the plan view drawing.

15. Create the plan view using the *Plan Callout* tool in the **Detailing** section of the **Annotation** tab.



16. In the Place Plan Callout dialog

• Drawing Seed: _TxDOT_Bridge_Plan_View

Note: _TxDOT_Plan will also work, it has the same settings this seed comes from the MicroStation configuration. If the user opens this drawing with MicroStation the _TxDOT_Bridge seeds will not be available.

Create Drawing: True

here Place Plan Callout	_		×
Drawing Seed:	_TxDOT_Bridge_Plan_View	•	
Detailing Symbol Style:	TXDOT_Symbols		>
	Create Drawing		A

17. Place the plan callout just above the bent, starting from the left side and ending on the right side, and dragging down just enough to capture the height of the cap.



- 18. In the Create Drawing dialog box
 - Name: Interior Bent Plan
 - Be sure the *Filename* toggle is set to *False* or *Untoggled*
 - Scale: 1⁄4" =1'-0"
 - Create Sheet Model: False
 - Press **OK** to create the drawing model within the same file.

Create Drawing		×		Create Sheet Mo	del		
		1	Seed Model:	B.DOT_BridgeDetails	Sheet_Definition.dg	film	
Nar	intenor Sent Plan		Filename:	(Active File)			m (4
Drawing Se	d: _TxDOT_Bridge_Plan_View *		Sheets	(New)		+	
View Ty	se Plan		<u>A</u>	Full Size 1 = 1			
Discipli	ve: Bridge		Drawing Boundary:	(New)		*	
Purpo	se: Plan View		Detail Scale :	3/8*=1'-0*			
	Create Drawing Model			Add To Sheet Ind	lex .	-	9
Seed Mod	el: TxDOT_BridgeDetails_Sheet_Definition.dgnlil			Make Sheet Coin	cident		57.4
Filenar	ie: [(Active File)	OR		Replicate Drawin	g in Sheet File		
	A 1/4"=1'-0" -			Open Model			
Visible Edg	es: Dynamic 👻				OK	0	ancel

Note: When the plan view opens, the user will notice that the **Plan Callout** tool does not have a limit on what to show "In" and "Out" of the page during the drawing creation. This can be changed in the properties of the plan callout.

- To change the depth of the plan callout, select the plan callout then change the *Bottom Height* and *Top Height* in the Clip Volume section in the Properties dialog.
 - Bottom Height: 5
 - Top Height: **5**



Note: Bottom Height controls the distance that in the up-station direction while the Top Height controls the down-station direction. This direction may change in abutments.

- 20. Once all the additional drawings are created with completed detailing and annotations, the user will need to manually attach the references into the sheets.
 - When referencing new drawing models to existing sheet files be sure to have the live nesting enabled and set to 99.



- 21. This concludes the plan production section. The creation of the other detail sheets is a combination of the tools showed so far, the abutment sheets will have more drawings since there are more sections required. See Appendix A for example sheets created using this same process.
- 22. This concludes the substructure drawings section.

Interoperability

This section will focus on the export tools and what is exported to each of the supported applications.

The Interoperability section is in the Utilities tab in OBM, this section contains all the export/import tools for the supported applications.



Exporting to LEAP Concrete or LEAP Steel

- To export to LEAP Concrete, the OBM Bridge superstructure unit can be any bridge type except Beam Slab (Steel Girders) and must be active.
- To export to LEAP Steel, the OBM Bridge superstructure unit must be defined as Beam Slab (Steel Girders) and must be active.
- When exporting a bridge to LEAP Concrete and the user is using OBD/OBM, the LEAP file will be saved within the OBD file. When the user is using OBM standalone, the user must have a standalone version of LEAP installed. Since Bentley has stopped developing standalone LEAP applications, if the user intends to use LEAP and RM, install OBD rather than OBM standalone.
- There is no tool to import a bridge model created in LEAP into OBM, OBM can only read analytics information of a bridge model originally created in OBM.
- If the bridge has multiple units, OBM will only transfer the active unit.
- When the user sets up the OBD workflow as Standalone, the user can modify the model in LEAP, however, the changes in the model will not be pushed back. In the BIM workflow the OBM model controls all the model changes.
- 1. To export a model to LEAP, press the *LEAP Bridge Concrete* icon or the *LEAP Bridge Steel* icon.



2. Please refer to Appendix B or Appendix C for the OBD 2022 R2 transfer report to see the assumptions and limitations of the transfer in LEAP Concrete and LEAP Steel

Example model export in LEAP Concrete



3. Example model export in LEAP Steel



This concludes the exporting to LEAP tutorial.

Exporting to RM Bridge

RM Bridge can accept Concrete or Steel superstructures.

RM Bridge files can be saved within the OBD file or outside in a separate directory. This option can be changed in *File > Settings* in the OBD dialog box, however, this is only when the user is working as a standalone workflow, when the users are in the BIM workflow the option gets ignored and the RM bridge files are stored in the OBD file.



Unlike LEAP, the user can select exactly what components to transfer to RM, and the user can select all units, and all bridges, RM will always export the active Bridge/Unit.

Segment splitting		- 0
the term of the second s	Selected new: Under	
Plan Colum, 4 Plan Plan Colum, 1 Colum, 1	Standard and Material Standard American Standard - AAGHTD LIFED ~ Material group AAGHTD LIFED	
(Column, 2 (Column, 3 (Column, 4 (Piete (Column, 4 (Column, 4 (Column, 4 (Column, 4 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 2 (Column, 4 (Column, 2 (Column, 4 (Column, 4 (Co	Other Satings Eastings Tableance for node conversion (2.001) Plennoue global offsets X (215/27) 54(205)? V: (2010)02,2758726 Initialize ALL sealpare data X (215/27) 54(205)? V: (2010)02,2758726	
Deck Substructure Const-frames SB_US281-Unit1	See ML to	1
Vice transfer limitations	Connect to RM	Carcel

As mentioned before, the materials and build order are important for RM Bridge as those are get used to analyze and create the stages when the model gets exported.

1. To start the export to RM Bridge, press the **RM Bridge** icon.



2. In the export dialog box, the user can define the structural analysis behavior of each of the elements. This information will not be covered in this manual.

Segment splitting		-	D X
+ mil + mil + mil (19311 - 0+1 + Samtodan + Samtodan + Saterit + Saterit	Selected Item: Units		
Colum, 4 Hes Colum, 1 Colum, 1 Colum, 2	Standard and Material Standard American Standard - AKSHTD LIFED V Material group AKSHTD LIFED		÷
Colum, 3 Pile Pile Pile	Other Satings Tellsrance for node conversion D 001 PRemove global offsets X 21%2732 64026532 Y C000002 2756726 Initialize ALL senilyzer data Sarex XMR, to		
View transfer limitations	Connect to RM	Can	cel

3. Example model export in RM Bridge.



4. RM Bridge assumptions and limitations can be found in Appendix D. This concludes the exporting to RM Bridge tutorial.

Interoperability with ProStructures

OBM now includes a vast number of tools from ProStructures within the OBM application. When the user **Activates** ProStructures within OBM the DGN will be branded as a ProStructures file. It is recommended to create a new blank OBM DGN file and then reference the original DGN to perform all ProStructures tasks in the new file.

Note: There are known compatibility issues with ProStructures files created in ProStructures and the ones created within the OBM ProStructures plug-in. Reinforcement created in one cannot be modified in the other program.

This manual will not cover any of the ProStructures tools as they are very extensive, a new training manual just for ProStructures will be created and used for the detailing of Concrete and Steel bridges.

ProConcrete tools are in the **ProConcrete** task. The user can reinforce beams, footings, walls, columns amongst other elements. This task also has limited tools to create and modify rebar definitions.





Placement of rebar schedules is available in OBM when the ProStructures plug-in is activated. Another task becomes available labeled Structural Detailing. In this task, there is a Concrete Drawing Production Tab and a Numbering, Marking section with the rebar scheduling tools.



This concludes the ProStructures interoperability section.

Appendices

Appendix A – Plan Production Examples

The following sheets were created using the workflow/process shown in the **Plan Production** section.

For the span sheet, a secondary clipped reference was added to show only the exterior beams, the reference was added manually, using the view created by the named boundaries.

Typically in span sheets we do not show the crowned deck, but in OBM we either have the cross slope or we don't, we cannot change the setting for the different types of drawings, so we have to adjust our standard drafting practices.

The border is a reference that is linked to the drawing seed, the users can replace the reference file as long as they keep the name of the file and just replace the contents.

All annotations were done manually.



Example Span Sheet of Box Beams

For the abutment sheets, details like the earwall detail and corner details were copied from the standards for simplicity. These drawings can also be done using OBM plan production tools.

Some lines were drafted manually, and some edges were masked using a line the same color as the background.

All annotations were done manually.



Example Abutment Sheet of Box Beams



Example Abutment Sheet of Box Beams

Appendix B – LEAP Bridge Concrete (LBC) – Assumptions and Limitations

LEAP Bridge Concrete (LBC)

Please be aware of the following assumptions and limitations when transferring the physical model from OBM to an analytical model in LBC, and bringing changes back from LBC to OBM.

- Data Transfer: In version 10.12.01.xx, the data transfer is bi-directional, e.g. from OBM to LBC (for all supported bridge types), and back from LBC to OBM (for prestressed concrete girder bridges). While the entire model is transferred from OBM to LBC, on the way back only selected superstructure (beams and beamlayout) and all substructure information is transferred. In LBC, use the Tools > OBM Sync > Send to OBM option to write information back to OBM via an XML file. In OBM on the Utilities tab of the ribbon toolbar, select LBC > Update from Analytics to select the same transfer XML file, and start the process of updating the OBM model with LBC data changes if any. At this time, other than footing design reinforcement, any other design reinforcement, strands or tendon information will not be transferred back from LBC to OBM.
- 2. Model: Model must be completed in OBM, with all super and substructure including bearings defined, before transferring to LBC.
- 3. Deck Slab Thickness: For a bridge model with varying deck thickness in spans, or across the crosssection in a single span, OBM will transfer the minimum thickness of the slab across all crosssections and all spans to LBC. The deck thickness is not transferred back from LBC to OBM.
- 3a. Multiple Decks: In the properties window, setting the Analytical Flag = true allows the deck to be transferred to LBC. Users should not mark approach slabs as analytical decks. A series of contiguous decks can also be transferred to LBC.
- 4. Haunch Thickness: While OBM models a very accurate haunch considering the slope of the deck transversely, and varying haunch thickness filling the gap between the top of the beam and the bottom of the slab, the analytical model in LBC uses a constant haunch thickness. OBM will conservatively transfer the maximum thickness from among all beams in all spans to LBC. The haunch thickness is not transferred back from LBC to OBM.
- 5. Beam Layout: LBC only supports prestressed beams spanning between supports. End blocks modeled in OBM with different sections will not be transferred to LBC. Beam Layout (including spacing of beams) changes in LBC can be transferred back to OBM. User will have an opportunity to view and accept or reject changes before coming back to OBM.
- 6. Beam Cross-sections: While transferring a beam cross-section from the non-LEAP library, e.g. a custom section which are typically drawn using MS drawing tools from OBM to LBC, LBC will first search for a matching name through its existing beam library, and if not will attempt to automatically create a new beam library object by interpreting a shape as close to the MS drawing as possible. The user may need to verify and modify this library object with appropriate structural properties and strand templates before continuing the design in LBC. When data is sent from LBC to OBM, changes to the Beam cross-section, if any, are flagged, and the user will have the opportunity to view and accept or reject the changes.

- 7. Diaphragm: Diaphragm defined in OBM is transferred in terms of the locations and equivalent point loads on concrete beams in LBC.
- 8. For CIP P/T Box Girder bridges and RC or P/T Slab bridges: OBM will transfer an interpreted cross-section, by populating the parametric variables, by intelligently interpreting the appropriate point pairs from OBM template. A screen showing the OBM Template and the interpreted cross-section is presented to the user before the final transfer to LBC. In this screen the user can modify the points used for picking up the points from the OBM templates. Changes from LBC to OBM for this bridge type is currently not supported.
- 9. Bearings: LBC can currently only handle rectangular shape bearings. Any other shape of bearing coming from OBM is converted to equivalent rectangular bearing during transfer. Grout pads on top of the bearings in OBM are not transferred to LBC, but the thickness at the center is added to the bearing seat thickness to compensate. Changes from LBC to OBM for bearings is currently not supported.
- 10. Materials: Beam material properties are transferred from OBM to LBC, and back into OBM if changes are made in LEAP. A new entry is created in the OBM materials library if an exact match of the materials modified in LEAP is not found.
- 11. Substructure:
 - a. Pier Location offset is measured in OBM, along the SupportLine, whereas in LBC it is measured perpendicular to the alignment. The conversion is done automatically when data is transferred from OBM to LBC.
 - b. Since LBC does not support inclined/sloped pier cap, when such a cap is transferred from OBM, it is treated as a straight/level cap and the bearing seats adjusted to fill in the gap under bearings/beams.
 - c. Other than the Oval column shape from OBM, all other 'regular' column shapes are supported in LBC. The Oval shape column is converted to an equivalent rectangular shape with fillets. When transferring template based column cross-sections from OBM, columns come in with a cross-section represented by a bounding rectangle around the shape. Variable pier caps with parabolic or circular variations are approximated by linear variations
 - d. User defined templates for footings and abutments are transferred as equivalent rectangles.
 - e. For Abutments, to accommodate various agency practices, OBM allows users to set three different locations (front face of backwall, centerline of abutment cap, back of abutment) as the reference line for placing abutments. Since LBC only allows one reference line at center of abutment, OBM on data transfer will maintain the accurate lengths of the girders, and adjust the position of abutment for an additional offset distance. Wingwalls are not transferred from OBM to LBC at this time.

- f. Integral substructures for Box Girder bridges and RC Slab bridges, with the integral cap taking the shape of the superstructure are currently not supported in OBM. These will need to be modeled in LBC, after initial model transfer from OBM.
- g. All geometry changes made to substructure in LBC can be brought back to OBM. The user will have the opportunity to view and accept or reject the changes when updating the model in OBM using the transfer XML format file.
- h. If you have modified the column length in LEAP and you want to update the column length in OBM, please be sure to have the footings elevation constraints unchecked in order to see the updated model.
- i. For Variable Columns, defined using Templates, transfer to LBC is not possible at this time.
- 12. Barrier: OBM will transfer Barriers from OBM to LBC as equivalent loads, and will also transfer the barrier width and location. User should check these loads and dimensions in LBC as these could affect the design.
- 13. File Name: When attempting to transfer data from OBM to LBC, user can provide a file name and path for the LBC data file. If such a file already exists, OBM will replace only the geometry and material data and retain all loads and other design parameter information.
- 14. Camber and Deflection results: If prestressed concrete beams are designed (with strands) in LBC, the results can be transferred back to OBM. Using the Reports > Camber option, user can view the estimated beam elevation values at erection, and deck screed elevation reports.
- 15. For offset (from alignment) bridges, OBM and LEAP Bridge support line stationing could be different due to differences in assumptions on layout in these two products. While the conversion is done on the fly and the bridge will be located geometrically accurate, future versions will address this issue.
- 16. Steel Cross Frames for Concrete beams modeled in OpenBridge Modeler will be transferred to LEAP Bridge Concrete as loads.

Appendix C – LEAP Bridge Steel (LBS) – Assumptions and Limitations

LEAP Bridge Steel (LBS)

Please be aware of the following assumptions and limitations when transferring the physical model from OBM to an analytical model in LEAP Bridge Steel and bringing selected changes back to OBM.

- 1. Data Transfer: In version 10.12.01.xx, the data transfer is bi-directional, e.g. from OBM to LBS, and back from LBS to OBM, for selected changes in superstructure and substructure. While the entire model is transferred from OBM to LBS, on the way back only selected superstructure (beams and beam layout) and all substructure information is transferred. In LBS, use the OpenBridge Modeler > Save to OBM option to write information back to OBM via an XML file. In OBM on the Utilities tab of the ribbon toolbar, select LBS > Update from Analytics to select the same transfer XML file, and start the process of updating the OBM model with LBS data changes if any. You will be prompted with a dialog showing what information has changed, along with options to bring in select information into OBM. In this release, stiffeners, cross-frames, field splices and shear studs are written from OBM to LBS, but any changes made in LBS, cannot be sent back to OBM.
- 2. Stiffeners and Cross Frames defined in OBM can now be transferred to LEAP Bridge Steel along with the all other bridge elements defined. At this time, the transfer is only one way from OBM to LBS.
- 3. Model: Model must be completed in OBM, with all super and substructure including bearings defined, before transferring to LBS.
- 4. Deck Slab Thickness: For a bridge model with varying deck thickness in spans, or across the cross-section in a single span, OBM will transfer the minimum thickness of the slab across all cross-sections and all spans to LBS. The deck thickness is not transferred back from LBS to OBM.
- 5. Haunch Thickness: In both OBM and in LBS, haunch thickness is measured from the bottom of the top flange to bottom of deck. OBM will conservatively transfer the maximum thickness from among all beams in all spans to LBS.
- 6. Beam Layout: To cover a wide variety of possible scenarios, LBS will always bring in beam paths from OBM as custom beam paths. While the user can modify these beam paths in LBS and send the information back to OBM, deleting and adding entirely new beam layouts and attempting to transfer this information back to OBM is not supported.
- 7. Beam Cross-sections: When using Rolled Beam Shapes, OBM transfers the appropriate name to LBS, and a corresponding section is picked from the Standard Sections list in LBS. For Built-up shapes, all transfers are by plate dimensions, a much simpler transfer. Steel Tubs can be transferred from OBM to LBS, but not vice-versa. The rotations of these sections from OBM are not supported in LEAP Bridge Steel, and they will be modeled without the rotation following the deck slope.
- 8. Bearings: LBS can currently only handle rectangular shape bearings. Any other shape of bearing coming from OBM is converted to equivalent rectangular bearing during transfer. Grout pads on top of the bearings in OBM are not transferred to LBS, but the thickness at the center is added to the

bearing seat thickness to compensate. For Steel Tub girders supported by a single bearing in OBM, LEAP will automatically create two bearings due to current limitations.

- 9. Substructure:
 - a. Pier Location offset is measured in OBM, along the SupportLine, whereas in LBS it is measured perpendicular to the alignment. The conversion is done automatically when data is transferred from OBM to LBS.
 - b. Since LBS does not support inclined/sloped pier cap, when such a cap is transferred from OBM, it is treated as a straight/level cap and the bearing seats adjusted to fill in the gap under bearings/beams.
 - c. For Abutments, to accommodate various agency practices, OBM allows users to set three different locations (front face of backwall, centerline of abutment cap, back of abutment) as the reference line for placing abutments. Since LBS only allows one reference line at center of abutment, OBM on data transfer will maintain the accurate lengths of the girders, and adjust the position of abutment for an additional offset distance.
 - d. LBS can have round, rectangular and rectangular-variable column shapes. OBM supports the following additional shapes: rectangular-chamfered, rectangular-filleted, rectangular-beveled and oval. All are transferred from OBM as standard rectangular columns in LBS. When transferring template based column cross-sections from OBM, columns come in with a cross-section represented by a bounding rectangle around the shape. Variable pier caps with parabolic or circular variations are approximated by linear variations.
 - e. Integral substructures in LBS will not transfer to OBM in this release of OBM.
 - f. LBS does not support Struts between columns or wingwalls. So transfer from/to OBM is not yet supported for these elements.
 - g. If you have modified the column length in LEAP and you want to update the column length in OBM, please be sure to have the footings elevation constraints unchecked in order to see the updated model.
 - h. For Variable Columns, defined using Templates, transfer to LBS is not possible at this time.
 - i. User defined templates for footings and abutments are transferred as equivalent rectangles.
- Auxiliary/Barrier: In this release OpenBridge Modeler will transfer Barriers from OpenBridge Modeler to LEAP Bridge Steel as equivalent loads. User should verify and adjust these elements in LEAP Bridge Steel as needed.
- 11. File Name: When attempting to transfer data from OBM to LBS, user can provide a file name and path for the LBS data file. If such a file already exists, OBM will replace only the geometry and material data and retain all loads and other design parameter information.
- 12. For offset (from alignment) bridges, OBM and LBS support line stationing could be different due to differences in assumptions on layout in these two products. While the conversion is done

automatically and the bridge will be located geometrically accurate, future versions will address this issue.

13. Field Splices and Shear Studs defined in OpenBridge Modeler can be transferred to LEAP Bridge Steel. At this time, the transfer is only one way from OpenBridge Modeler to LEAP Bridge Steel.

Appendix D – RM Bridge Connect – Assumptions and Limitations

RM Bridge CONNECT

Please be aware of the following limitations when transferring the physical model from OBM to RM Bridge CONNECT:

- 1. Steel girder top cover plates: they are not supported on transfer to RM because it will generate cross section elements overlapping which invalidates the geometrical model in RM.
- 2. Barriers: they are not transferred because they can be simulated on RM side as a load on the side of the bridge.
- 3. The following elements modeled in OBM are currently not transferred to RM:
 - a. wing walls
 - b. approach slab
 - c. pile rock sockets
 - d. advanced variable columns
 - e. steel girder haunch extensions
- 4. Materials: if no material is assigned to a structural element, a default material will be added on transfer to RM.
- 5. Support springs on multi-unit transfer: Bearing springs will not generate correctly in cases where both side of the common pier have girder slab bridges. These springs can be corrected in RM Modeler manually.