VDOT GEOPAK® Bridge

Training Manual

TRN007590-1/0003

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Patents

United States Patent Nos. 5,815,415; 5,784,068 and 6,199,125.

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1 Basic Road Tools to Know

OBJECTIVES

This part is to introduce you to the Road Project Manager and to the basic Road tools provided by GEOPAK. The Road Project Manager allows you to select a Project which automatically sets the location of the GPK file and working directory. The Road tools enable you to familiarize yourself with the Project basic geometry information; the geometry that will be used during the modeling process, the Super Elevation information and to analyze the data stored within the GPK file (Chains).

ROAD PROJECT MANAGER

Project Manager is a GEOPAK tool that associates a project with its respective coordinate geometry job number, users, working directories and project files.

ACCESSING PROJECT MANAGER

OPEN A BRIDGE DESIGN FILE AND SELECT THE ROAD PROJECT MANAGER

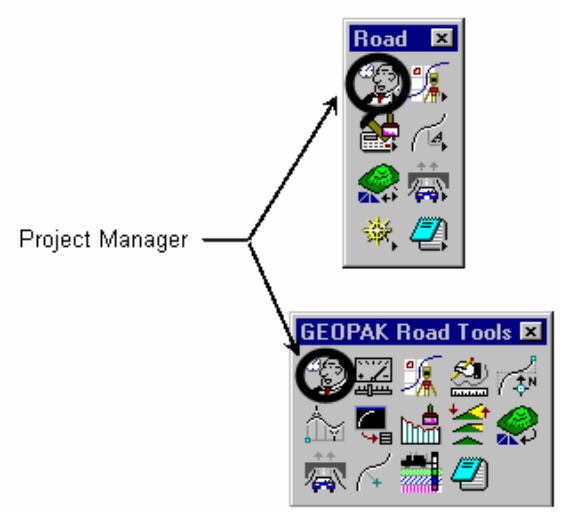
Open Bridge3D.dgn

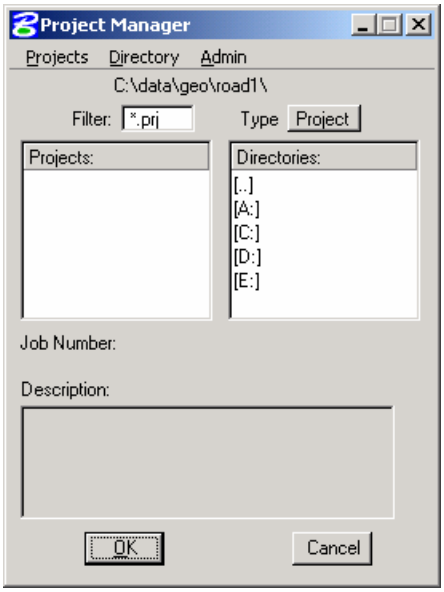
Open file **C:\DATA\GEO\VDOT\Bridge\ BasicRoadToolsToKnow\ Job200Bridge3D.dgn**.

To access Project Manager, select (MicroStation: Applications> GEOPAK ROAD>GEOPAK ROAD Tools) or (MicroStation: Applications>GEOPAK BRIDGE>Road Tools). Select the road **Project Manager** icon. The Project Manager dialog appears.

Select the Road Project Using the Road Project Manager

1. Select the Road **Project Manager** tool. The Project Manager dialog box appears.

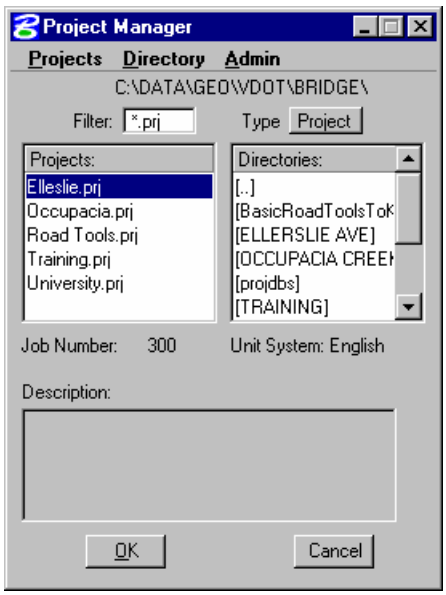




The current directory is displayed at the top of the dialog box. This may be modified by traversing to a different directory in the Directories list box.

2. Under the Directories list box, select **C:\DATA\GEO\VDOT\BRIDGE.**

   The Projects list box shows the available projects:



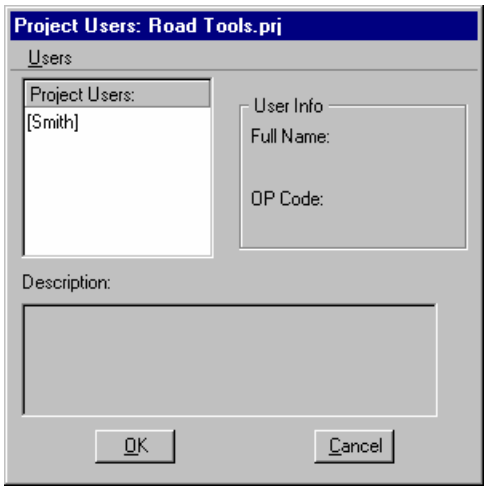
3. Under the Projects list box, select **Road Tools.prj**. .

Note Record in your manual the Job Number displayed in the middle of the dialog box.

4. Click **OK** button to continue.

Note To exit Project Manager click the **Cancel** button

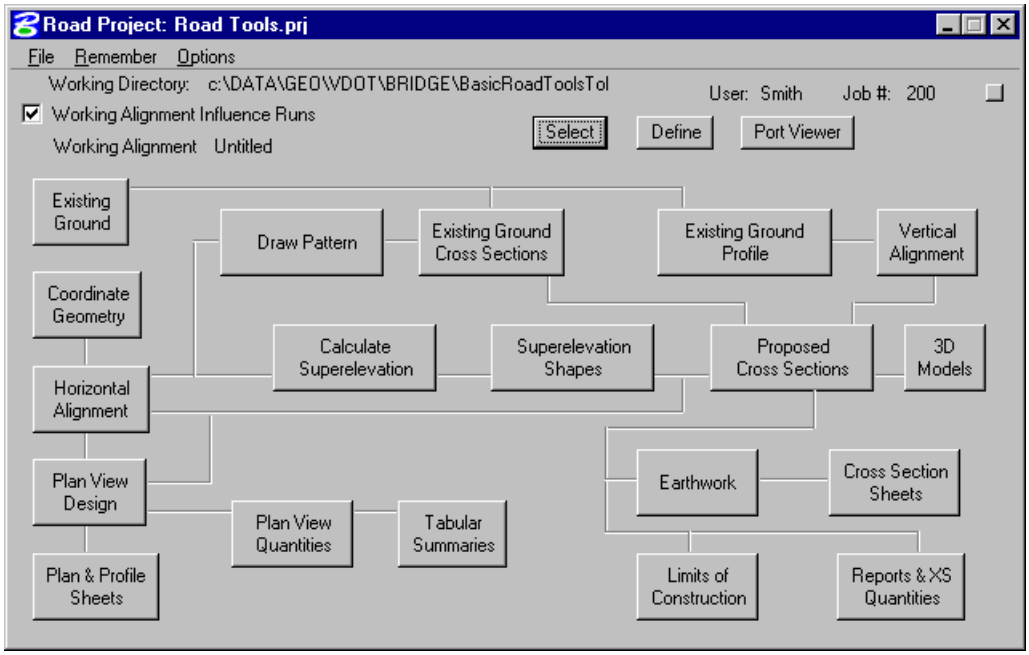
5. The Project Users dialog box appears.



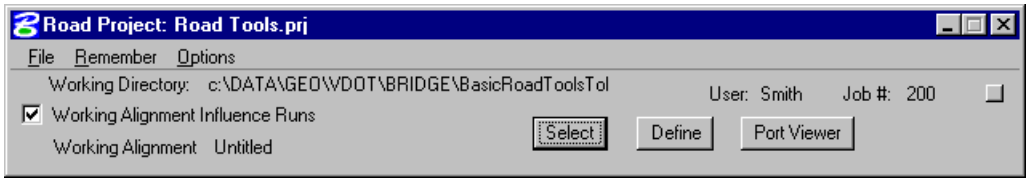
6. **Select** your name from the list of user. If your name is not available, contact your project administrator

7. Click **OK** to continue. The Road Project dialog box appears.

The top of the dialog displays the Working Directory, User and GEOPAK Job Number..



The small square in the upper right corner will condense the dialog as depicted in the graphic below.



Note Use the Road Project Manager each time before you start a new session with GEOPAK

8. Minimize the **Road Project** dialog box.

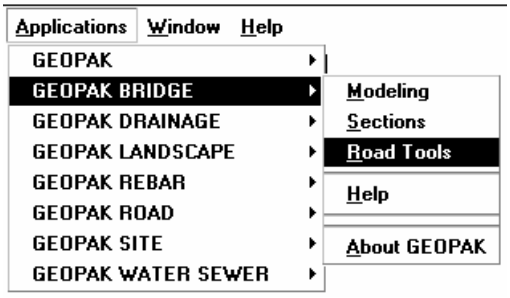
BASIC ROAD TOOLS

Two tools that you will be reviewing are:

- The **Navigator** tool: This tool is located in the Coordinate Geometry dialog box.
- The **Shape Properties** and the **Shape Analyst:** These tools are located in the Superelevation Shape Manager tool palette.

Starting GEOPAK Bridge> Road Tools

1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Road Tools**).

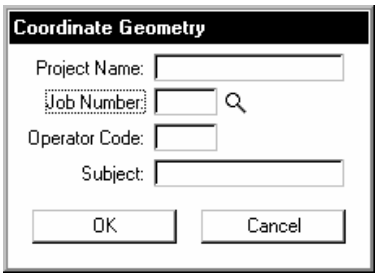


The **GEOPAK Road Tools** palette appears.

ACCESSING THE COORDINATE GEOMETRY DIALOG BOX

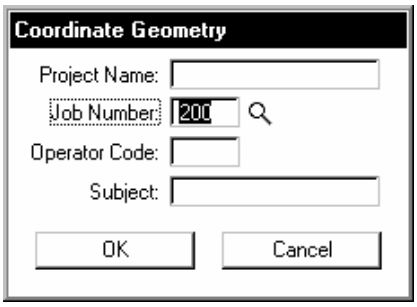
Open the COGO Geometry Dialog Box

1. Select the **COGO** tool from the GEOPAK Road tools palette. The Coordinate Geometry dialog to select a Job Number appears.

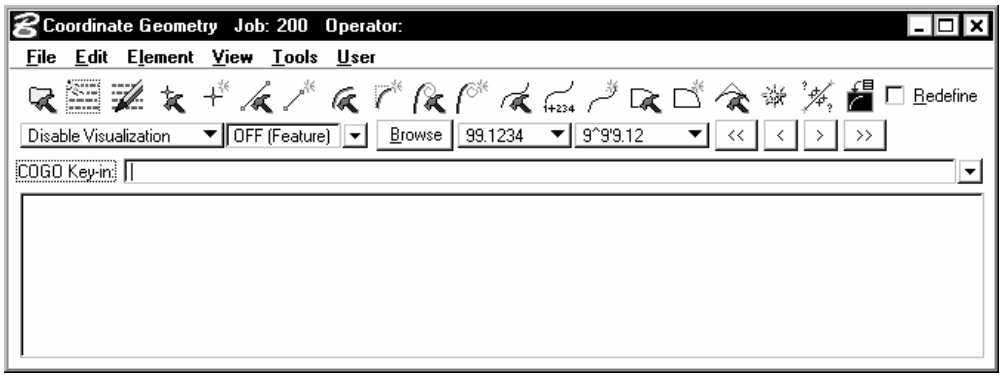


2. Select the **Select GPK File** tool. The Job Number: dialog appears.

3. Select **job200.gpk** from the list.
4. Click **OK** to proceed. The Coordinate Geometry updated dialog appears.



5. Click **OK** to proceed. The Coordinate Geometry dialog appears as shown below:



THE NAVIGATOR

The Navigator is a basic tool used to review the data already stored in a GPK file (CHAINS). The Navigator is used to visualize graphically Chains, Points and Curves etc.

When more specific information is required by the designer, the Navigator also provides Utility tools to allow for Describing the component.

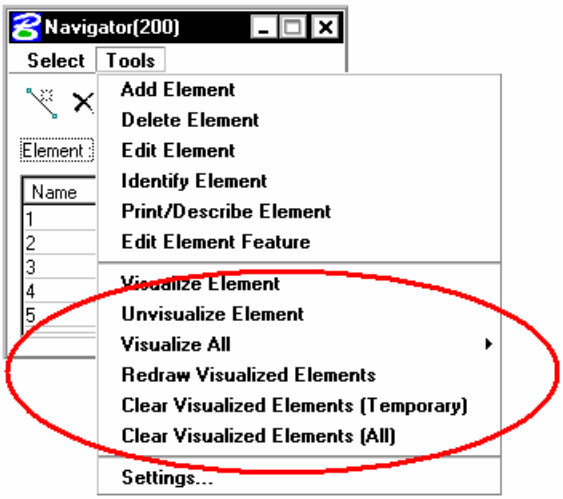
The tools that will be reviewed in this chapter are:

- Visualize Element

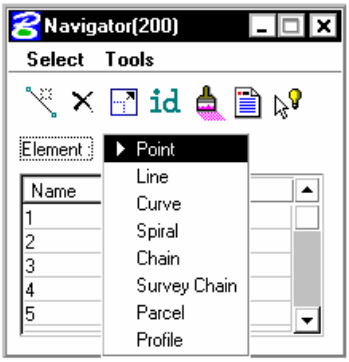
There are two methods to visualize components:

- Permanently (Permanent Visualization) by drawing the components in the DGN file
- Temporarily (Temporarily Visualization) by displaying the component in the DGN file.

Temporarily visualized elements can be cleared from visualization at any time by selecting one of the options available in the Tools pulldown list.

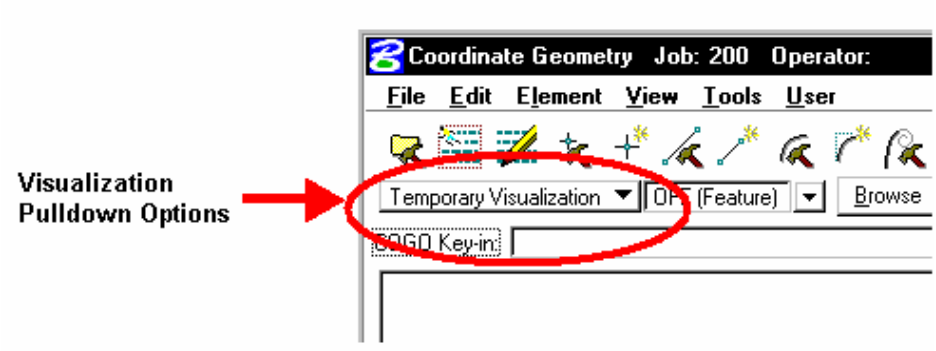


- Print/Describe Element
  - The Elements pull down list

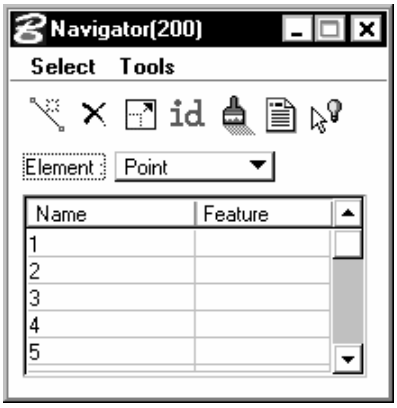


Visualization

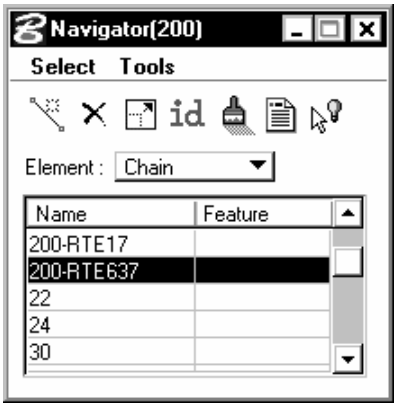
1. From the Visualization pull down list, select **Temporary Visualization**.



2. Select the **Navigator** tool, from the Coordinate Geometry dialog. The **Navigator (200)** dialog appears.



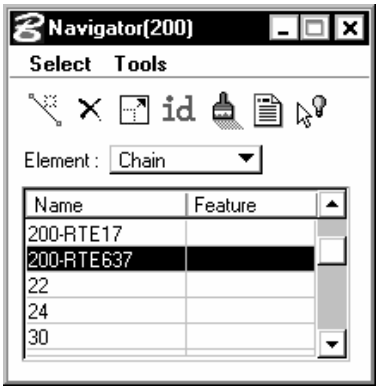
3. From the Elements pull down list, select **Chain**. The available Chains in the current GPK file appear in the list.



4. Select **200-RTE637** Chain.
5. Select the **Visualize Element** tool. Notice that the Chain appears in the DGN file.
6. Select the MicroStation **Fit View** tool.
7. From the Navigator Menu, select **Tools > Clear Visualized Elements (Temporary)** option.
8. Close the Navigator dialog. Click on the **X** located on the Top Right Corner of the dialog.

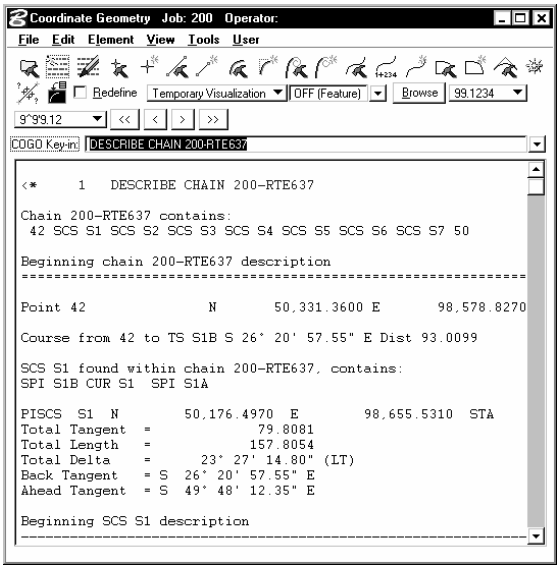
Describe Chain Element

1. From the Coordinate Geometry dialog, select the **Navigator** tool. The **Navigator (200)** dialog appears.
2. From the Elements pull down list select **Chain**. The available Chains in the current GPK file appear in the list.

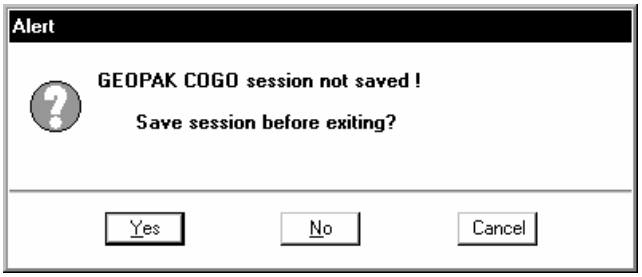


3. Select **200-RTE637** Chain from the list.

4. Select the **Print/Describe Element** tool. Notice that the Coordinate Geometry dialog shows all of the information related to the selected element. Use the Scroll bar to review the data.



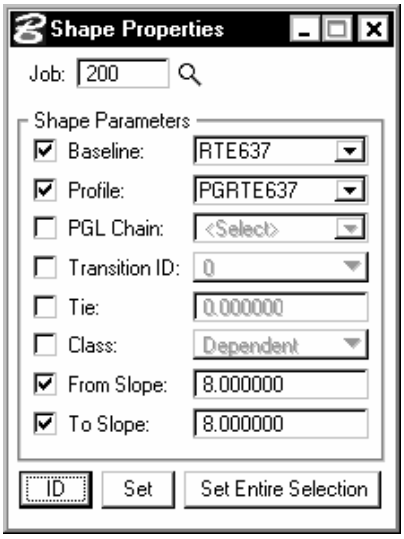
5. Close the Coordinate Geometry dialog box. Click on the **X** located on the Top Right Corner of the dialog. The Alert Box appears. Click **No** to proceed.



THE SHAPE MANAGER

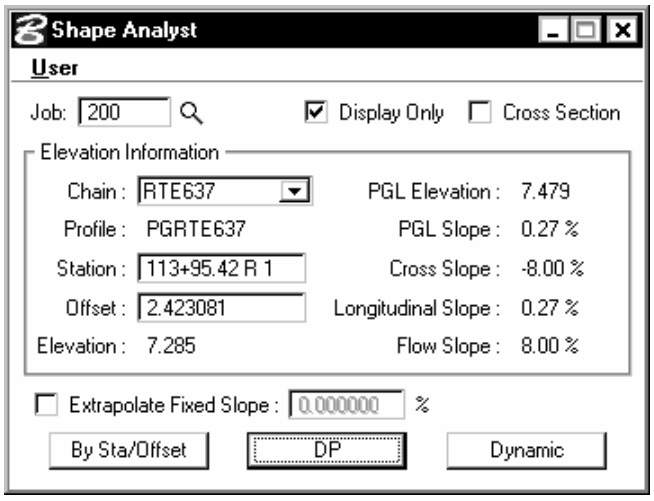
The tools described in this part are the Shape Properties and the Shape Analyst.

The Shape Properties: This tool is used to extract the attributes from a GEOPAK Shape. Automatically these attributes are displayed in the Shape Properties dialog box as shown below; The Baseline, Profile, Tie, From Slope, To Slope and Class. You should review this information to get familiar with the GPK information Bridge will be utilizing to calculate Z-Levels.



The Shape Analyst: The Shape Analyst can be used to visualize graphically the information that is calculated at anywhere within the Bridge Model; Chain, Profile, Station, Offset to the indicated point from the Chain, Elevation, PGL Elevation, PGL Slope, Cross Slope, Longitudinal Slope and the Flow Slope.

Note The **Display Only** option allows the user to view graphically the Elevations values temporarily.

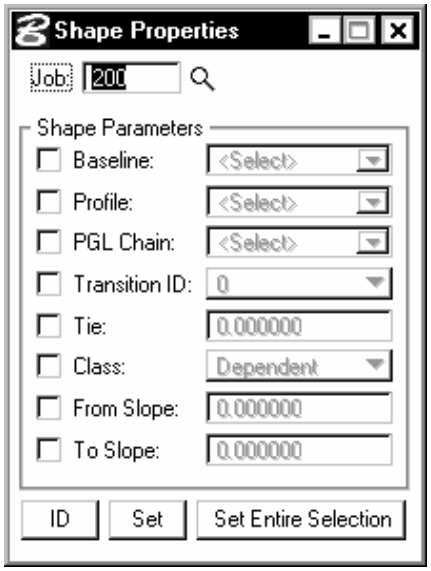


Shape Properties

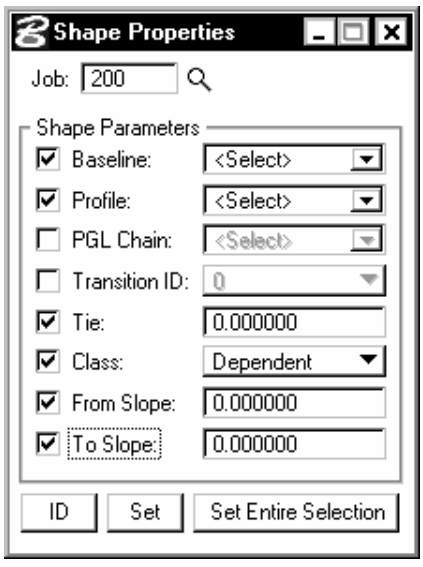
1. Select the Shape Manager tool from the GEOPAK Road Tools.

2. Select the **Shape Properties** tool from the Superelevation Shape Manager tools palette.

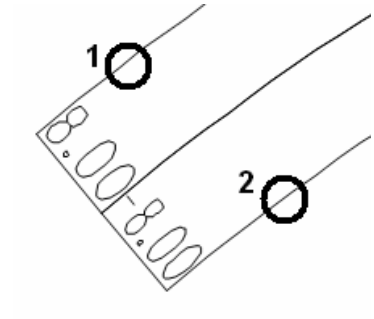
The Shape Properties dialog appears.



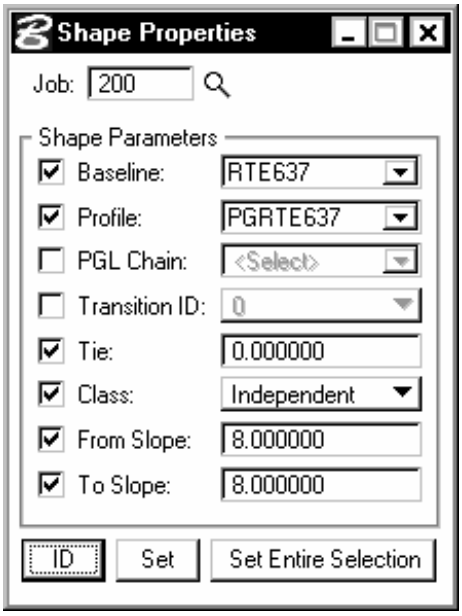
3. Enable the **Baseline**, **Profile**, **Tie**, **Class**, **From Slope** and **To Slope** options. The dialog changes.



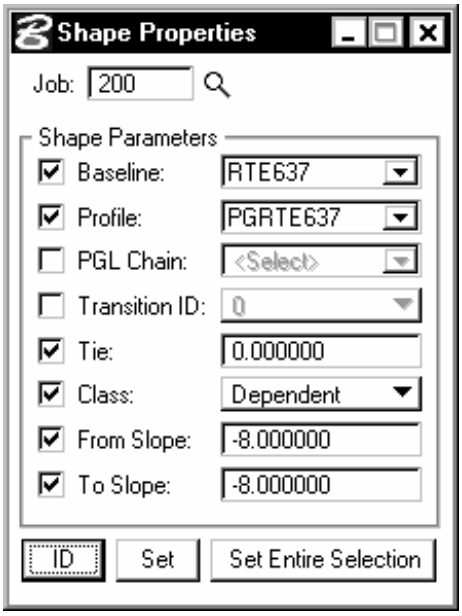
4. Click on the **ID** push button.



5. Indicate a **Data Point** inside of the **Circle 1**, touching the shape element. Accept the selection. The Shape Properties changes as shown below.



6. Indicate a **Data Point** inside of the **Circle 2**, touching the shape element. Accept the selection. The Shape Properties changes as shown below.

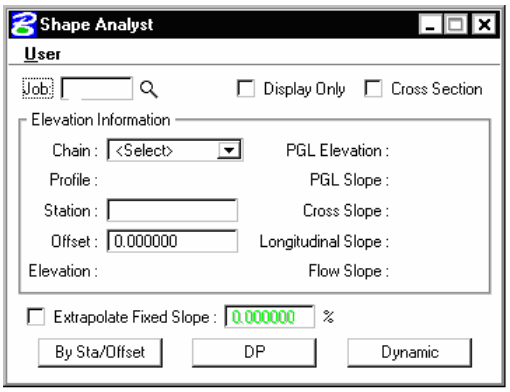


Shape Analyst

1. Select the **Shape Manager** tool from the GEOPAK Road tools palette.

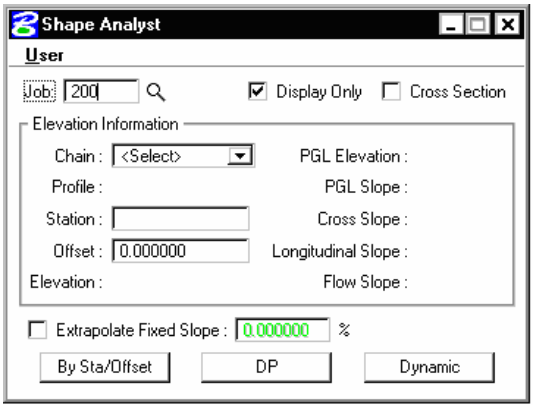
2. Select the **Shape Analyst** tool from the Superelevation Shape Manager Tools palette.

The Shape Analyst dialog appears.

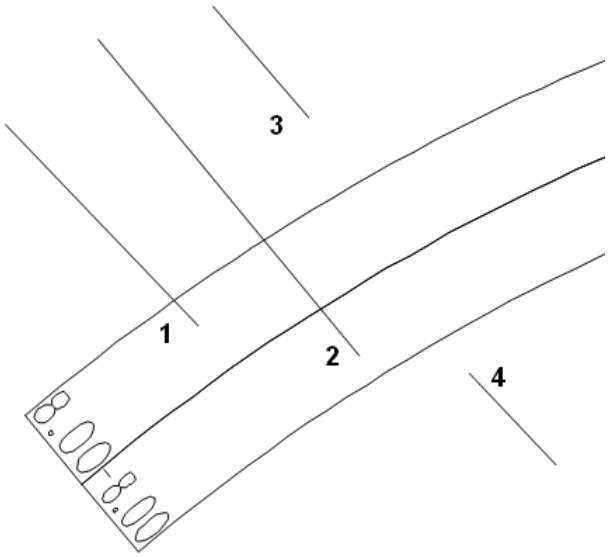


3. Select Job number. Select the **Select GPK File** tool. Select j**ob200.gpk** from the list.

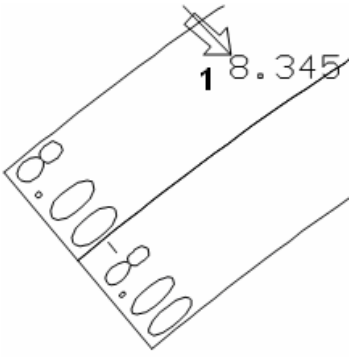
4. Click **OK** to proceed.

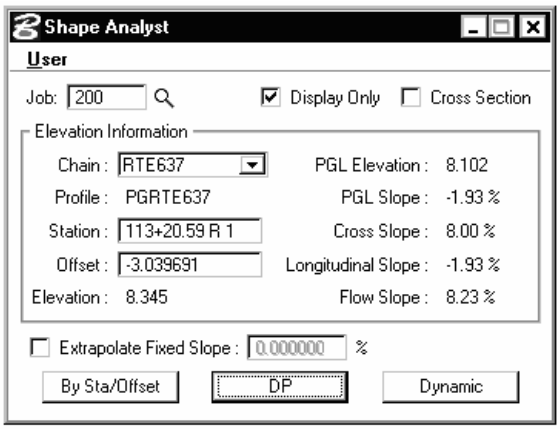


5. Enable the **Display Only** option.
6. Click the **DP** button. Proceed to indicated DP data points as shown below. Notice the values displayed in the dialog.



The Shape Analyst dialog shown below displays all the information related to the Indicated point 1.





Shape Analyst and information for Point 1 Shown

7. Close the Shape Analyst dialog by Clicking on the **X** located on the Top Right Corner of the dialog.

2 Job520 Bridge

OBJECTIVES

In this part you will learn the basics of how to create a Bridge Model. GEOPAK Bridge allows you to create Models using simple to complex alignments.

STARTING BRIDGE

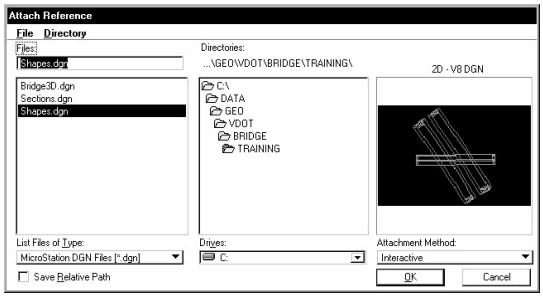
Open Bridge3D.dgn and Attach Shapes.dgn file as Reference

This SHAPES.DGN contains all the information required to calculate elevations (Z Levels); Profile and Cross Slope information along the Bridge.

1. Open **Bridge3D.dgn** file (**C:\DATA\Geo\VDOT\Bridge\ Training\Bridge3D.dgn)**
2. Select **References** tool from the MicroStation Primary Tools.

Note For additional information related to Using References, see MicroStation On-Line Help.

3. Select **Attach Reference** tool.
4. Select **C:\DATA\GEO\VDOT\BRIDGE\TRAINING\Shapes.dgn.** Click **OK** to proceed.



5. Enter for Logical Name **Shapes.**

6. Click **OK**.
7. Close the **References** dialog box.

Select the Road Project Using the Road Project Manager

1. Select the Road Project Manager tool. The Project Manager dialog box appears.
2. Under the Directories list box, select **C:\DATA\GEO\VDOT\BRIDGE**.
3. Under the Projects list box, select **Training.prj**. The Project Users dialog box appears.

Note Record in your manual, the Job Number shown in the dialog.

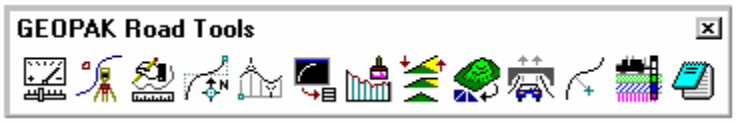
4. Under the Project Users list box select your name from the list of users.

Warning If your name is not available, contact your project administrator.

5. Click **OK** to continue.
6. Minimize the **Road Project** dialog box.

Check the Shapes Data and Record the CHAIN name

1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Road Tools**).



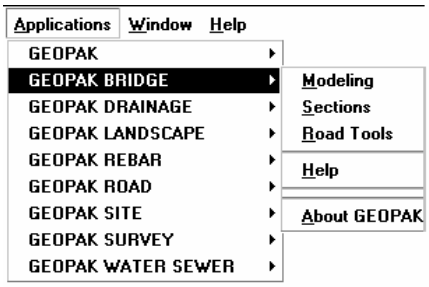
2. Select the **Shape Manager** tool from the GEOPAK Road tools palette.

3. Select the **Shape Analyst** tool from the Superelevation Shape Manager Tools palette. The Shape Analyst dialog appears.
4. Enable the **Display Only** option.
5. Click the **Dynamic** button. Proceed to indicated DP and move the mouse cursor within the shapes area. Notice the values displayed in the dialog

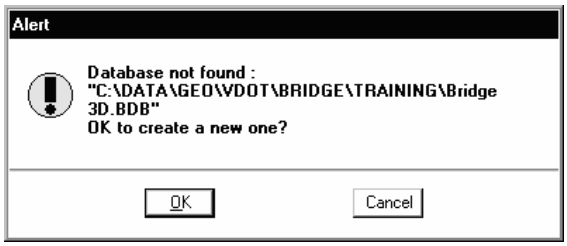
Note Write in your training manual, the name of CHAIN that appears in the **Chain** pull down list. You will make references to this chain later in this chapter.

Selecting GEOPAK BRIDGE

1. Select GEOPAK BRIDGE (MicroStation: **Applications>GEOPAK BRIDGE>Modeling**).

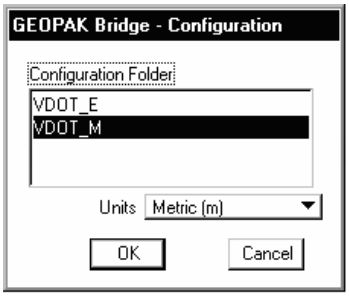


Note If the database is not available, a new database is created.



2. Click **OK** to proceed.

3. Select **VDOT_M** from the Configuration Folder list.



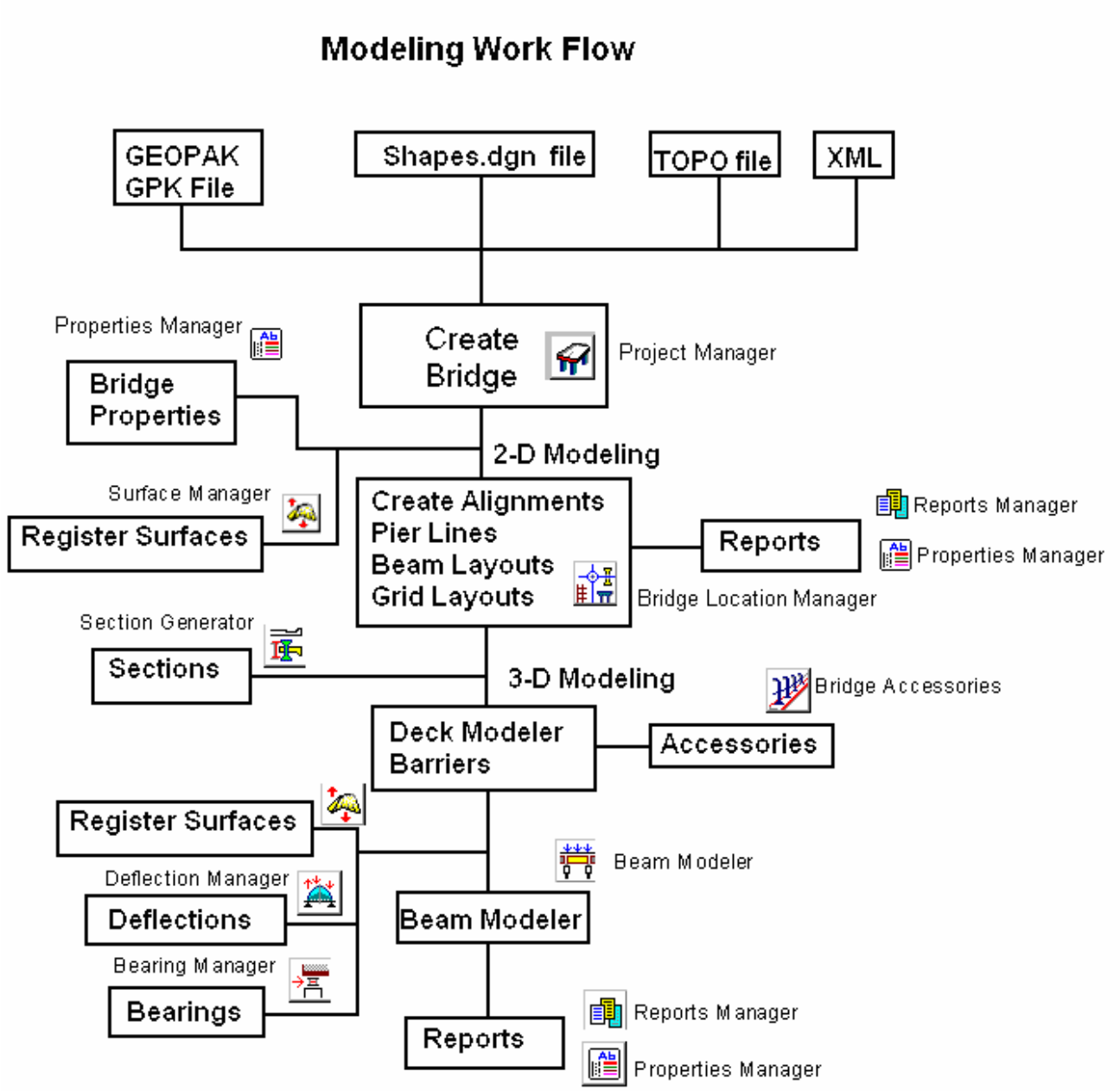
4. Select **Metric (m)** from the Units pulldown list. Click **OK** to proceed.

Note An Information box appears informing that a Default Bridge database is created.

5. Click **OK** to proceed. The Bridge tools palette appear as shown below.

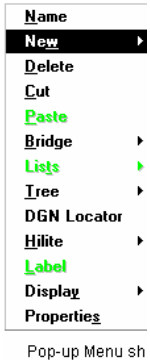
Bridge Tools palette shown

MODELING WORK FLOW



CREATING A NEW BRIDGE

The Bridge Project Manager enables the user to add, delete, and modify bridges within the current project. At the beginning of a project, the list box in the center of the dialog is blank. As bridges are created, they are added to the list. To modify or review a bridge, simply highlight the line, then use the action buttons on the right side. Several bridges may be defined within each project, and the user may work on all as he selects.



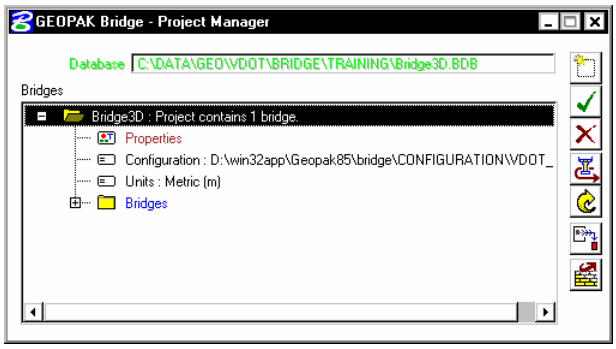
Bridges are created in the Bridge Project Manager by selecting the Create Bridge tool or by right mouse click anywhere within the Bridge tree list. Then, after the Pop-up menu appears, select the New > Item option.

Additional tools are available on the right side of the dialog: Redesign a bridge, Reload configuration parameters and Create a Template Database in the current Configuration Folder.

Create a new Bridge

TOOL	DESCRIPTION
	Project Manager

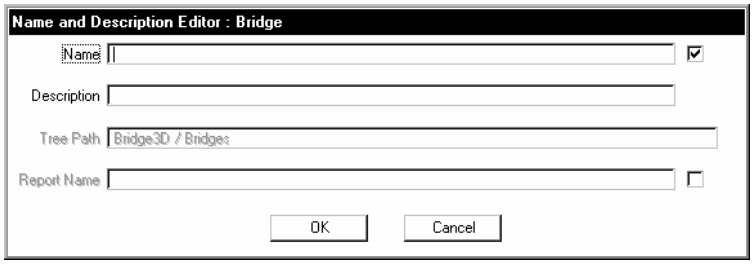
1. Select the **Project Manager** tool from the GEOPAK Bridge tools palette.



2. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item.**

Note Another way to create a Bridge is to select **Create Bridge** tool. This tool is located in the right side of the dialog.

3. The **Name and Description Editor: Bridge** dialog appears.



4. Enter Name **East.**
5. Click **OK** to proceed.

USING BRIDGE ON-LINE HELP

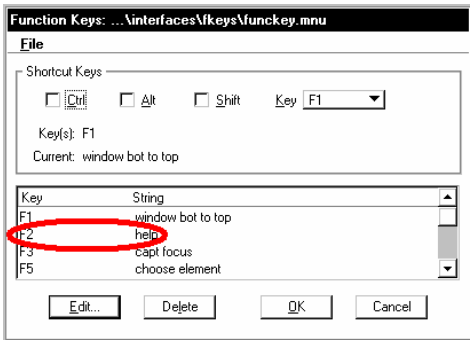
There are two options to start up the Bridge On-Line help.

- Selecting MicroStation Main Menu: **(Applications > GEOPAK >BRIDGE > Help)**
- Selecting the keyboard Function Key assigned to Help.

Note	Check which Function Key in your Keyboard is assigned to Help. The Key assignment varies from User to User.

Check the Function Key Assigned to Help

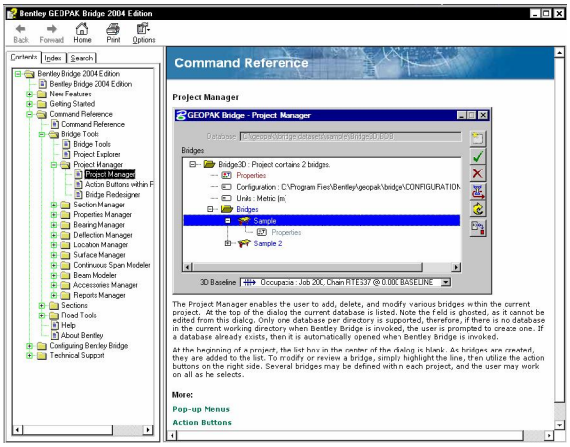
1. Select MicroStation Main Menu: **Workspace > Function Keys**… The Function Keys dialog appears. In the capture shown below the function key F2 is assigned to Help. Take note of the Function Key you need to use in the next exercise.



2. Click **Cancel** to close the dialog.

Use the Bridge Help

1. Click anywhere within the GEOPAK Bridge - Project Manager Dialog box.
2. Select the Function Key from your keyboard that is assigned to Help. The Bridge On-Line Help opens and displays the information of the specific active dialog.



3. Review the information. Close the Help dialog.
4. **Close** the Project Manager Dialog box by clicking on the **X** located in the Right upper corner.

CREATE BRIDGE SURFACES

GEOPAK Bridge calculates Elevations (Z Levels) by making reference to surfaces using the following methods:

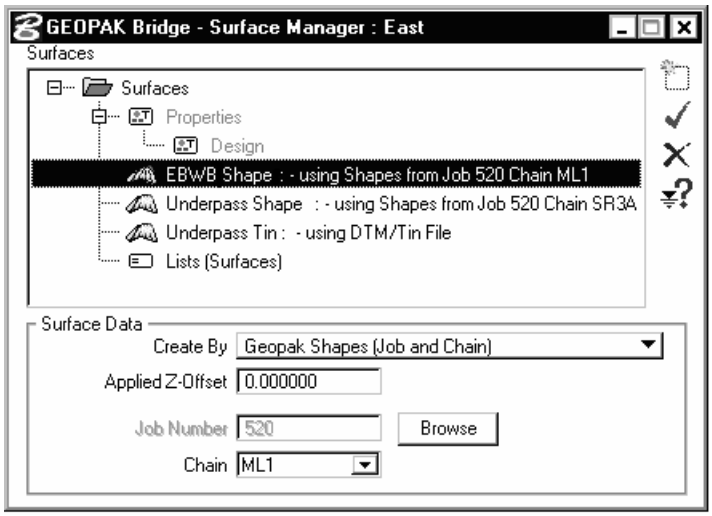
- GEOPAK Shapes (DGN file Shapes.dgn needs to be Referenced in the Bridge DGN file) that are identified by Job Number and CHAIN or a Bridge Alignment
- GEOPAK DTM (TIN file needs to be available)
- Top-side of Deck Component (Deck already placed in the model)
- Bottom-side of Deck Component
- Combined Selected Surfaces.

Surfaces are created in the Surface Manager by selecting the Surface Manager tool. At the beginning of a project, the list box in the center of the dialog is blank. As Surfaces are defined, they are added to the list.

Once the Surface Manager dialog appears, proceed to select the Surfaces folder. This action forces the dialog to expand showing the Surface Data that is required to register a Bridge Surface. After the Surface Data is defined, select the Create Surface tool or Right Mouse click anywhere in the Bridge tree list to select New Item.

The Display Z Levels tool in the Surface Manager, allows the user to verify the validity of the surface by displaying elevation (Z Levels) values. The procedure is to first select the Surface from the Bridge tree list. The second step is to select the Display Z Levels tool and the third step, you nee to move the cursor anywhere in the design file. Bridge will display the Elevation, also the location of the point relative to the Shape; Bridge displays if the point is Inside or Outside of the Surface.

When all the surfaces are created, the Surface Manager dialog appears as shown below.



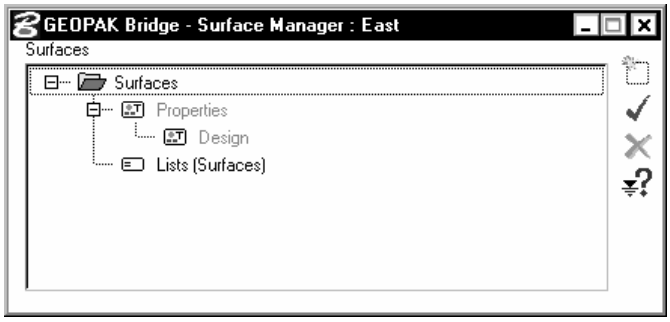
Final Surface Managers dialog shown

Register "EBWB Shape" Surface (Bridge Riding Surface)

TOOL	DESCRIPTION
	Surface Manager
	Display Z Levels

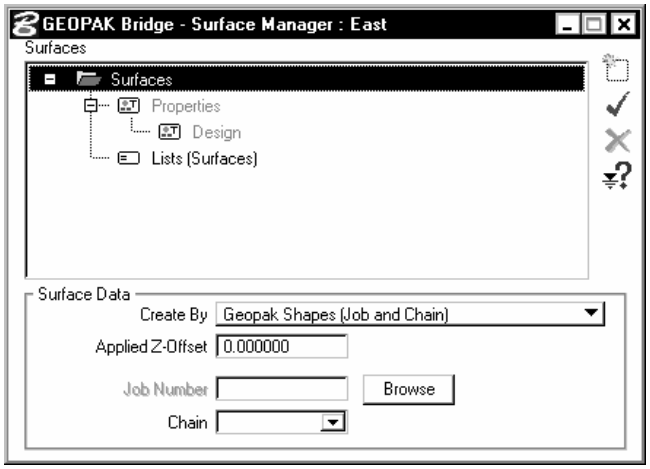
1. Select the **Surface Manager** tool from the GEOPAK Bridge tools palette.

The Surface Manager dialog appears.



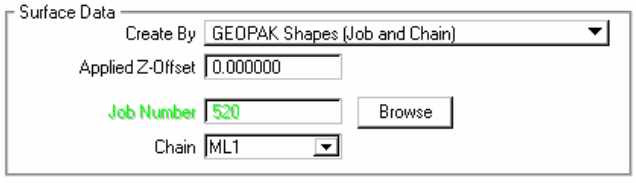
GEOPAK Bridge – Surface Manager: East dialog shown

2. Select the **Surfaces** folder. The dialog expands.



GEOPAK Bridge – Surface Manager: East expanded dialog shown

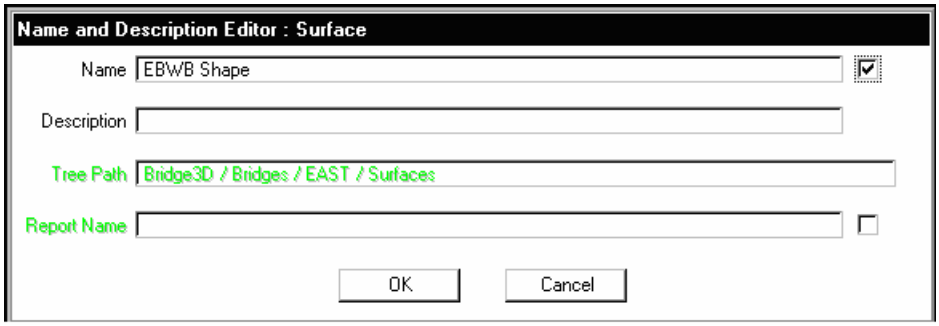
Under the Surface Data group box:



3. Select **GEOPAK Shapes (Job and Chain)** from the "Create By" pulldown list.
4. Click **Browse** to select the location of the Job file. Select **C:\DATA\GEO\VDOT\BRIDGE\TRAINING**
5. Select J**ob520**.

6. Select **ML1** from the Chain pulldown list.

7. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
8. The **Name and Description Editor: Surface** dialog appears. Enter Name **EBWB Shape**.

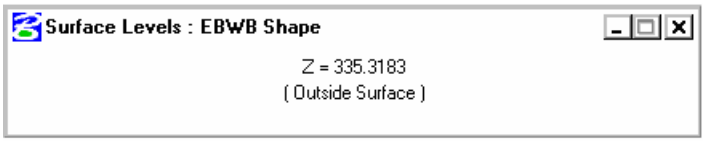


Name and Description Editor: Surface shown

9. Click **OK** to proceed.

10. Select the **Display Z Levels** tool, to browse elevations (Z Levels) of the selected surface.

Hint Move the cursor anywhere over the selected surface and the corresponding elevations are displayed in the Surface Levels dialog. If the point indicated is outside of the surface, Bridge will display that the point is Outside of the Surface.

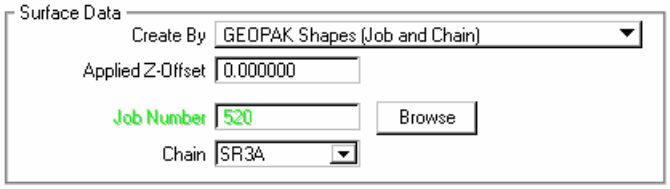


Surface Levels: EBWB Shapes showing the Z Level and location of the Point

11. **Close** the Surface Levels dialog box.

Register "Underpass Shape" Surface

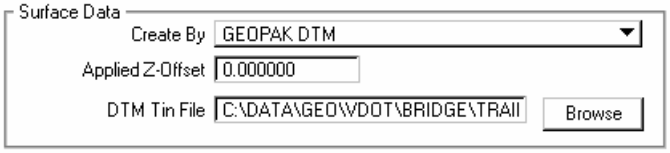
Under the Surface Data group box:



1. Select **GEOPAK Shapes (Job and Chain)** from the "Create By" pulldown list.
2. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\TRAINING**.
3. Select J**ob520**.
4. Select **SR3A** from the Chain pulldown list.
5. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
6. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Underpass Shape"**.
7. Click **OK** to proceed.

Register "Underpass Tin" Surface

Under the Surface Data group box:



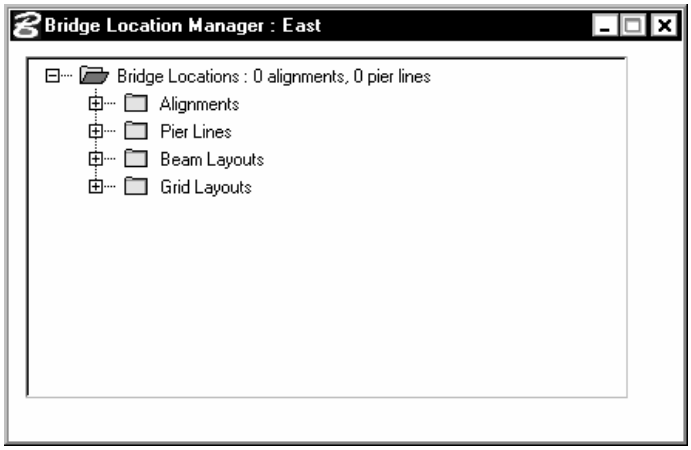
1. Select **GEOPAK DTM** from the "Create By" pulldown list.
2. Click **Browse** and **s**elect directory **C:\DATA\GEO\VDOT\BRIDGE\TRAINING.**
3. Select **Underpass.tin**. Click **OK** to proceed.
4. Select the **Create Surface** tool.
5. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Underpass Tin"**.
6. Click **OK** to proceed.
7. **Close** the GEOPAK Bridge – Surface Manager Dialog box.

BRIDGE LOCATION MANAGER (ALIGNMENTS, PIER LINES, BEAM LAYOUTS AND GRIDS)

The Bridge Location Manager is responsible for the primary locations for all aspects of your bridge models. Alignments for the bridge deck and beams etc. are registered within the Location Manager. Pier line locations are chosen along the appropriate baseline alignment. Single span and continuous span beam layouts (their centerlines) are established with reference to the alignments and selected Pier locations. Grid patterns are developed and superimposed on beam layouts to generate deck elevations.

These locations represent the basis for the bridge layout. For maximum ease of use, they are created entirely within the X/Y plane (top view) and require no 3D modeling information or input.

The Location Manager enables the user to add, delete, and modify various alignments, pier lines, beam layouts and grids within the selected bridge previously created in the Project Manager. If no bridge is displayed in the dialog title, right mouse click and select the Bridge.



Collapsed Tree Shown

When the **Bridge Location Manager** tool is selected the Bridge Location Manager dialog appears.

The Bridge Location Manager is a Tree like design that contains four main folders -. the Alignments, Pier Lines, Beam Layouts and Grids.

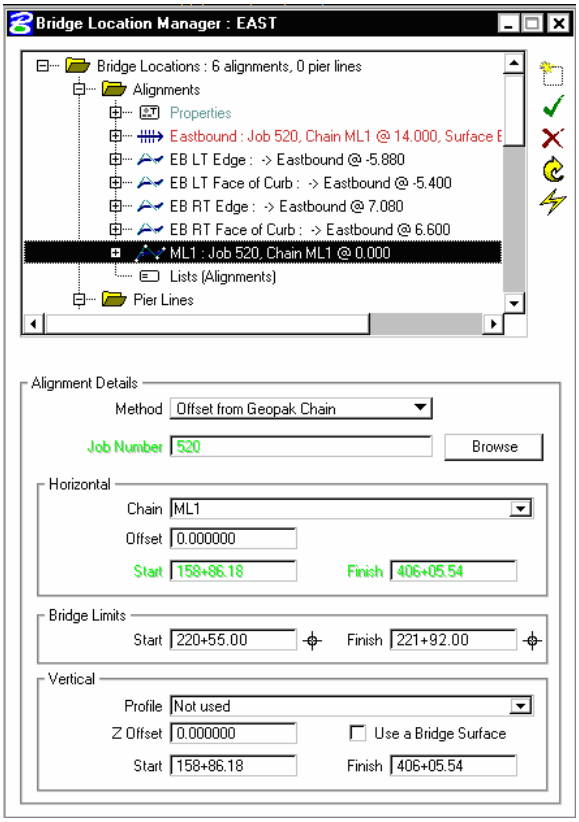
Selecting either the Alignments or Pier Lines folder automatically forces the Bridge Location Manager dialog to expand when selected

CREATING ALIGNMENTS IN THE BRIDGE LOCATION MANAGER

Several methods are available in Bridge to create Bridge Alignments:

- Offset from GEOPAK Chain,
- Offset from Alignment (Bridge Alignment need to be created first)
- Offset from Baseline (the Bridge Master Alignment)
- Long/Short Chords between Pier Lines (Pier lines need to be created first)
- Arbitrary option is also provided by Picking Points or by indicating MicroStation lines.

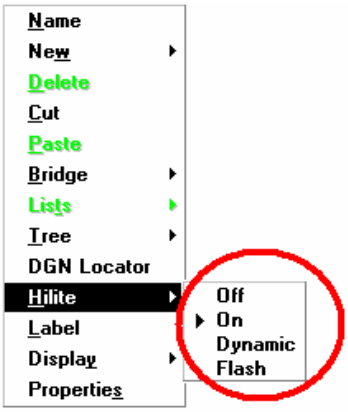
The Bridge Location Manager dialog appears as shown below when all the alignments are created.



Final Bridge Location Managers dialog shown

HIGHLIGHTING BRIDGE COMPONENTS

Bridge components selected in the Bridge Tree list can be highlighted using any of the Hilite options available. You need to **Right mouse-click** anywhere within the Bridge tree list for the the Pop-up menu to appear. Select the Hilite option from the menu and proceed to select any of the available options: **Off** - no element(s) are hilited. **On** - elements are hilited in the MicroStation hilite color. **Dynamic** - view 7 is opened and the DGN locator elements are windowed and centered in the view. **Flash** - the selected bridge components flash in the hilited color. Only one option can be selected at the time, however, the Dynamic option responds to the Flash option. Flash assumes that the hilite is on.

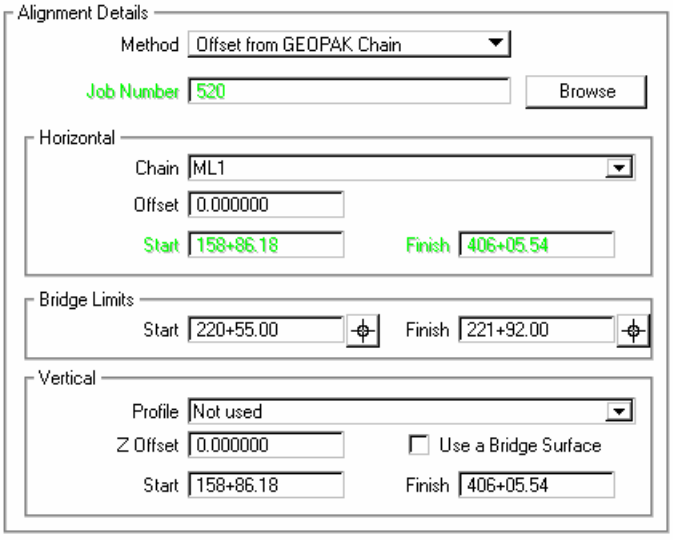


Creating Bridge Alignment "ML1"

TOOL / OPTION	DESCRIPTION
	Bridge Location Manager

1. Select the **Bridge Location Manager** tool from the GEOPAK Bridge tools palette.
2. Select the **Alignments** folder. The dialog expands.

Under the Alignment Details group box:



3. Select **Offset from GEOPAK Chain** from the Method pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\TRAINING**.
5. Select **Job520**.

Under the Horizontal group box:

6. Select **ML1** from the Chain pulldown list.

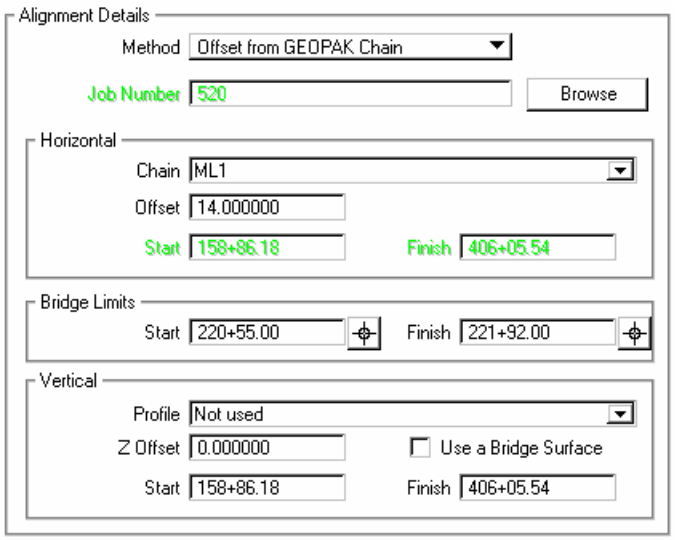
Under the Bridge Limits group box:

7. Select **Indicate Start Limit** tool. Indicate a Data Point just inside the beginning of the Shapes. If you wish, modify the input field to Station **220+55.00** (or type 22055.00).
8. Select **Indicate Finish Limit** tool. Indicate a Data Point just inside the end of the Shapes. If you wish, modify the station value to **221+92.00** (or type 22192.00).
9. Under the Vertical group box, select **Not used** from the Profile pulldown list.
10. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
11. The **Name and Description Editor: Alignment** dialog appears. Enter Name "**ML1"**.
12. Click **OK** to proceed.

Note The Alignment will appear in the DGN file. If the alignment is not visible, use the MicroStation **Fit View** tool to update the MicroStation window.

Create Alignment " Eastbound"

Under the Alignment Details group box:

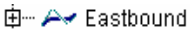


1. Select **Offset from GEOPAK Chain** from the Method pulldown list.
2. Under the Horizontal group box, select **ML1** from the Chain pulldown list.
3. Change the **Offset** to **14.0**.
4. Under the Vertical group box, select **Not used** from the Profile pulldown list.
5. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
6. The **Name and Description Editor: Alignment** dialog appears. Enter Name "**Eastbound**".
7. Click **OK** to continue.

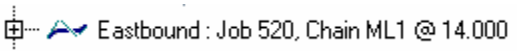
Set Alignment as the Bridge Baseline

This exercise is to set a Bridge alignment as the Bridge Baseline.

TOOL / OPTION	DESCRIPTION
	Set alignment as Baseline



1. Under the Alignments folder, select the **Eastbound** icon. Notice the icon for this alignment looks as shown below.



2. Select the **Set alignment as Baseline** tool. The alignment is set as the Baseline of the Bridge and the icon changes as shown below.

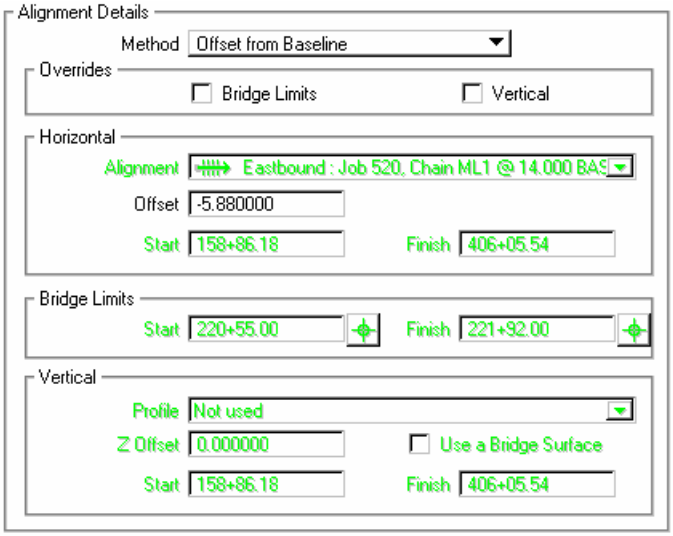
Note If the Bridge Baseline is modified by changing the alignment, an Alert box will appear alerting that changing the Baseline may have significant effect on the Bridge design.

Create Additional Bridge Alignments

Create the Left and Right Edge and the Left and Right Face of Curb. For Method, select **Offset from Baseline**. The only change required is the offset value as shown below.

Note Prior to creating an Alignment, set the Method, Name and Offset as shown below.

Under Alignment Details group box:



1. Select **Offset from Baseline** from the Method pulldown list.
2. Change the **Offset** input as indicated below.
3. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
4. The **Name and Description Editor: Alignment** dialog appears. Enter Alignment Name as indicated in table below.
5. Click **OK** to proceed.

6. Repeat the same process to create the remaining alignments shown in the table below.

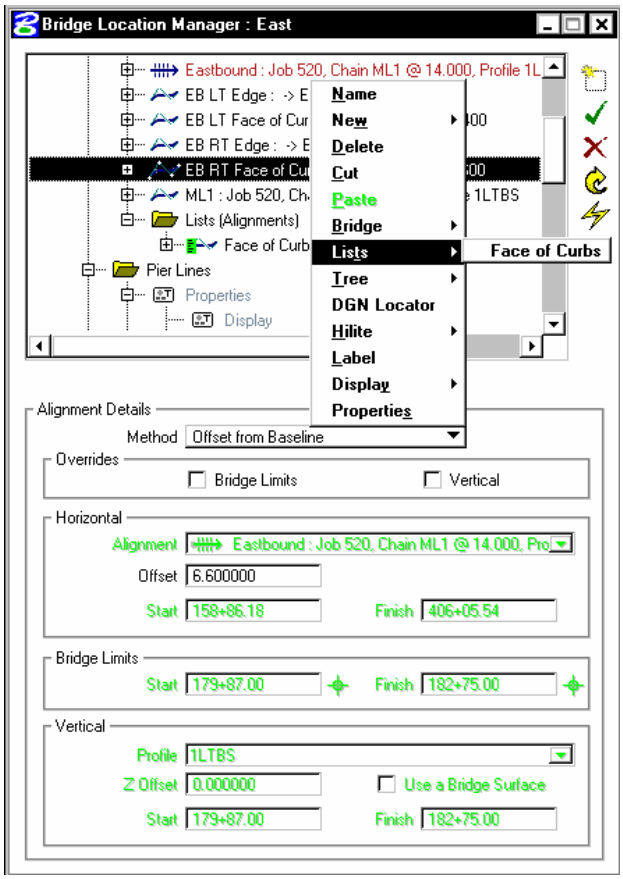
METHOD	ALIGNMENT NAME	OFFSET (+ OR -)
Offset from Baseline	EB LT Edge	-5.88
Offset from Baseline	EB LT Face of Curb	-5.4
Offset from Baseline	EB RT Edge	7.08
Offset from Baseline	EB RT Face of Curb	6.60

CREATING AN ALIGNMENT LIST

Whenever you have a large list of Alignments and you need to isolate just a few Alignments for purposes of easy selection, you can create your own predefined "List" of Alignments.

Select the "Lists" item at the bottom of the Alignment Manager tree. Select the "New" option to establish a new List. After entering the name of the List, use the right mouse button menu to Add or Clear all alignments in the List.

Alternatively, you can selectively add existing alignments to the List. The picture depicted below shows the Alignment already selected and the Pop-up menu pulldown list. In the Pop-up Menu, the Lists option is selected. It shows the available Lists that can be selected; The Face of Curbs list is available for selection.

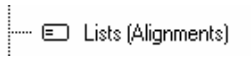


Notice the "Lists" menu contains the name of your new List(s). Having selected the list name, the Alignment is appended to that list. The entry is updated in the Alignment tree.

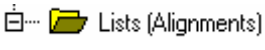
Your Alignment List is made available for selection in all other dialog boxes where an Alignment selection is required. Simply choose the right mouse button at those locations and select the List name or the "Master" list. The available Alignments are updated accordingly.

In this exercise an alignment list **Face of Curbs** will be created. The List will be used in the calculation of Deck Elevations.

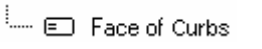
Create Alignment List "Face of Curbs"



1. Select the **List (Alignments)** icon.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
3. The **Name and Description Editor: List of Alignment** dialog appears.
4. Enter Name "**Face of Curbs"**.
5. Click **OK** to proceed.



Note A Folder **List (Alignments)** and **Face of Curbs** icon are automatically created.



6. Select **Face of Curbs** icon.
7. **Right mouse-click** anywhere within the Bridge tree list. Select **Lists** > **Add All**.

Note Since all created Alignments are added to the list, alignments that do not describe a Face of Curb should be deleted.

8. **Expand the Tree** for this List by clicking the **Plus Sign** icon.
9. Select **EB LT Edge** from the list.
10. **Right mouse-click** anywhere within the Bridge tree list. Select **Delete**.

Note The **Delete** tool is also available for selection in the right side of the dialog.

11. Remove **EB RT Edge, Eastbound** and **ML1** alignments from the list.

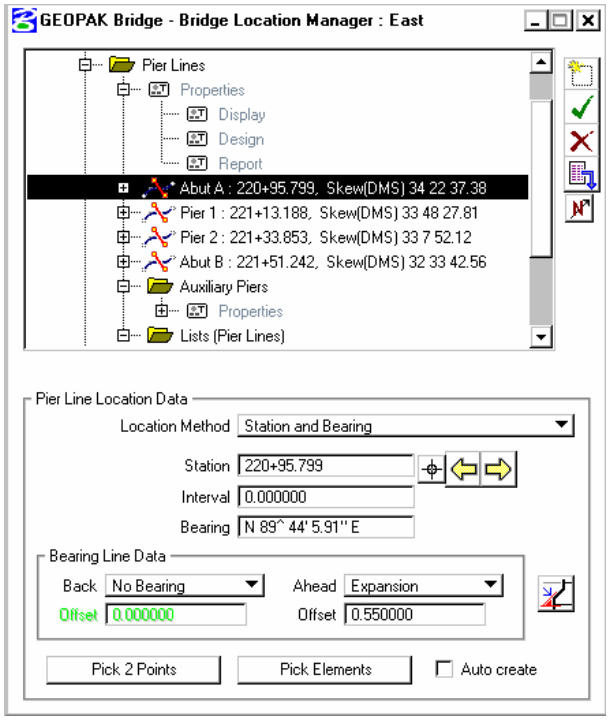
CREATING PIERS LINES AND BEARING LINES IN THE BRIDGE LOCATION MANAGER

Piers are created in the Bridge Location Manager. The process begins by selecting the Pier Lines folder located in the Bridge trees list.

Under the Pier Location Data group box, there are several methods available in the Location Method pulldown list to locate a Pier Line:

- By Station and Skew angle (the Skew Angle can be in degrees, or enable the **DMS** option to define the Skew in degrees, minutes and seconds-space between degrees, minutes and seconds is required)
- By Station and Bearing
- By Station and Azimuth
- By Alignment Intersection
- By selecting an Existing Pier (distance along Baseline)
- By selecting an Existing Pier (offset normal to Pier)
- By Picking two Points
- By Picking Elements (MicroStation lines).

At each Pier Line location, Bearing Line Data back and ahead of the pier line is defined by entering offset values (normal distances) to the pier line and by selecting the bearing type; Expansion or Fixed support.



You can review the pier Skew (in degrees or in degrees minutes and seconds), the Bearing, and Azimuth values by using the **Bearing/Azimuth/Skew/DMS Display Mode** tool.

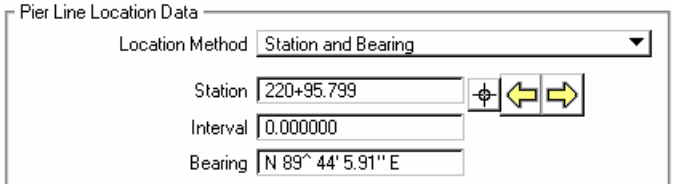
Select the Update Pier Line tool to update changes made to the Station, or Skew, or Bearing etc.

CREATE PIER LINE “ABUT A”

Create Pier Line “Abut A”

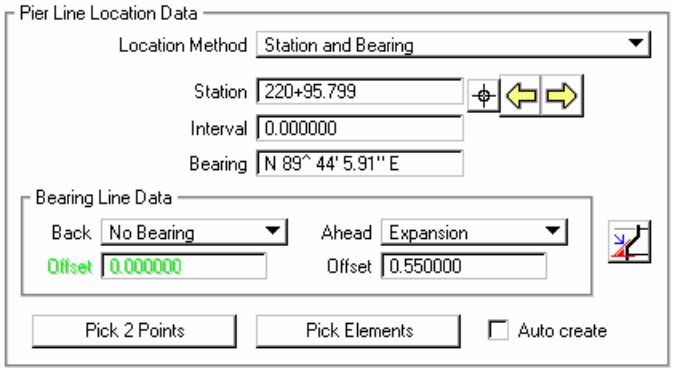
1. Select the **Pier Lines** folder. The dialog expands.

Under the Pier Line Location Data group box:



2. Select **Station and Bearing** from the Location Method pulldown list.
3. Enter **220+95.799** (or 22095.799) in the Station key-in field.
4. Enter **N 89 44 5.91 E**. in the Bearing key-in field.

Under the Bearing Line Data group box:



5. Select **No Bearing** from the Back pulldown list.
6. Select **Expansion** from the Ahead pulldown list.

Note The selection Expansion or Fixed in the Bearing Line Data group box Back or Ahead has not effect in any of the calculations performed by Bridge. This information is only used for reporting purposes.

7. Enter **0.550m** for the Ahead offset.
8. **Right mouse-click** anywhere within the Bridge tree list. Select **New**> **Item**.
9. The **Name and Description Editor: Pier Line** dialog appears. Name “**Abut A”**.
10. Click **OK** to continue.

11. Select **Bearing/Azimuth/Skew/DMS Display Mode** tool, to set the display view to Bearing, Azimuth, Skew, or DMS.

Note Select the **Bearing/Azimuth/Skew/DMS Display Mode** tool and click several times. Notice in the dialog tree next to each pier name, the value changes each time the **Bearing/Azimuth/Skew/DMS Display Mode** tool is selected.

CREATE ADDITIONAL PIER LINES

Create Additional Pier Lines

Since the pier lines are parallel, just change the Name, Station and Bearing Line Data as described in the table below. The data should be entered in the dialog prior to creating the Pier.

Pier Line Name	Pier 1	Pier 2	Abut B
Location Method	Station and Bearing	Station and Bearing	Station and Bearing
Station	221+ 13.188	221+33.853	221+51.242
Bearing	N 89 44 5.91 E	N 89 44 5.91 E	N 89 44 5.91 E
Bearing Back type	Expansion	Expansion	Expansion
Bearing Back Offset	0.350	0.350	0.550
Bearing Ahead type	Expansion	Expansion	No Bearing
Bearing Ahead Offset	0.350	0.350	0.0

1. Select existing pier **Abut A** icon.
2. Under the Pier Line Location Data group box, change **Station** value.
3. Under the Bearing Line Data group box, change the **Offset** Back and Ahead.
4. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
5. **The Name and Description Editor: Pier Line** dialog appears. Enter **Pier** Name.
6. Click **OK** to continue.
7. Repeat steps above to create the additional pier lines.

CREATING PIER LISTS

User-defined Lists for Pier Lines are often essential in the Bridge modeling process. Pier Lines are created for many purposes. One use is for the locating physical Piers or Abutments. They are also used for locating the ends of spans, the ends of decks and barriers etc.. A user-defined List of Pier Lines is an easy way to isolate just those Piers that beam layouts should span between. Of course, they also make for easy selection amongst a large list of Piers.

Select the "Lists (Pier Lines)" item at the bottom of the Pier Lines tree. Select the "New" icon to establish a new List. After entering the name of the List, use the right mouse button menu to Add or Clear all pier lines in the List:

Alternatively, you can selectively add any of your existing Piers to the List by first selecting a Pier and then displaying the Lists option by clicking the right mouse button.

The Pier Line Lists are made available for selection in all other dialog boxes where a Pier selection is required.

Create the "Interior Span" Pier List

1. Select the **List (Pier Lines)** icon.
2. **Right mouse-click** anywhere within the Bridge tree list. Select > **New** > **Item**.
3. The **Name and Description Editor: List of Pier Line** dialog appears. Enter Name "**Interior Span"**.
4. Click **OK** to continue.

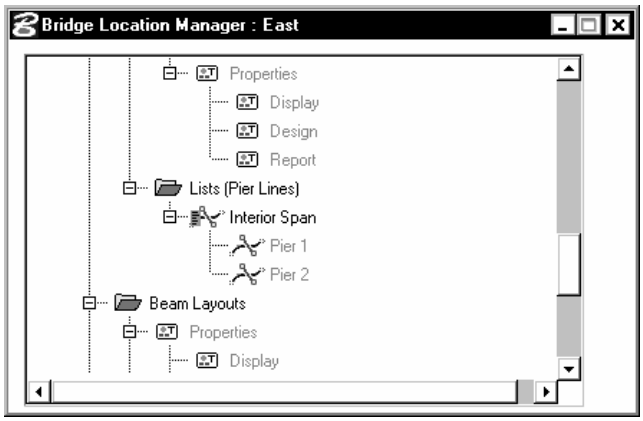
Note A Folder **List (Pier Lines)** and **Interior Span** icon are automatically created.

5. Select the **Interior Span** icon.
6. **Right mouse-click** anywhere within the Bridge tree list. Select **Lists** > **Add All**.

Note Since all Pier Lines are added to the list, Pier Lines that do not describe the Interior Span should be deleted.

7. **Expand the Tree** for this List by clicking the **Plus Sign** icon
8. Select **Abut A** icon from the list. **Right mouse-click** anywhere within the Bridge tree list. Select **Delete**.
9. Select **Abut B** icon from the list. **Right Mouse-click** anywhere within the Bridge tree list. Select **Delete**.

The Bridge Location Manager dialog appears as shown below when the Pier Lists is created.



Final Pier List Shown

CREATE PIER LINES USING THE ALIGNMENT INTERSECTION METHOD

When there is an Alignment already registered in Bridge, this alignment can be intersected with the Baseline. In this exercise, the Baseline intersects the alignment SR3A. This option places the pier line tangential to the intersected alignment.

Create Alignment " SR3A"

Create the underpass alignment SR3A.

1. Select the **Alignments** folder in the Bridge tree list.

Under the Alignment Details group box:

2. Select **Offset from GEOPAK Chain** from the Method pulldown list.
3. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\TRAINING**.
4. Select **Job520.**

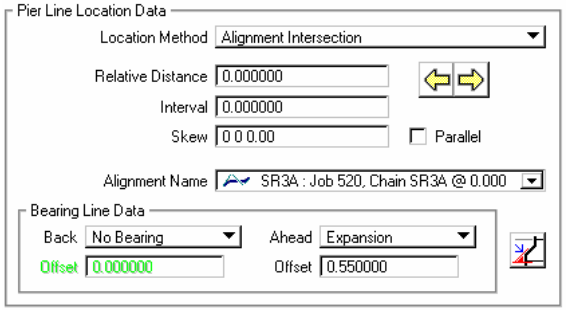
Under the Horizontal group box:

5. Select **SR3A** from the Chain pulldown list.
6. Change the **Offset** to **0.00**.
7. Under the Vertical group box, select **Not used** from the Profile pulldown list.
8. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
9. The **Name and Description Editor: Alignment** dialog appears. Enter Name "**SR3A**". Click **OK** to continue

Create Pier Line

1. Select the **Pier Lines** folder. The dialog expands

Under the Pier Line Location Data group box:



2. Select **Alignment Intersection** from the Location Method pulldown list.
3. Enable the **Parallel** option.
4. Enter **0.0** in the Relative Distance, Interval and Skew key-in fields.
5. Select **SR3A** from the Alignment Name pulldown list.

6. Select the **Create new Pier Line** tool.
7. The **Name and Description Editor: Pier Line** dialog appears. Enter Name "**Test"**. Click **OK** to continue.

8. Select **Bearing/Azimuth/Skew/DMS Display Mode** tool, to set the display view to Bearing. Compare the Bearing of Abut A and the Bearing of the pier Test. The Bearings should be the same.
9. **Delete** the Test pier line.

SET BEAM LINES NAMING PATTERN PROPERTIES (DESIGN RULES)

As groups of components are created, they are automatically given a name in accordance with your default Naming Patterns. You can format your naming pattern from a mix of literal text and any of the available naming codes shown in the popup list.

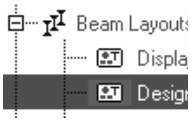
For example, five spans of beam might be created, each containing 4 beams. Specifying a Span naming pattern as "Span {D-H}", will generate span names such "Span D", "Span E" through "Span H". Note the code {D-H} causing the span sequence to be named with letters starting with the letter "D". The beams within each span could then be named using "Beam {@}" to generate "Beam A" "Beam B" etc.

Set or Review Design Pattern Rule Property

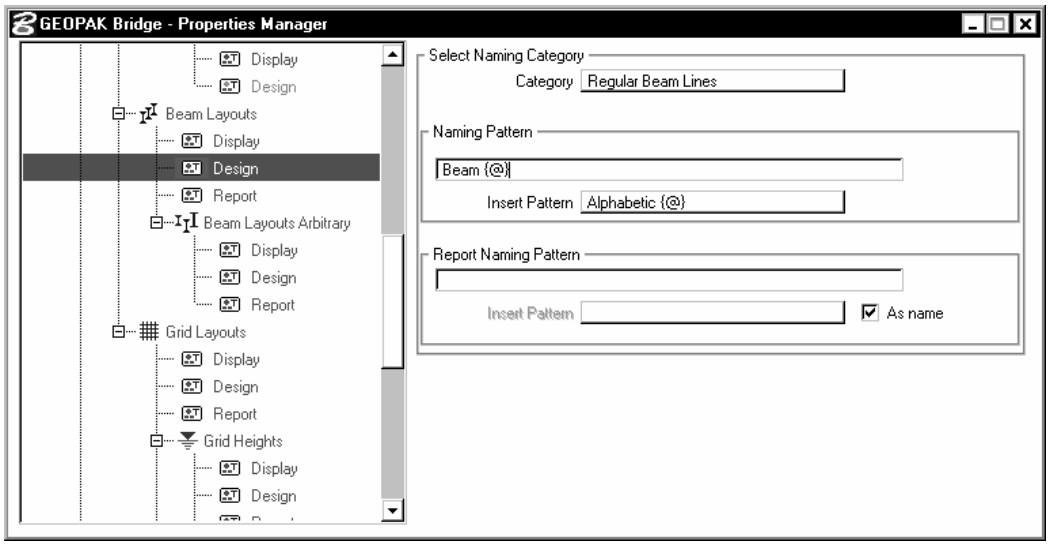
1. Select the **Properties Manager** tool from in the Bridge tools palette.

Note The properties shown in the GEOPAK Bridge – Properties Manager dialog are from the default properties stored in the default template. The default values are automatically transferred from the default template to the current project when a Bridge Database is created

2. Under Bridge Locations icon, select Beam Layouts icon.



3. Under Beam Layouts icon, select the **Design** icon. The dialog changes as shown below.

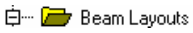


4. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.

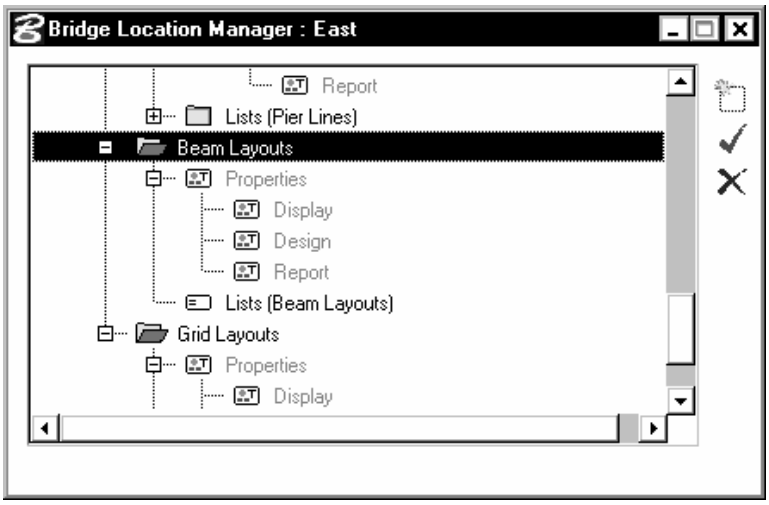
Note Under the Naming Pattern group box, review the naming pattern: **Beam {@}**. The word "Beam" is the literal part and **{@}** is the alphabetic pattern selected from the Insert Pattern pulldown list.

5. Close the Properties Manager dialog.

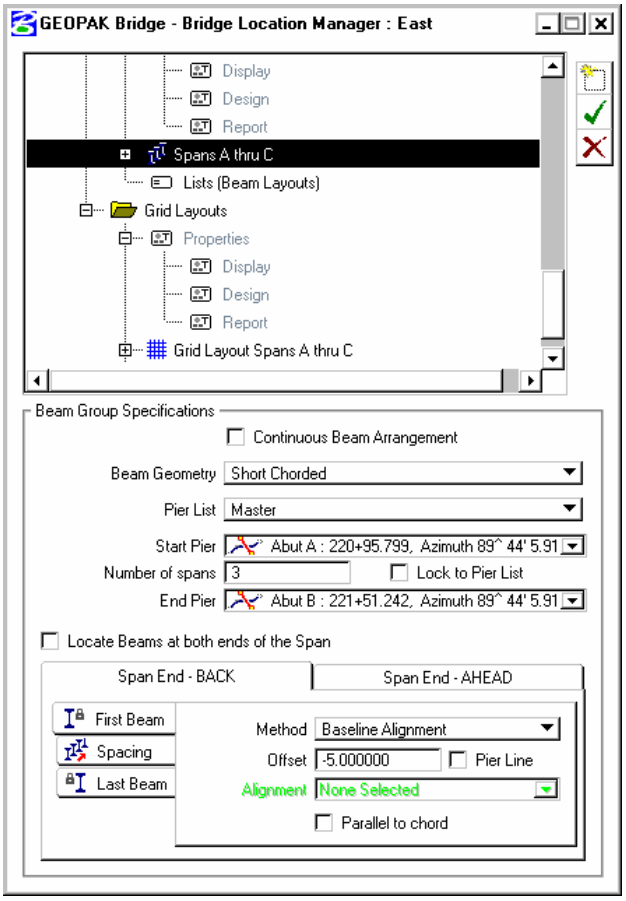
CREATING BEAM LAYOUTS AND BEAM LINES



The procedure to create Beam Lines begins by creating a Beam Layout name. The Beam Layout name is created by first selecting the Beam Layouts folder located in the Bridge tree list, followed by selecting the Create Beam Line tool or by right mouse click anywhere within the Bridge tree list (to access the Pop-up menu to select the New > Item option).



The Beam Layout name created is automatically selected by Bridge and the Bridge Location Manager dialog expands. See lower portion of the dialog depicted below.

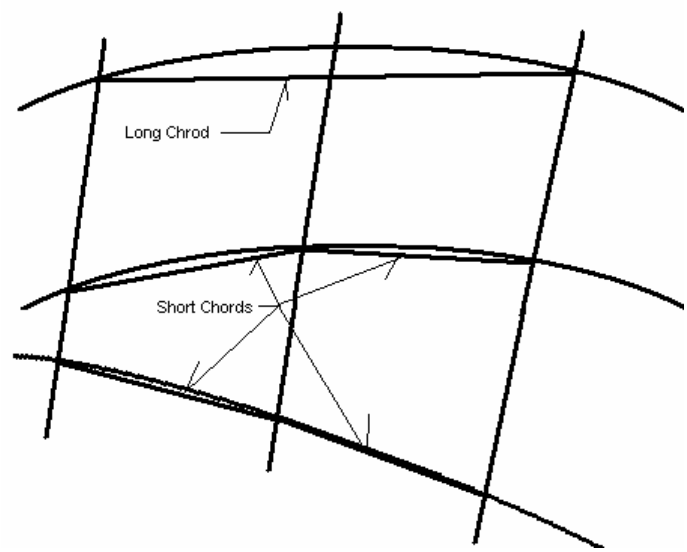


Bridge Location Manager shown

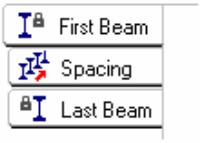
The beam layout options available to define Beam Layouts are located within the Beam Group Specifications window in the Beam Geometry pulldown list. The methods available are:

- Short Chorded for single spans arrangements.
- Continuous Beam Arrangement is available when the Continuous Beam Arrangement option is enabled. When this option is activated, you can create continuous beams arrangements made of:
  - Concentric / Parallel segments
  - Short Chorded segments.
  - And Long Chorded segments.

The Short Chord method and the Long Chord method are generally used to place beam lines by locating the points of intersection between an Alignment and Pier Lines at any specified Offset.

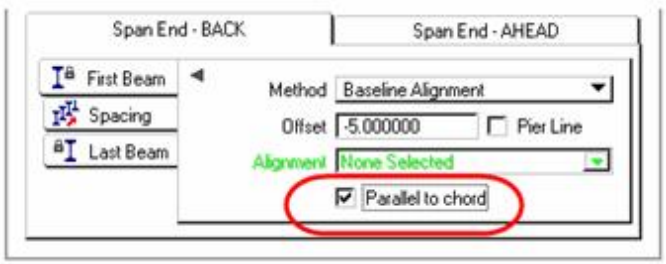


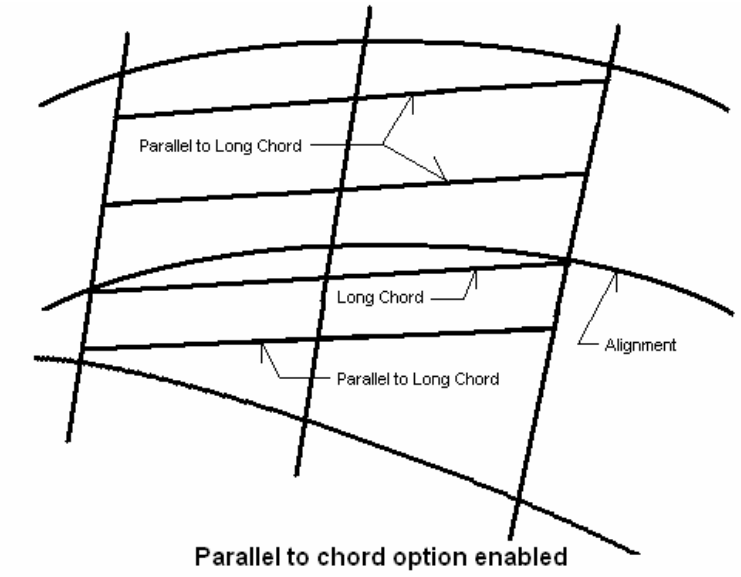
There are three Tabs within the Beam Group Specifications window:



- To define the First Beam
- To define the Spacing
- To define the Last Beam

Note Enable the **Parallel to chord** option when a beam line is to be placed parallel to a Chord of the selected alignment.

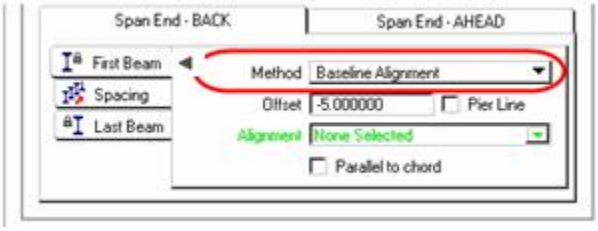




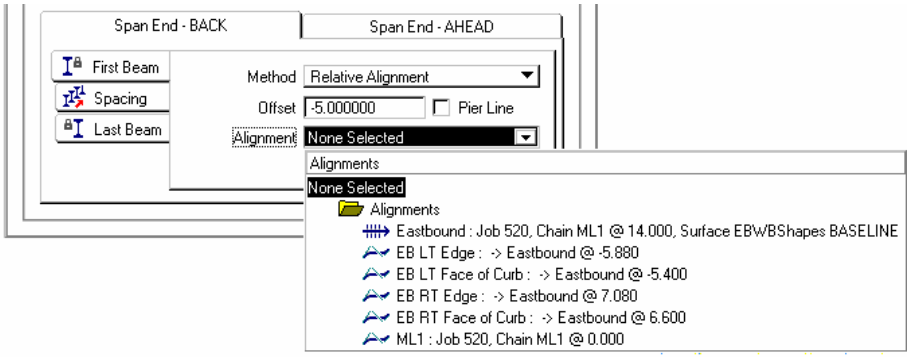
Parallel to chord option enabled

There are two general methods to place the first beam:

- By the Baseline Alignment.

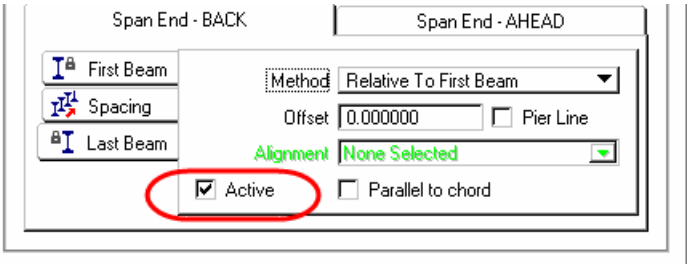


- By a Relative Alignment. The Relative alignment allows for selection of any alignment that has been registered in the Alignments folder.



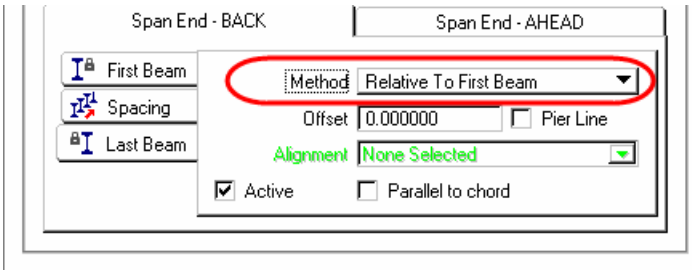
First Beam and Relative Alignment option shown

The Last Beam is defined by selecting the Last Beam tab. The options are available only when the Active option is enabled.



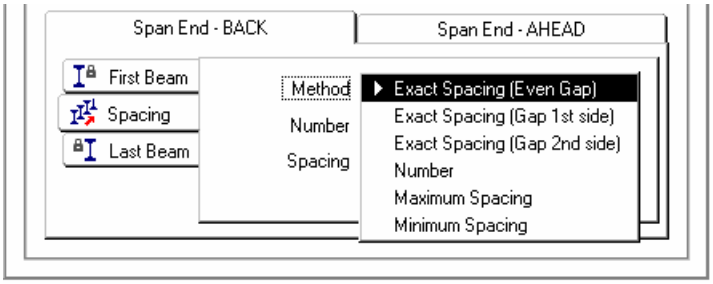
There are three options to define the Last Beam:

- Baseline Alignment
- Relative Alignment
- Relative To First Beam. The last beam can be defined parallel to the Chord if the Parallel to chord option is enabled.



Beam Group Specifications window and Last Beam tab options shown

The Spacing tab is used to define the beam lines from the first beam to the last. The options available are as shown in the partial dialog shown below.



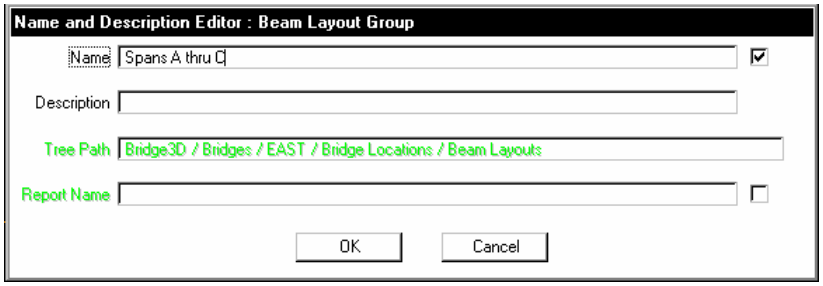
Spacing Tab and Available options shown

CREATE BEAM LAYOUT FOR “SPANS A THRU C”

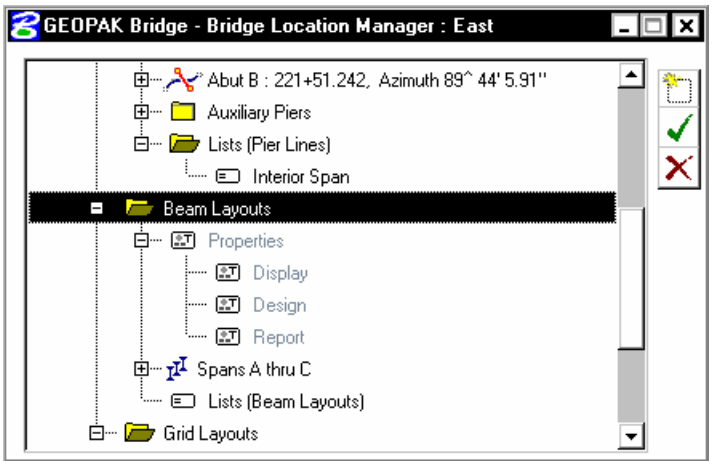
In this exercise one beam layout will be created for defining the beam lines for Spans A thru C. The beam lines are drawn by selecting the short chords of concentric curves parallel to the Baseline. These beam lines are not necessarily parallel.

Create Beam Layout “Spans A thru C”

1. Select the **Beam Layouts** folder in the Bridge Location Manager.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
3. **Name and Description Editor: Beam Layout Group** dialog appears.
4. Enter Name **Spans A thru C.**



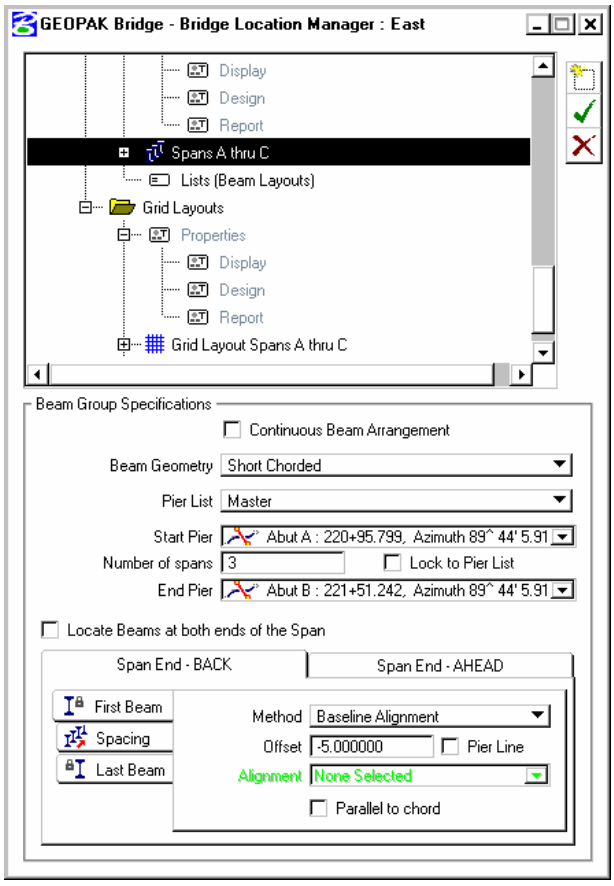
5. Click **OK** to proceed.



CREATE BEAM LINES FOR “SPANS A THRU C”

Define the First Beam

1. Select beam layout **Spans A thru C** icon in the Bridge tree list. The dialog expands showing the Beam Group Specifications as shown below.



Location Manager Spans A thru C shown

Under Beam Group Specifications group box:

2. Select **Master** from Pier List pulldown list.

Note	The Pier List pulldown allows the user to select a Pier List. The Master pier list contains the list of all the piers previously created. The Master option is the default name and it is created internally by Bridge.

3. Select **Abut A** from the Start Pier pulldown list.
4. Select **Abut B** from the End Pier pulldown list.
5. Click the **First Beam** tab to define the First Beam.
6. Select **Baseline Alignment** from the Method pulldown list.

Note	In this example, beams lines are placed per span using the Short Chord of concentric curves to the baseline. As a result, beams are not necessarily parallel to each other. If you want to place beams lines parallel to the Short Chord of the Baseline, you need to select the **Parallel to chord** option.

7. Change **Offset** to **-5.0m**

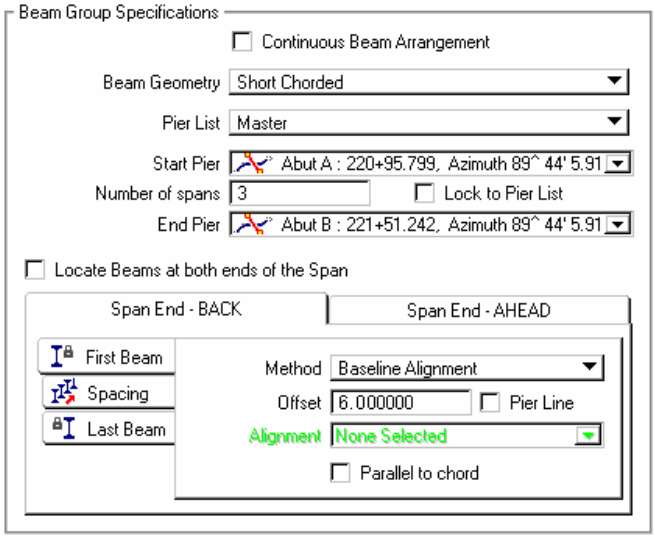
Define the Last Beam

Under Beam Group Specifications group box:

1. Click **Last Beam** tab to define the Last Beam
2. Enable the **Active** option to define the Last Beam.

Note If all the beams are parallel to the first beam, it is not necessary to define the Last Beam.

3. Select **Baseline Alignment** from the Method pulldown list.
4. Change the **Offset** to **6.0m**



Bottom portion of the Bridge Location Manager shown

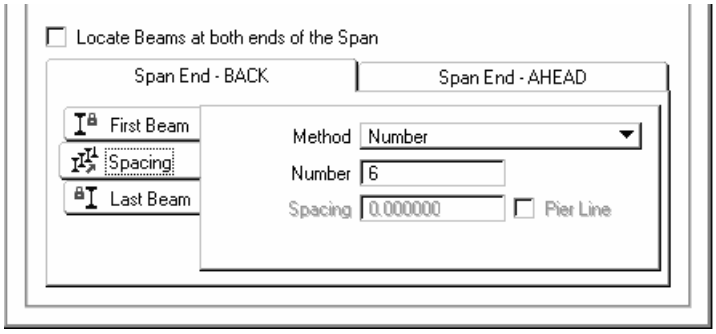
Define the Beam Spacing

1. Click the **Spacing** tab to define the Beam Spacing.
2. Select **Number** from the Method pulldown list.
3. Enter **6** in the Number Key-in field.

Note The number is defined as the total number of beams in the group.

4. Select the **Modify Beam Line** tool to update the information.

Note Notice that all beams are drawn in the design file.



Bottom portion of the Bridge Location Manager shown

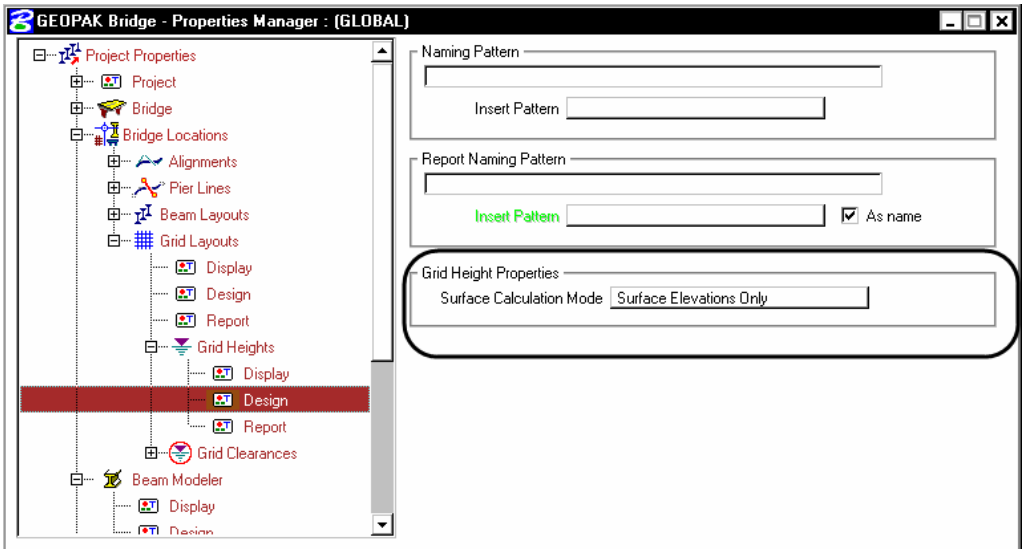
CREATE GRID LAYOUTS AND GRID LINES FOR CALCULATING ELEVATIONS

Grid Lines are an imaginary set of lines placed at regular intervals within each span. They are used to calculate elevations at the points of intersection between the beam lines and the Grid Lines and/or Face of Curbs or Face of Rails. Vertical clearances are also calculated, if the surface below is provided.

Grids lines are tied to the reference alignment, and can be drawn Normal to the alignment, Parallel to the Start Pier or Parallel to the Finish Pier. They can be distributed along an alignment by Spacing, Fraction, Number and Stationing calculated between Bearings, between Pier Lines, Along Beam Line between Piers and Along Beam line between Bearings.

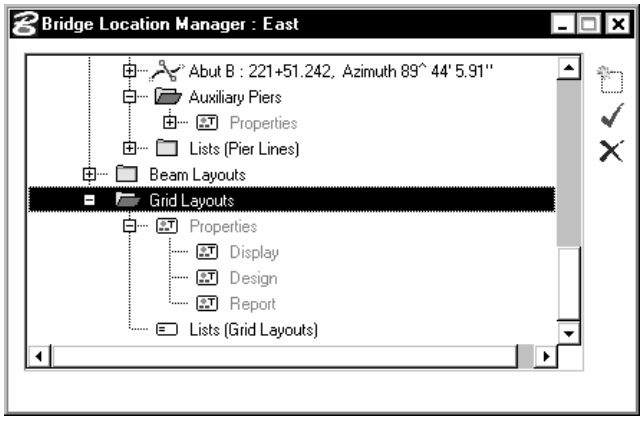
If a Reference Alignment is not defined, the Reference Alignment is the Baseline by default. The additional data required are the major Surface, and/or an Alignment list.

To calculate Surface Elevations, you need to specify the Surface Calculation Mode in the Grid Heights Design Properties.

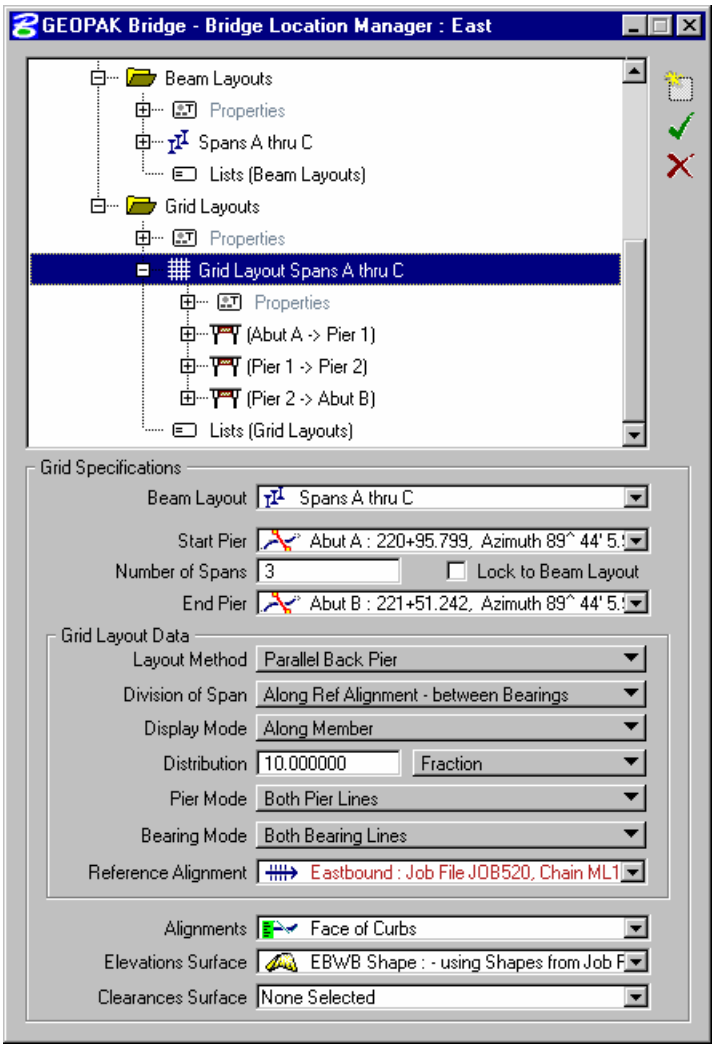


The procedure to create Grid Layout Lines begins by creating the Grid Layout name first.

The Grid Layout name is created by selecting the Grid Layouts folder in the Bridge Location Manager. Grid Layout names are created by selecting the Create Grid tool or by right mouse click anywhere within the Bridge tree list to access the Pop-up menu to select the New > Item option.



The Grid Layout name created is automatically selected by Bridge and the Bridge Location Manager dialog expands. See lower portion of the dialog depicted below.



Lower portion of dialog shows the Grid Specifications window

SET GRID LAYOUTS PROPERTIES

Different properties options are available to Display, Design and Reporting Grid Layouts.

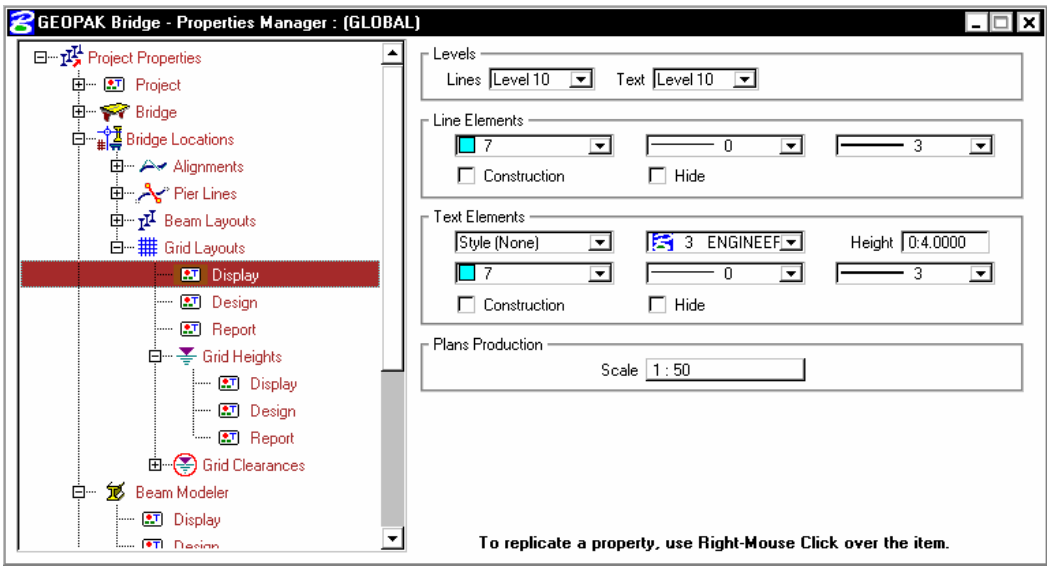
Set or Review Grid Layouts Display Properties

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.

Note The properties shown in the GEOPAK Bridge – Properties Manager dialog are from the default properties stored in the default template. The default values are automatically transferred from the default template to the current project when a Bridge Database is created.

2. Under Bridge Locations select **Grid Layouts** icon. Under Grid Layouts select the **Display** icon. The dialog changes as shown below.

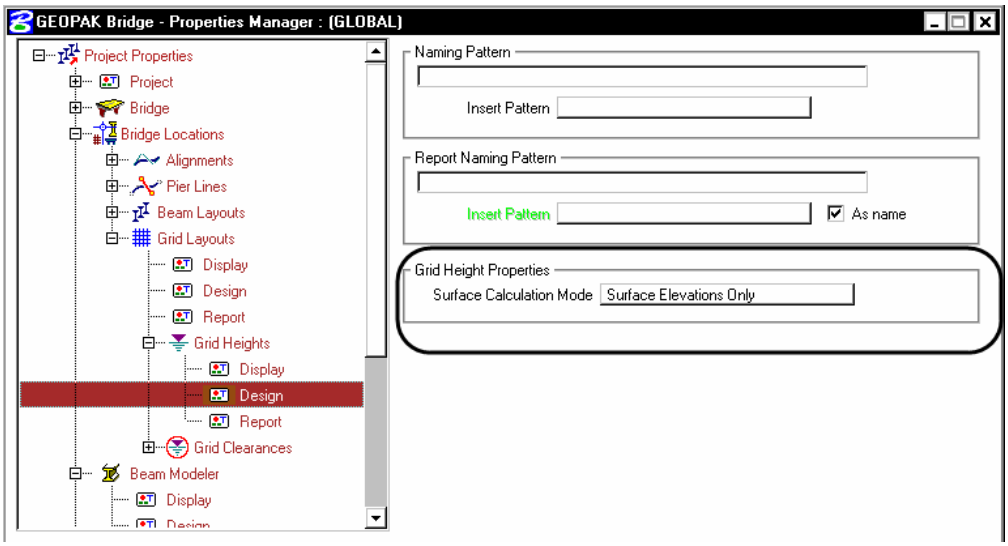
Hint Notice that the Project Properties tree can be collapsed and expanded by clicking on the **+** or **–** icons. You can use the vertical scroll bar to browse the tree.



The defaults settings under Levels, Line Elements, Text Elements and Plans Production should be the same as the ones shown above.

Set or Review Grid Layouts Grid Heights Design Properties

1. Under Bridge Locations select Grid Layouts icon. Under Grid Layouts select the Grid Heights icon and under the Grid Heights icon select the **Design** icon. The dialog changes as shown below.

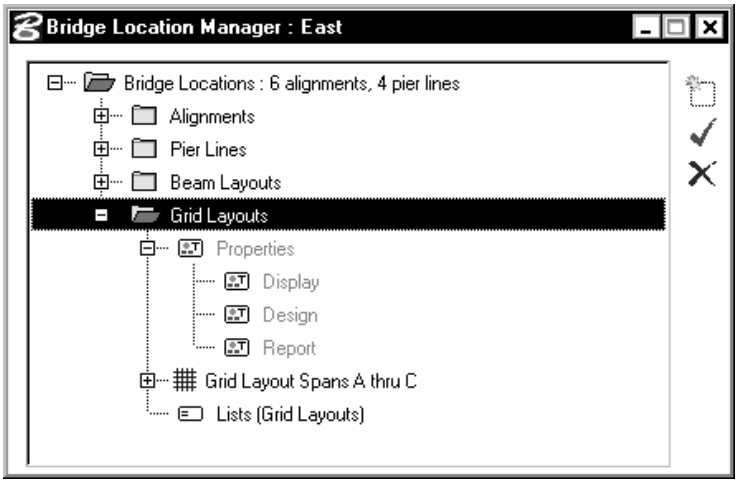


2. Check that under the Grid Height Properties, the **Surface Elevations Only** from the Surface Calculation Mode pulldown list is selected.
3. Click the **X** top right corner to close the dialog.

CREATING GRID LAYOUTS AND GRID LINES FOR "SPANS A THRU C"

Create Grid Layout for "Spans A thru C"

1. Select the **Grid Layouts** folder in the Bridge Location Manager.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
3. **Name and Description Editor** dialog appears.
4. Enter name "**Grid Layout Spans A thru C**".
5. Click **OK** to proceed.

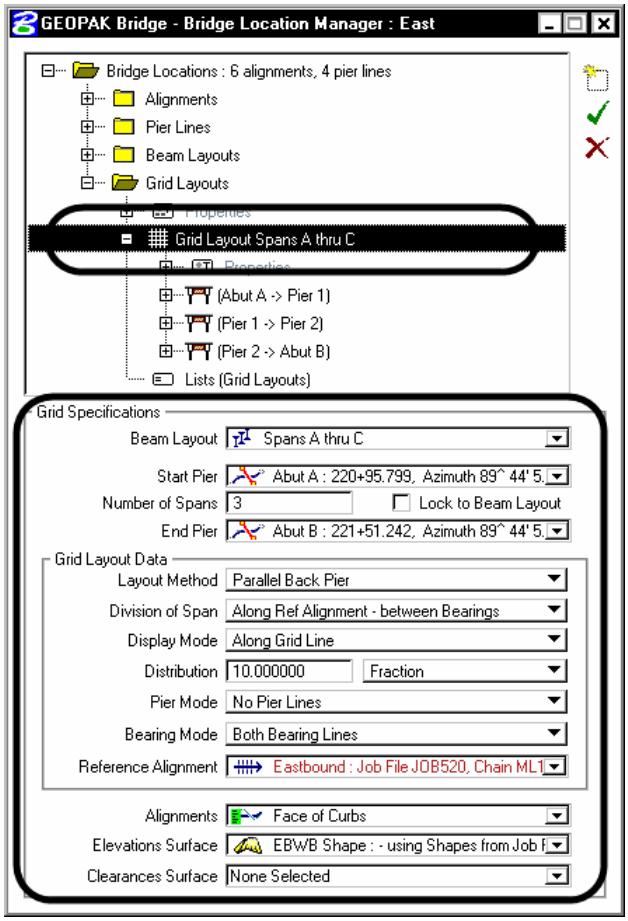


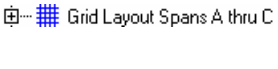
Grid Layout Spans A thru C shown

CREATING GRID LINES FOR “SPANS A THRU C”

Create Grid Lines

The picture depicted below shows the completed Bridge Location Manager dialog box.

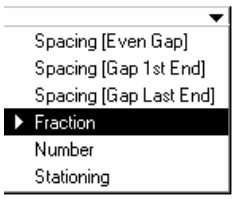




1. **Select** the **Grid Layout Spans A thru C** icon. The dialog expands.
2. Under Grid Specifications group box, select **Spans A thru C** from the Beam Layout pulldown list.

> ***Note*** Notice that under the Grid Specifications the Start Pier, Number of Spans and End Pier are automatically selected. The information was extracted from the data that was used when the Beam Layout Spans A thru C was created.

Under the Grid Layout Data group box:



3. Select **Parallel Back Pier** from the Layout Method pulldown list.
4. Select **Along Ref Alignment - between Bearings** from the Division of Span pulldown list.
5. Select **Along Grid Line** from the Display Mode pulldown list.
6. Enter Distribution value **0.10** and select **Fraction** from the Distribution pulldown list.

> ***Note*** When you select the Fraction option for the grid distribution, the distribution value can be enter as a fraction (decimal value) or as the denominator of the fraction. For example if you want to distribute the grid lines as 1/10 of the span, you can enter either 0.1 or a 10 (the denominator of the fraction).

7. Select **No Pier Lines** from the Pier Mode pulldown list.

8. Select **Both Bearing Lines** from the Bearing Mode pulldown list.
9. Select **Eastbound** from the Reference Alignment pulldown.

At the bottom of the Grid Specifications box:

10. Select **Face of Curbs** from the Alignments pulldown list.

Note The Face of Curbs will be included in the calculations.

11. Select **EBWB Shape** from the Elevation Surface pulldown list.

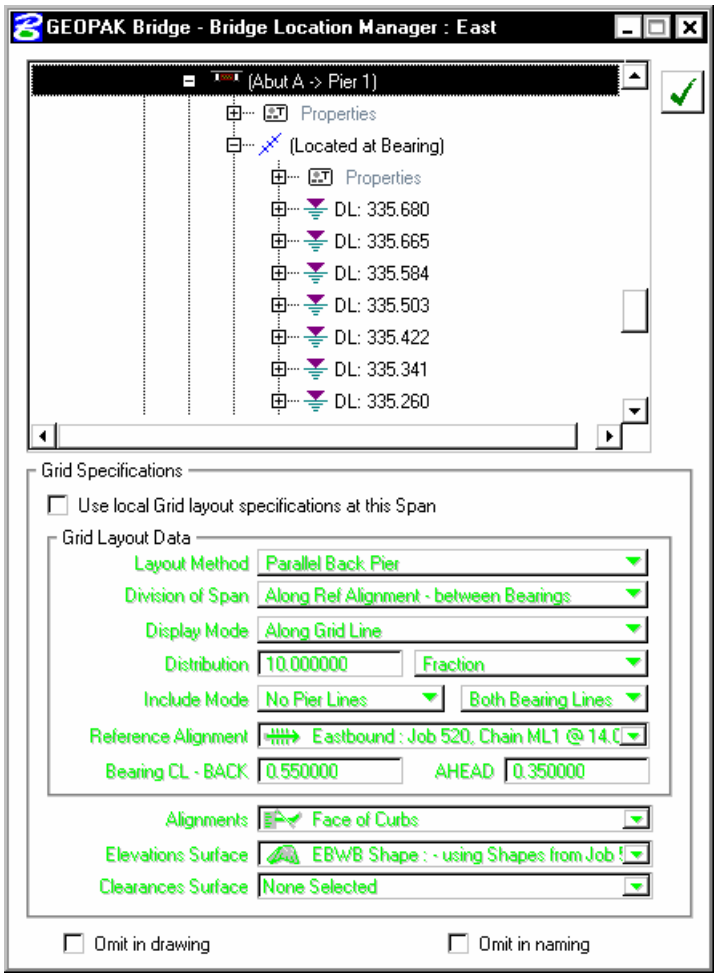
12. Select the **Modify Grid** tool to update the changes.

Note Elevations are calculated and drawn in the DGN file. If Elevation values are not displayed, Fit View the MicroStation window if necessary.

Review Calculated Elevations

1. Expand the **Grid Layout Spans A thru C.**
2. Click on the + icon to expand the **Abut A -> Pier 1** icon.

3. Expand a Grid Line icon. Each Grid line is shown with Elevations.



Grid Line and Deck Elevations shown

4. Move the cursor over the circles that appear in the DGN file. After a short delay, the flyover text will show the Elevation at the point.
5. Right mouse click anywhere within the Bridge tree list, the Pop-up menu appears. Select **Hilite > On**. Proceed to select any Elevation icon and notice that the Elevation is highlighted in the DGN file.

CREATE REPORTS

Reports are based on predefined templates made of Bridge symbols. These symbols are provided by Bridge to describe the reportable data for any component. For example, when creating deck elevations reports, symbols shown in the Grid.rpt template file are used as shown below:

SYMBOLS / GRID.RPT	DESCRIPTION
GridHeightName	The name of the grid height (or grid point were a height was evaluated)
XCoord	The X coordinates of the grid point.
YCoord	The Y coordinates of the grid point.
ZCoord	The Z coordinate of the grid point recorded at the grid height.
Station	The station to reference alignment (or baseline).
Offset	The offset to reference alignment (or baseline).

PROCEDURE

Reports are created by using both the **Properties Manager** and the **Reports Manager**.

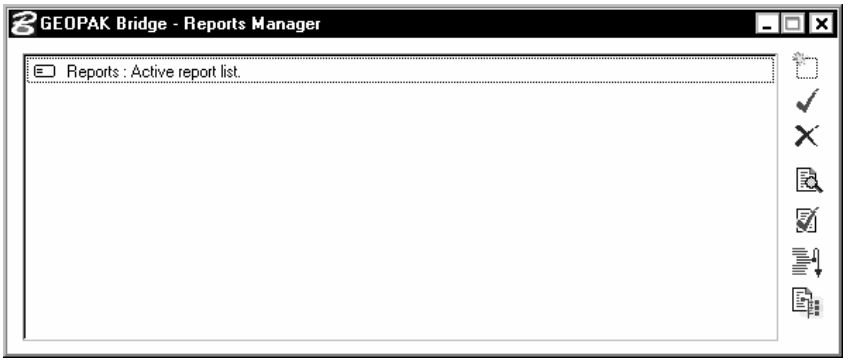
1. The Reports Manager is where output files are managed.
2. The Properties Manager tool is where reports are activated and where Report Templates are selected.

REPORTS MANAGER

The Report Manager is used to create Reports Sets. Each report set may contain Text, CSV (comma separated values) and XML reports. The report manager is used to manage the updating, deleting, re-sequencing and displaying of reports.

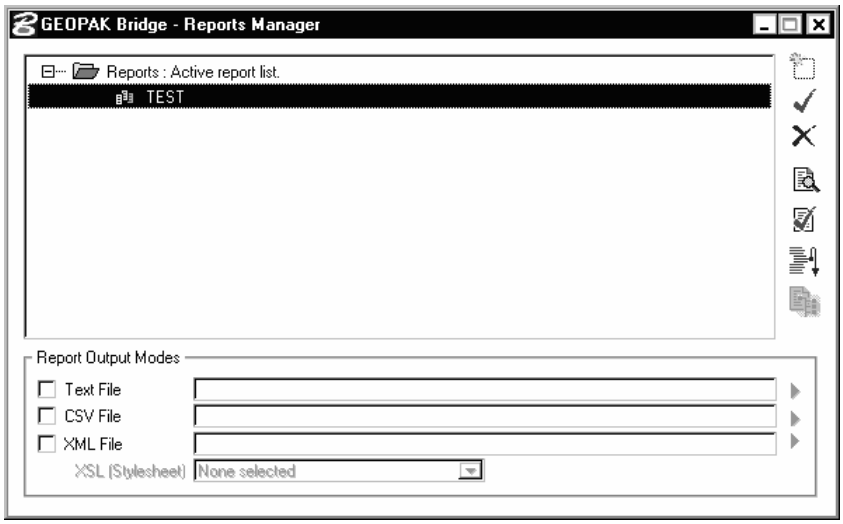
Create a Report Set

1. Select the **Reports Manager** tool from the GEOPAK Bridge tools palette. The GEOPAK Bridge – Reports Manager dialog appears.

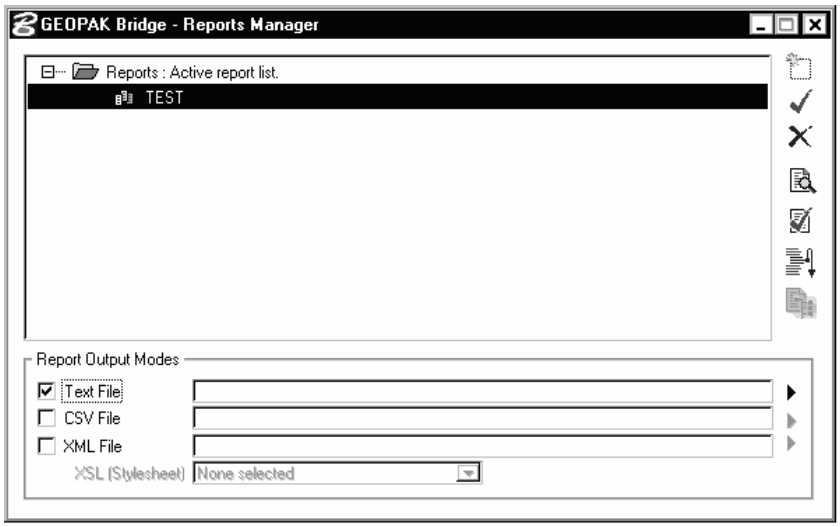


2. Select the **Create Reports set** tool.
3. The **Name and Description Editor: Bridge Component** dialog appears. Enter Name "**TEST"**.
4. Click **OK** to proceed.

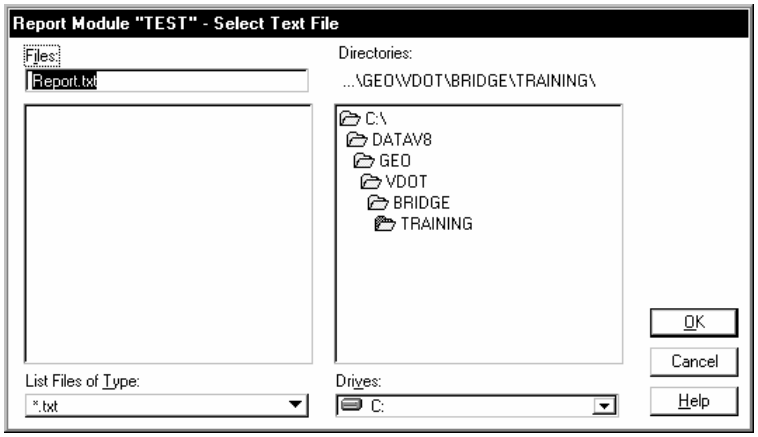
5. Select **TEST** icon. The dialog expands.



6. Under the Report Output Modes group box, enable the **Text File** option.

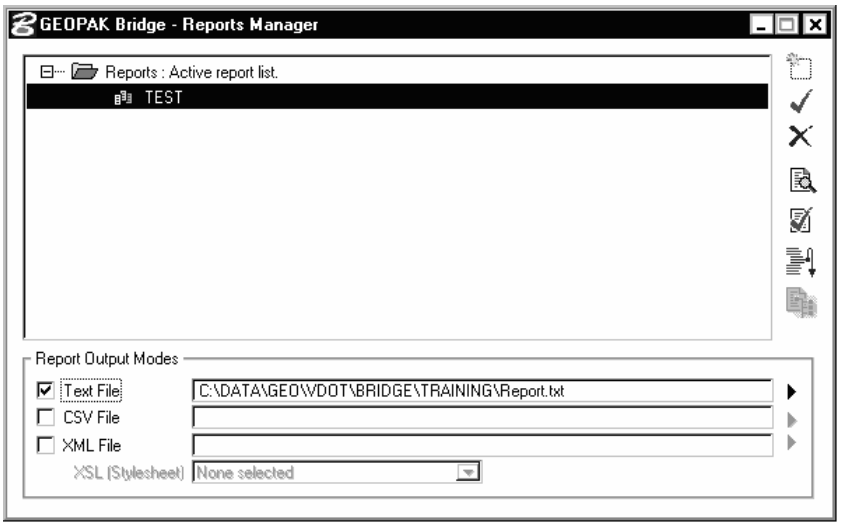


7. Select the **Select Text File** tool. The default directory appears. Under Files, enter **Report**.



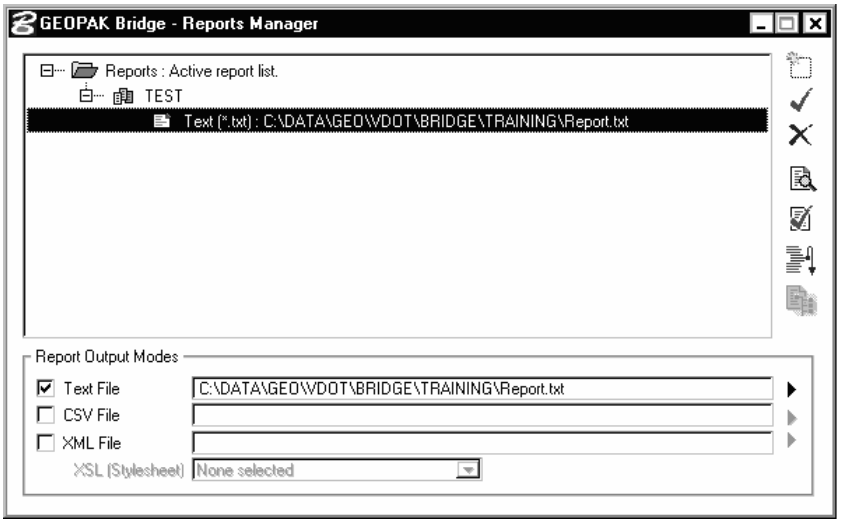
8. Click **OK** to continue.

9. Select the **Modify Reports Set** tool to update the changes.



10. Expand the **TEST** tree. Select the Text icon as shown below

Warning **DO NOT CLOSE THE REPORTS MANAGER DIALOG**. We need to proceed with the Properties Manager to enable the reports properties.

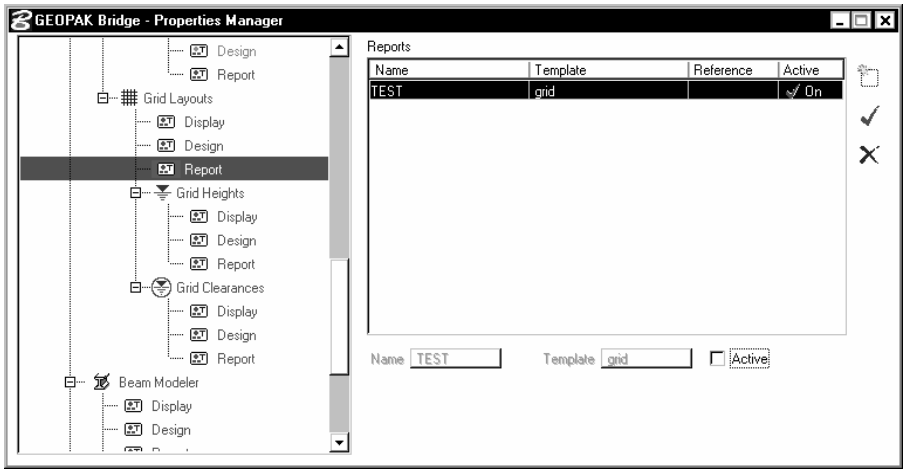


ACTIVATE REPORTS IN THE BRIDGE PROPERTIES

Reports are activated in the Bridge Properties Manager. If a Bridge Database template was available when the Bridge was created, some of the items under the Report window like the Report template are automatically selected If this is the case, select the missing information and select the Modify Report tool. Otherwise, select the Create Report tool.

Activate Grid Layouts Report

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.
2. Under the **Grid Layouts** icon, select the **Reports** icon.

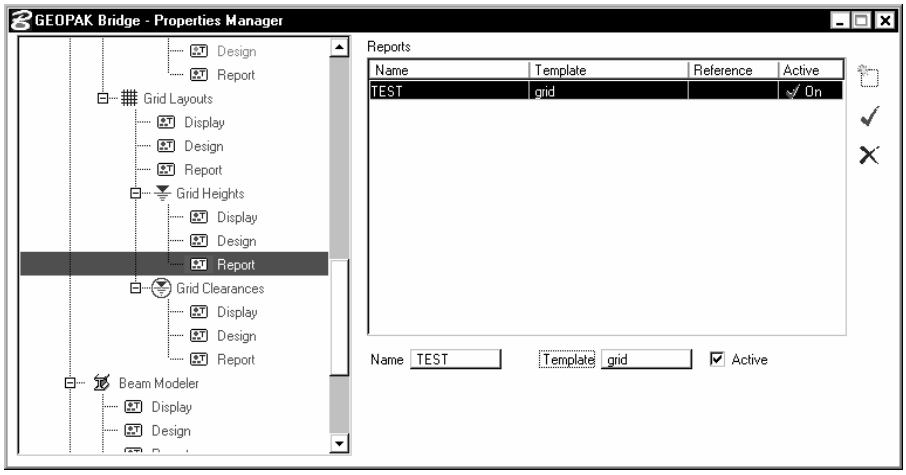


Global Bridge Properties dialog shown

3. Under the Reports window, select **TEST** from the Name pulldown list.
4. Select **Modify Report** tool from the right side of the dialog.

Activate Grid Heights Report

1. Under the **Grid Heights** icon, select the **Reports** icon.
2. Under the Reports window, select **TEST** from the Name pulldown list.
3. Select **Modify Report** tool from the right side of the dialog.



Report activated for Grid Heights shown

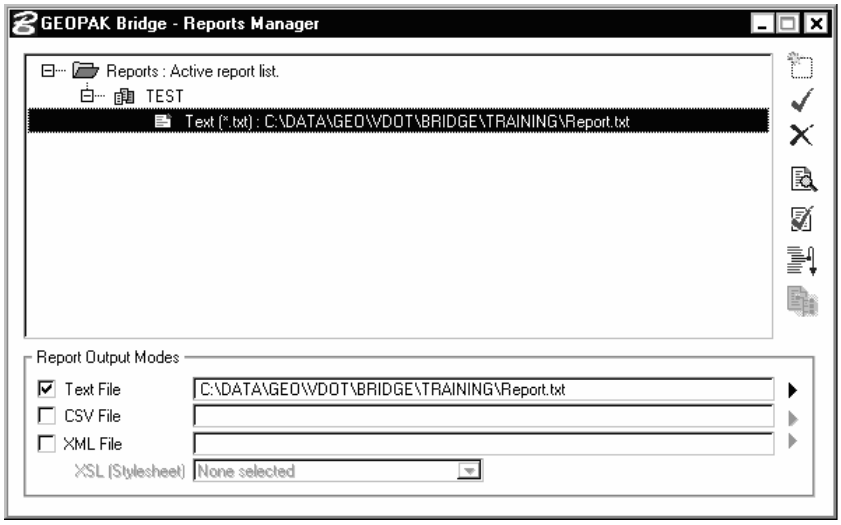
4. **Close** the Bridge Properties dialog

UPDATE REPORT

When reports are activated in the Properties Manager dialog, the Reports Manager can process the report.

Update Report

1. Proceed to locate the Reports Manager dialog.



2. Select the **Update Report** tool. Wait for processing.

Note The Report is automatically displayed. To view the report at any time, select the **Display Report** tool.

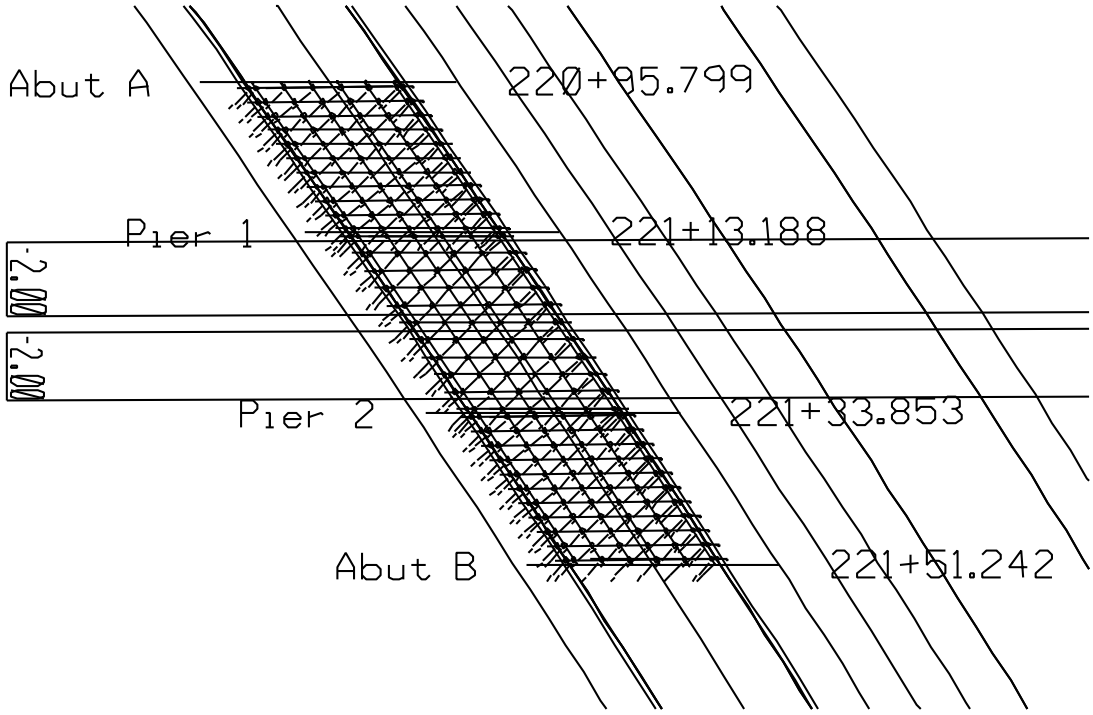
The Grid Report is partially shown below.

Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Grid No.1	(Located at Bearing)					
EB LT Face of Curb	1524534.223	1103770.679	335.680	221+00.18	-5.400	335.272
Beam A	1524533.735	1103770.677	335.665	220+99.90	-4.997	335.271
Beam B	1524531.070	1103770.664	335.584	220+98.39	-2.794	335.265
Beam C	1524528.405	1103770.652	335.503	220+96.88	-0.593	335.259
Beam D	1524525.740	1103770.640	335.422	220+95.36	1.607	335.252
Beam E	1524523.074	1103770.627	335.341	220+93.84	3.806	335.246
Beam F	1524520.409	1103770.615	335.260	220+92.32	6.003	335.239
EB RT Face of Curb	1524519.685	1103770.612	335.237	220+91.90	6.600	335.237
Grid No.2						
EB LT Face of Curb	1524535.136	1103769.348	335.686	221+01.80	-5.400	335.278
Beam A	1524534.641	1103769.346	335.671	221+01.52	-4.990	335.277
Beam B	1524531.978	1103769.334	335.590	221+00.01	-2.788	335.271
Beam C	1524529.314	1103769.321	335.510	220+98.50	-0.586	335.265
Beam D	1524526.650	1103769.309	335.429	220+96.99	1.614	335.259
Beam E	1524523.987	1103769.297	335.348	220+95.47	3.812	335.253
Beam F	1524521.323	1103769.284	335.266	220+93.95	6.010	335.246
EB RT Face of Curb	1524520.608	1103769.281	335.245	220+93.54	6.600	335.245

Part of Grid Report Shown

The Design file should appear as shown below.

Warning If Elevation values are not displayed, Fit View the MicroStation window.



Un-Rotated Plan view of Bridge shown

OCCUPACIA Creek Bridge

OBJECTIVES

Develop the Bridge model for Occupacia Creek Bridge.

The alignment is on a horizontal curve with a radius of 125 meters. Two spans of 13.0 meters with substructure units parallel to the flow were necessary to satisfy hydraulics. Type II prestessed beams were selected. The bridge is on a sag vertical curve with a constant cross slope of 8%.

SUBSTRUCTURE UNITS:

The bent was placed first. It was set at a skew of 40°, roughly parallel to the flow. The abutments were placed parallel to the bent. This resulted in a skew of 45°-57'-32" at Abutment A and 34°-2'-28" at Abutment B. Setting all of the substructure units parallel would allow all of the beams to be the same length, as long as the beams in each span are parallel.

BEAM LAYOUT:

Span a -- The initial layout consisted of beams parallel to the short chord. Due to the skew and horizontal curvature, the overhangs were too large at one end of the span and at the same time too small at the other end. Therefore, the exterior beams could not be placed parallel to the short chord. Arcs were drawn concentric to the centerline and offset by 4.6 meters. The exterior beams were placed along the chords (running from face of Backwall to C/L bent) of these offset arcs. The overhangs were then checked at each end of the span to make sure they were within reasonable limits. The resulting beam layout has three interior beams all the same length, equally spaced (2300 mm) and aligned parallel to the short chord. The exterior beams are each a different length and are not parallel to each other or to the interior beams.

Span b -- Preferably, the beam spacing in span b would be the same as in span a, and the beams in each span would meet at the bent centerline (i.e., the beams in span b would depart the bent at the same point the beams in span a arrive). This is not possible with horizontal curvature and skew. The beams were set to meet at the same point along the bent centerline. Other than the different beam spacing, the beam layout procedure in span b was the same as in span a. The resulting beam layout has three interior beams all the same length, equally spaced (2510 mm) and aligned parallel to the short chord. The exterior beams are each a different length and are not parallel to each other or to the interior beams.

GENERAL DATA

Units: Metric

Concrete Girders Type II

Horizontal Alignment:

SC Sta. 113+02.2473 N 50254.7231 E 99609.7078

PI Sta. 114+13.3883 LC 168.5179 R 125000 N 50349.4680 E 99668.4530

CS Sta. 114+70.7652 N 50268.0703 E 99765.1789

Profile:

CG Sta. 113+60.000 EL 7.2 VC = 100.00 g1 -2.247% g2 +0.7%

GPK file available: **JOB200**

Shapes available: **Shapes.dgn**

Survey Base Line available: **RTE637**

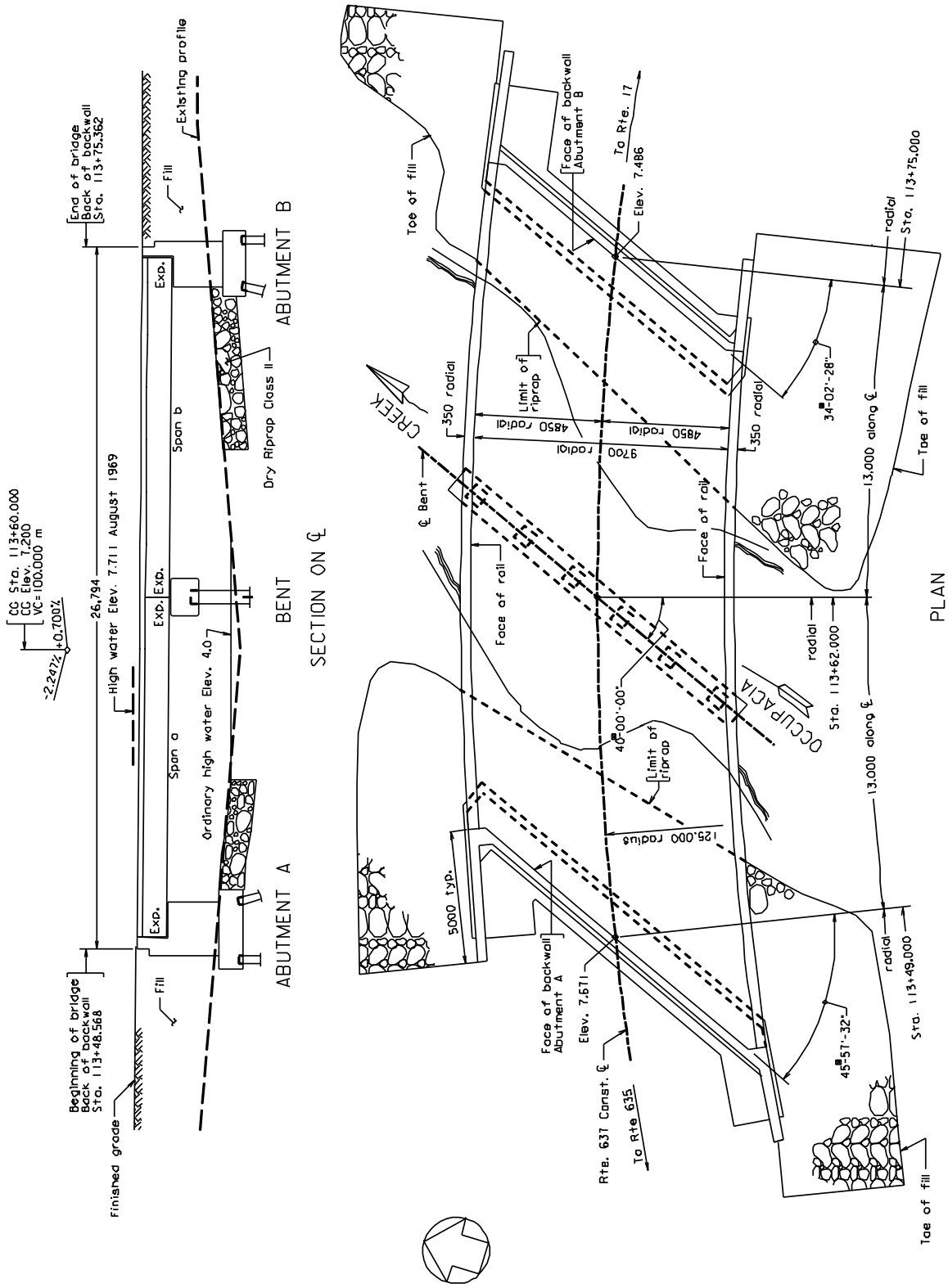
Profile Grade Line available: **PGRTE637**

Cross Slope: **8%**

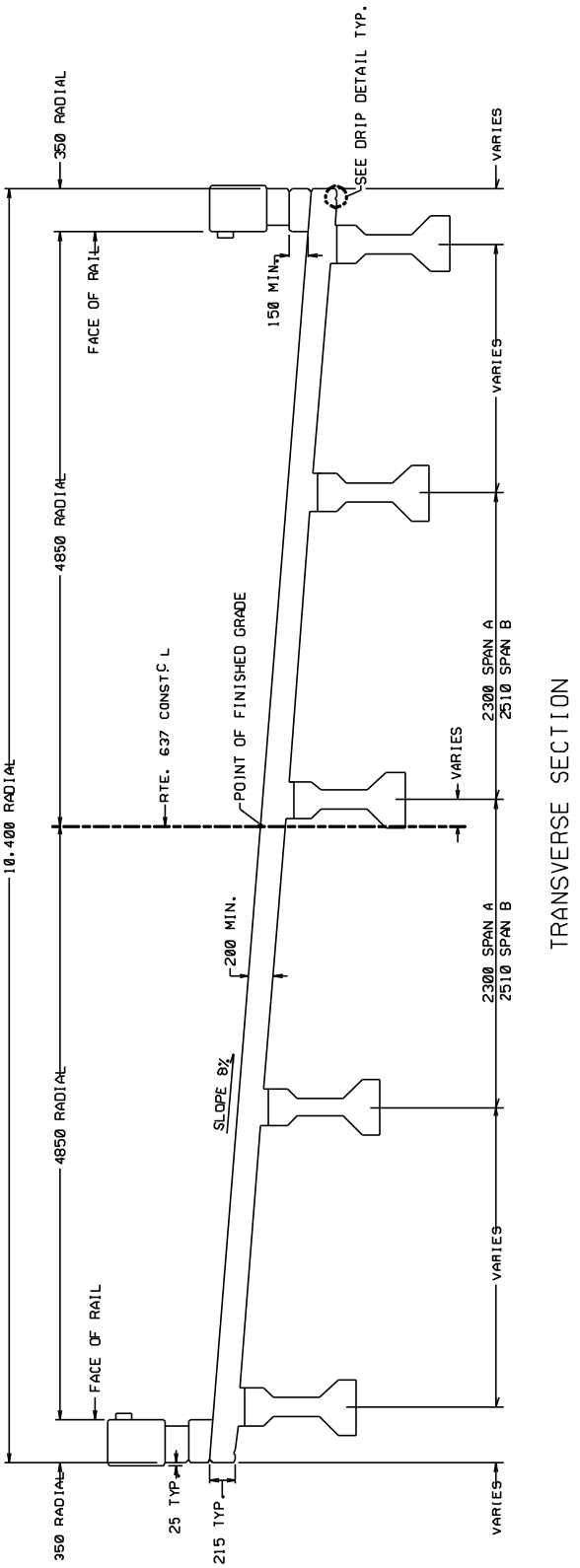
Modeling DGN file available: C:\DATA\GEO\VDOT\Bridge\OCCUPACIA REEK\Bridge3D.dgn

PLAN VIEW AND SECTION ON C. L.

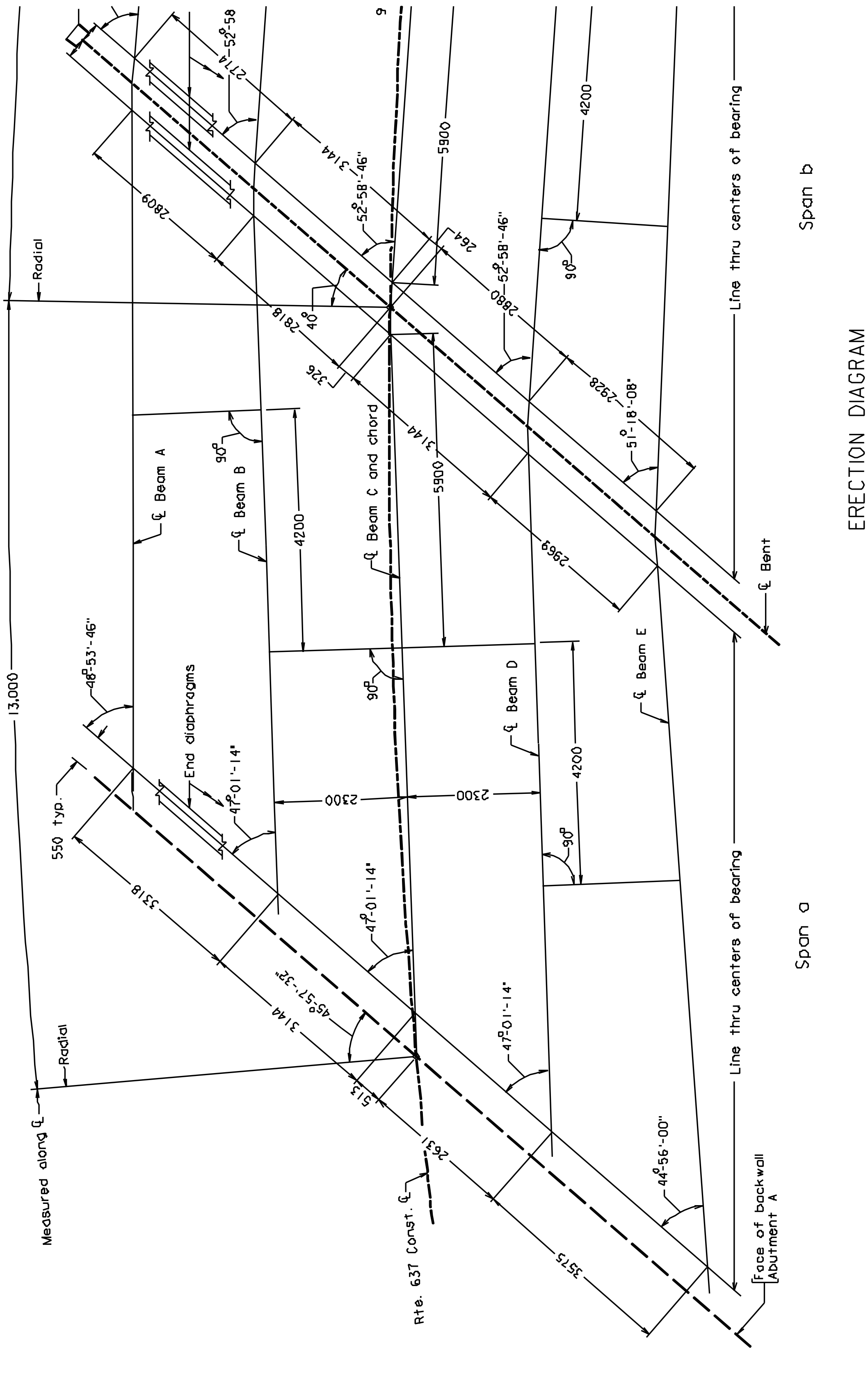
Plan and Elevation shown below:



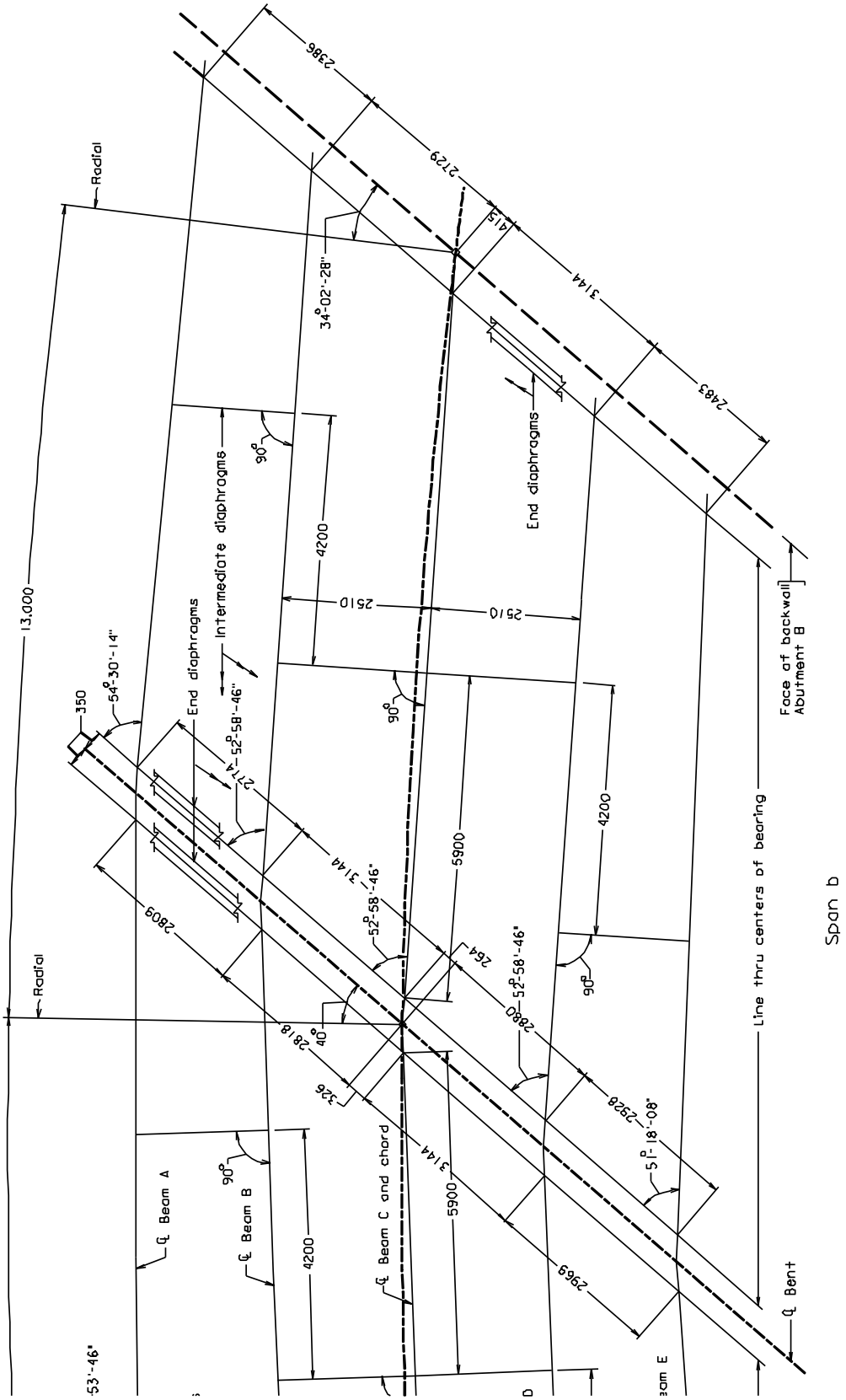
TRANSVERSE SECTION



BEAM LAYOUT


ERECTION DIAGRAM
Span a
Span b
Line thru centers of bearing
Line thru centers of bearing
℄ Bent
℄ Beam A
℄ Beam B
℄ Beam C and chord
℄ Beam D
℄ Beam E
End diaphragms
550 typ.
Radial
Radial
13,000
Measured along ℄
Rte. 637 Const. ℄
Face of backwall
Abutment A
4200
4200
4200
4200
5900
5900
2300
2300
48°-53'-46"
47°-01'-14"
47°-01'-14"
47°-01'-14"
45°-57'-32"
44°-56'-00"
52°-58'-46"
52°-58'-46"
52°-58'
51°-18'-08"
90°
40°
3318
3144
513
2631
3575
2809
2818
326
3144
2969
2714
3144
264
2880
2928

BEAM LAYOUT PART II



STARTING BRIDGE

Open Bridge3D.dgn and Attach Shapes.dgn file as Reference

1. Open **Bridge3D.dgn** file (**C:\DATA\Geo\VDOT\Bridge\ Occupacia Creek)**.
2. Select **References** tool.
3. Select **Attach Reference** tool.
4. Select **C:\DATA\Geo\VDOT\Bridge\Occupacia Creek\Shapes.dgn**.
5. Enter for Logical Name **Shapes**.
6. Click **OK**.
7. Close the **References** dialog box.

Select the Road Project Using the Road Project Manager

1. Select the Road Project Manager tool. The Project Manager dialog box appears.
2. Under the Directories list box, select **C:\DATA\GEO\VDOT\BRIDGE**.
3. Under the Projects list box, select **Occupacia.prj**. The Project Users dialog box appears.

Note Record in your manual, the Job Number shown in the dialog.

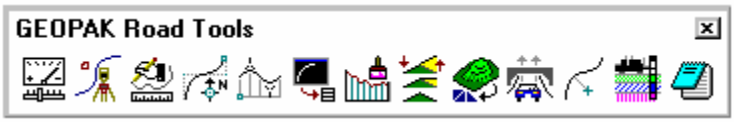
4. Under the Project Users list box select your name from the list of users.

Warning If your name is not available, contact your project administrator.

5. Click **OK** to continue.
6. Minimize the **Road Project** dialog box.

Check the Shapes Data and Record the CHAIN name

1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Road Tools**).



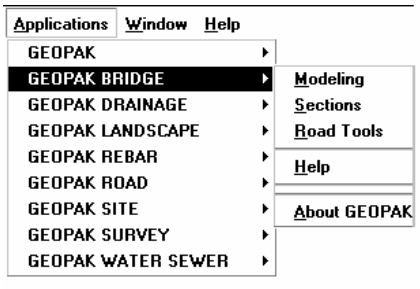
2. Select the **Shape Manager** tool from the GEOPAK Road tools palette.

3. Select the **Shape Analyst** tool from the Superelevation Shape Manager Tools palette. The Shape Analyst dialog appears.
4. Enable the **Display Only** option.
5. Click the **Dynamic** button. Proceed to indicated DP and move the mouse cursor within the shapes area. Notice the values displayed in the dialog

Write in your training manual, the name of CHAIN that appears in the **Chain** pull down list. You will make references to this chain later in this chapter

Selecting GEOPAK Bridge

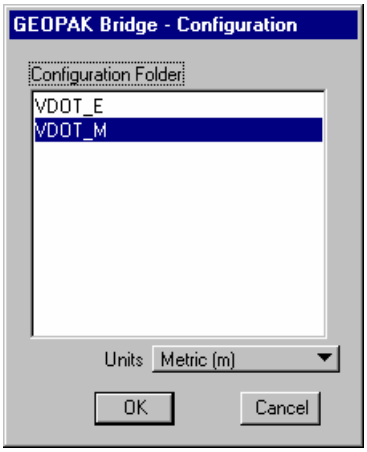
1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Modeling**).



Note If the database is not available, a new database will be created.

2. Click **OK** to proceed.

3. Select the Configuration Folder **VDOT_M.** Select for Units **Metric (m)**. Click **OK** to proceed.



Bridge Configuration selection dialog

An Information box appears informing that a Default Bridge database was created.

4. Click **OK** to proceed. The Bridge tools appears.

CREATING A NEW BRIDGE

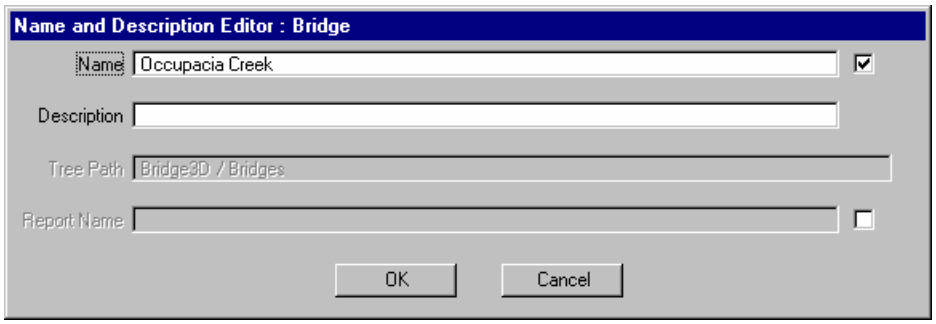
Create a new Bridge

TOOL	DESCRIPTION
	Project Manager

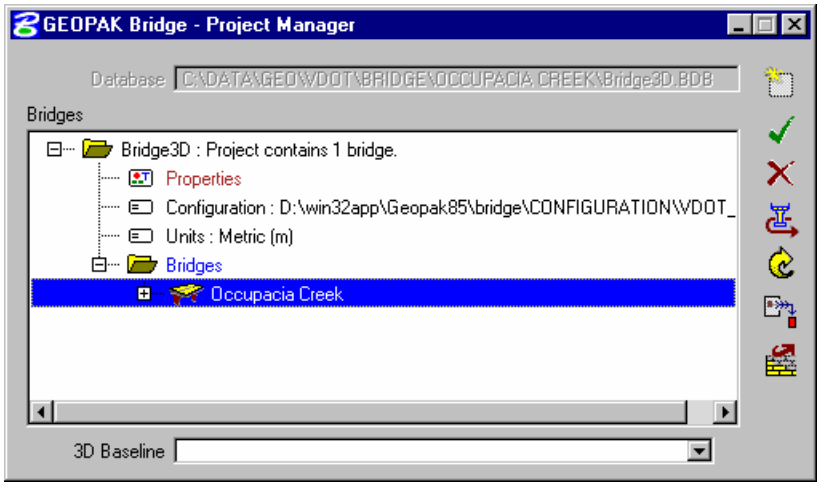
1. Select the **Project Manager** tool from the GEOPAK Bridge tools palette.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item.**

Note Another way to create a Bridge is to select the **Create Bridge** tool Located in the right side of the dialog.

3. The **Name and Description Editor: Bridge** dialog appears.
4. Enter Name **"Occupacia Creek".**



5. Click **OK** to proceed. The GEOPAK Bridge – Project Manager's tree list updates automatically showing the Occupacia Creek bridge icon.



6. **Close** the Project Manager Dialog box.

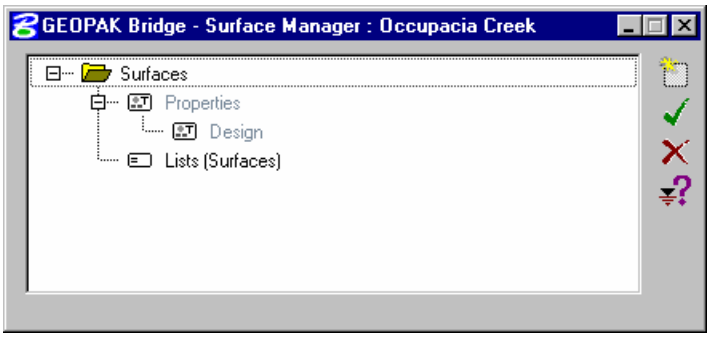
CREATE BRIDGE SURFACES

For more information refer to **CREATE A BRIDGE SURFACE** in Chapter 1 or in the On-Line Help (MicroStation: **Applications>GEOPAK>BRIDGE>Help).**

Register "Road Shape" Surface (Bridge Riding Surface)

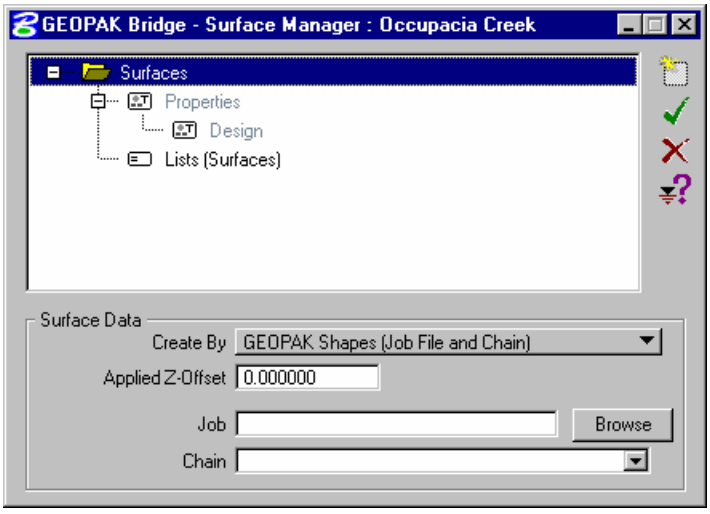
TOOL	DESCRIPTION
	Surface Manager
	Display Z Levels

1. Select the **Surface Manager** tool from the GEOPAK Bridge tools palette. The Surface Manager dialog appears.



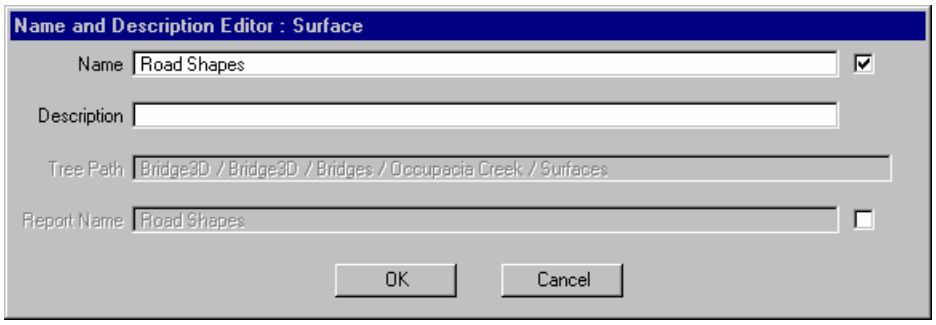
Surface Manager Dialog shown

2. Select the **Surfaces** folder. The dialog expands.

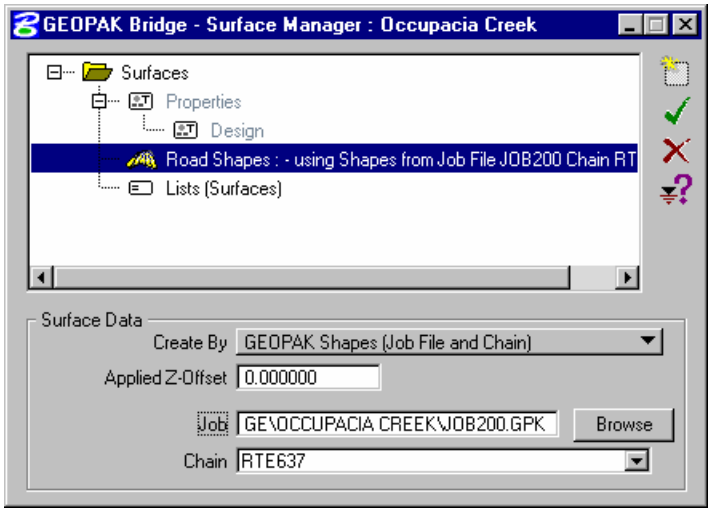


3. Under Surface Data, select **GEOPAK Shapes (Job and Chain)** from the Create By pulldown list.
4. Select GEOPAK Job File. Under Surface Data, click on **Browse** to select the location of the Job file. Select **C:\DATA\GEO\VDOT\BRIDGE\OCCUPACIA CREEK**
5. Select Job Number. Select **Job200**.
6. Under Surface Data, select Chain **RTE637** from the pulldown list.

7. **Right mouse-click** anywhere within the Bridge tree list. Select **New**> **Item.**
8. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Road Shapes"**.



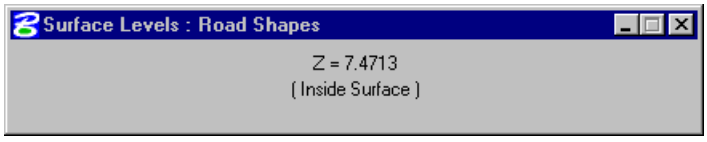
9. Click **OK** to proceed.



Final Surface Manager Dialog shown

10. Select the **Display Z Levels** tool, to browse elevations (Z Levels) of the selected surface.

Hint Move the cursor anywhere over the selected surface and the corresponding elevations are displayed in the Surface Levels dialog. If the point indicated is outside of the surface, Bridge will display that the point is Outside of the Surface.



11. Close the **Surface Levels** and the **Surface Manager** Dialog boxes.

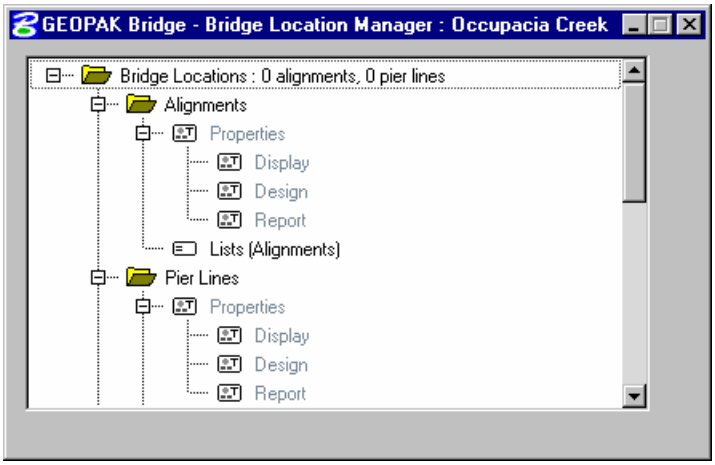
BRIDGE LOCATION MANAGER (ALIGNMENTS, PIER LINES, BEAM LAYOUTS AND GRIDS)

The Bridge Location Manager is responsible for the primary locations for all aspects of your bridge models. Alignments for the bridge deck and beams etc. are registered within the Location Manager. Pier line locations are chosen along the appropriate baseline alignment. Single span and continuous span beam layouts (their centerlines) are established with reference to the alignments and selected Pier locations. Grid patterns are developed and superimposed on beam layouts to generate deck elevations.

These locations represent the basis for the bridge layout. For maximum ease of use, they are created entirely within the X/Y plane (top view) and require no 3D modeling information or input

When the **Bridge Location Manager** tool is selected the Bridge Location Manager dialog appears.

After a Bridge is created, folders for Alignments, Pier Locations, Beam Layouts and Grid Lines appear in the Bridge Location Manager. The Bridge Location Manager displays a tree view of these folders. The Bridge Location Manager dialog expands automatically when the alignments or pier lines folder are selected.



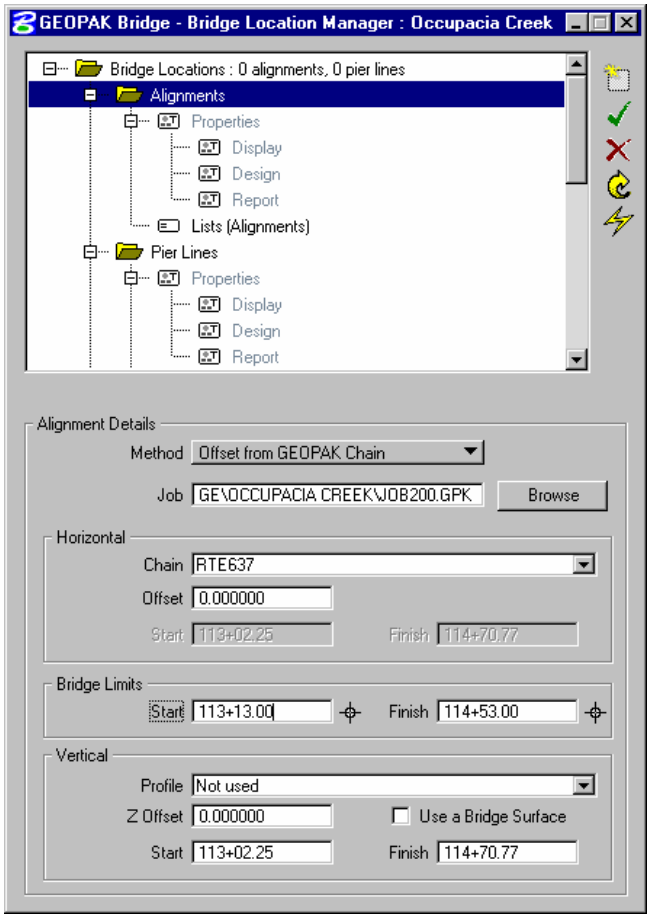
Bridge Location Manager and Folders shown

CREATE BRIDGE ALIGNMENTS IN THE BRIDGE LOCATION MANAGER

Five alignments will be created: the Bridge Baseline, the Left Edge, the Right Edge, the Left Face of Rail and the Right Face of Rail. The first thing you will do is to create the Bridge Baseline alignment, second you will set that alignment as the Bridge Baseline and finally you will create the remaining alignments based on the Bridge Baseline.

Create Bridge Alignment "Occupacia Creek" (Bridge Baseline)

1. Select the **Bridge Location Manager** tool from the GEOPAK Bridge tools palette.
2. Select the **Alignments** folder. The dialog expands.



Expanded dialog box shown

Under the Alignment Details group box:

3. Select **Offset from GEOPAK Chain** from the Method pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\OCCUPACIA CREEK**.
5. Select **Job200.**

Under the Horizontal group box:

6. Select **RTE637** from the Chain pulldown list.
7. Enter Offset **0.00**.

Under the Bridge Limits group box:

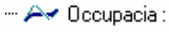
8. Select the **Indicate Start Limit** tool. Indicate a Data Point just inside the beginning of the Shapes. If you wish type **113+13.00** (or 11313.00) in the Start key-in field.

9. Select **Indicate Finish Limit** tool. Indicate a Data Point just inside the end of the Shapes. If you wish type **114+53.00** (or 11453.00) in the Finish key-in field.

Under the Vertical group box:

10. Select **Not used** from the Profile pulldown list.
11. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
12. The **Name and Description Editor: Alignment** dialog appears
13. Enter Alignment Name "**Occupacia"**.
14. Click **OK** to proceed. The Occupacia icon is automatically added to the Alignment tree list.

Set Alignment as Baseline



1. Under the Alignments folder, select the **Occupacia** icon.
2. Select the **Set alignment as Baseline** tool.

Note If the Bridge Baseline is modified by changing the alignment, an Alert box will appear alerting that changing the Baseline may have significant effect on the Bridge design.

Create Additional Bridge Alignments

Create the Left and Right Edge and the Left and Right Face of Rail. For Method, select **Offset from Baseline**. The only change required is the offset value as shown in table below.

Note Prior to creating an Alignment, set the Method and Offset

Under Alignment Details group box:

1. Select **Offset from Baseline** from the Method pulldown list.

Under the Horizontal group box,

2. Change the **Offset** input as indicated in table below.
3. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
4. The **Name and Description Editor: Alignment** dialog appears.
5. Enter **Name** of Alignment as indicated in table below. Click **OK** to proceed

When an Alignment is created, repeat the same steps to create the remaining alignments shown in the table below.

Method	Offset (+ or -)	Alignment Name
Offset from Baseline	-5.200	Left Edge
Offset from Baseline	-4.850	Left Face of Rail
Offset from Baseline	5.200	Right Edge
Offset from Baseline	4.850	Right Face of Rail

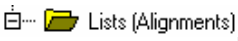
CREATING AN ALIGNMENT LIST

Whenever you have a large list of Alignments and you need to isolate just a few Alignments for purposes of selecting them as a group, you need to create a predefined "List" of Alignments.

In this exercise an alignment list **Face of Rails and Baseline** will be created. The List will be referenced in the calculation for Deck Elevations.

Create Alignment List "Face of Rails and Baseline"

1. Select the **List (Alignments)** icon.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
3. The **Name and Description Editor: List of Alignment** dialog appears.
4. Enter Name "**Face of Rails and Baseline"**. Click **OK** to proceed.



Note A Folder **List (Alignments)** and the list **Face of Rails and Baseline** icon are automatically created.

5. Select the **Face of Rails and Baseline** icon. 

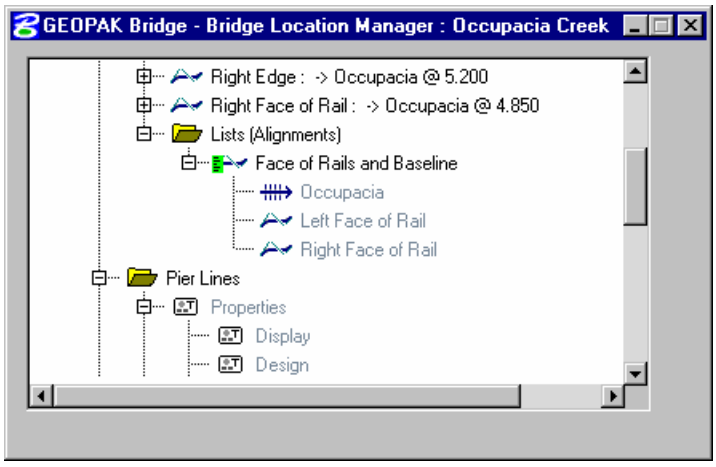
6. **Right mouse-click** anywhere within the Bridge tree list. Select **Lists** > **Add All**.

Note Since all created Alignments are added to the list, alignments that do not describe a Face of Rail or the Baseline should be deleted.

7. **Expand the Tree** for Face of Railss and Baseline. Click the **Plus Sign** icon.
8. Select **Left Edge** from the list.
9. **Right mouse-click** anywhere within the Bridge tree list. Select **Delete**.

Note The **Delete** tool is also available for selection in the right side of the dialog.

10. Remove **Right Edge** alignments from the list using the same procedure.



Alignment List Face of Rails and Baseline shown

CREATING PIER LINES AND BEARINGS LINES IN THE BRIDGE LOCATION MANAGER

There are several methods available to locate a Pier Line:

- By Station and Skew angle. Two options are available:
  - Skew Angle in degrees
  - Skew Angle in DMS format (Degrees Minutes Seconds)

Note Extra spaces between degrees, minutes and seconds are required.

- By Station and Bearing
- By Station and Azimuth
- By Alignment Intersection
- By selecting an Existing Pier (distance along Baseline)
- By selecting an Existing Pier (offset normal to Pier)
- By Picking two Points
- By Picking Elements (MicroStation lines)

At each Pier Line location, Bearing Line Data back and ahead of the pier line is defined by entering offset values (normal distances) to the pier line and by selecting the bearing type; Expansion or Fixed support.

The first pier line that needs to be defined is the Interior pier, so that it can be used as reference to create the locations and directions of Abutment A and Abutment B. In this exercise, the Topo.dgn file which shows the local conditions (the Creek location and flow direction) is used as reference for the preliminary design of the location and skew angle of the interior pier.

The preliminary location and direction of the Interior Pier is first defined by drawing a MicroStation line running along to the middle of the Creek. The MicroStation line is the element that Bridge will use to create the preliminary pier line.

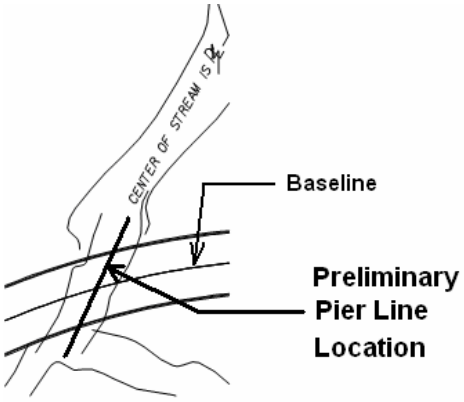
When the preliminary pier line has been located, you can review the Station, Skew, Bearing, Azimuth data, using the **Bearing/Azimuth/Skew/DMS Display Mode** tool. You can also change the Station, or Skew, or Bearing values as required and select the Update Pier Line tool to save the changes to finalize the location of the Pier Line.

CREATE “C.L. BENT”

Create the Preliminary Interior pier line location “C.L. Bent”

1. Select **References** tool.
2. Select **Attach Reference** tool.
3. Select **C:\DATA\Geo\VDOT\Bridge\Occupacia Creek\ s15256Revised.dgn**
4. Enter for Logical Name **“Topo”** and click **OK** to proceed.
5. **Draw a Line** intersecting the baseline and running along the middle of the Creek.

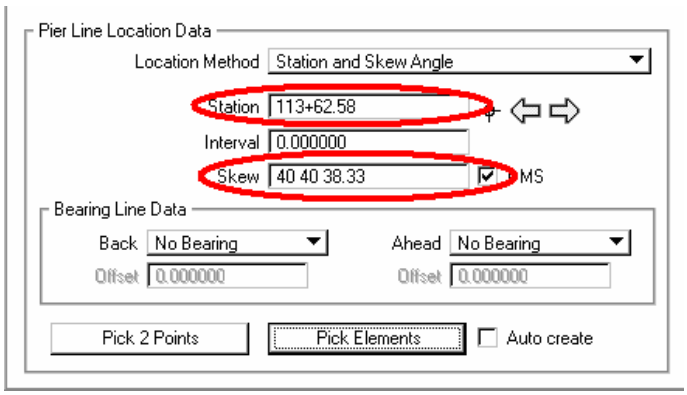
Hint	There is a line already provided in the Topo file. If you choose another location, proceed now to draw that line.



6. Select the **Pier Lines** folder. The dialog expands.

Under the Pier Line Location Data group box:

7. Select **Station and Skew Angle** from the Location Method pulldown list.
8. Enable the **DMS** option.
9. Click **Pick Elements**.
10. Select the MicroStation line. **Accept** the selection.
11. Select the **Create new Pier Line** tool. The **Name and Description Editor: Pier Line** dialog appears.
12. Enter Pier Name **“C.L. Bent”**. Click **OK** to continue.
13. Review data calculated by Bridge. Station 113+62.58 and Skew 40° 40’ 38.33” as shown below. You will use this data to determine the final Station and Skew angle.



14. Assume you decide that, for this example, the Skew Angle should be rounded to **40.00 degrees** and the **Station** to **113+62.00**. Make the changes in the Station and Skew key-in fields.

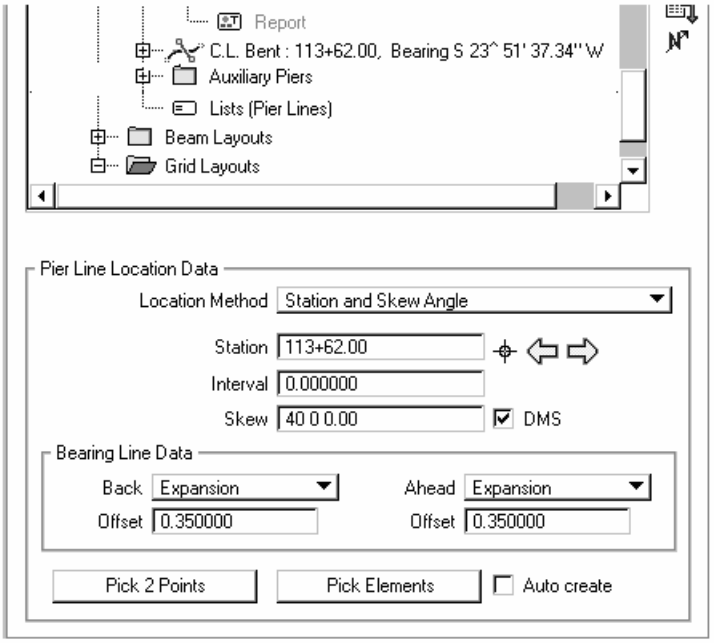
15. Select the **Modify Pier Line** tool to update the changes.

Note If you wish, you can delete the line you drew in step 4 using MicroStation delete command.

Define Bearing Line Data

Under the Bearing Line Data group box:

1. Select **Expansion** from the Back pulldown list.
2. Enter Offset **0.350 m** for Back.
3. Select **Expansion** from the Ahead pulldown list.
4. Enter Offset **0.350 m** for Ahead.
5. Select the **Modify Pier Line** tool to save the changes. Partial Bridge Location Manager dialog shown below.



Lower portion of the Bridge Location Manager shown

Note Select the **Bearing/Azimuth/Skew/DMS Display Mode** tool and click several times as required until the Bearing is displayed. Notice the Bearing of the Pier Line is **S 23^ 51’ 37.34” W.** The Abutment A and B are now to be set parallel to the C.L. Bent.

CREATE “ABUTMENT A”

There are three options to create the Abutment “A” pier line;

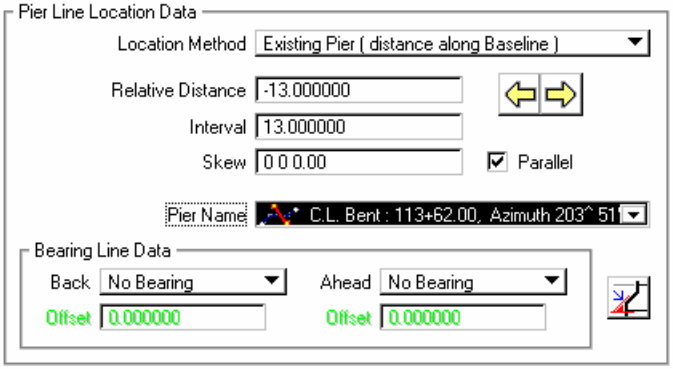
- By using the Location Method Existing Pier (distance along Baseline)
- By using the Location Method Existing Pier (offset normal to Pier)
- By using the Bearing direction of the C.L. Bent as described above

In this exercise the Existing Pier (distance along Baseline) option is used.

It was decided the “Abutment A” is to be located 13.00m along the baseline from the C.L. Bent.

Create “Abutment A” Pier Line

Under Pier Line Location Data group box:



1. Select **Existing Pier (distance along baseline)** from the Location Method pulldown list.
2. In the **Interval** key-in field enter **13.0m**.
3. Select the **Subtract Station Interval** tool once.

Note Notice the Relative Distance field changes to negative 13.00m.

4. Enable the **Parallel** option (parallel to existing pier).

Note Enabling the Parallel option, forces the Skew value to zero (skew angle measured relative to the selected Existing Pier).

5. Select **C.L. Bent** icon from the Pier Name pulldown list.

Define Bearing Line Data

Under the Bearing Line Data group box:

1. Select **No Bearing** from the Back pulldown list.

Note The Offset value defaults to zero.

2. Select **Expansion** from the Ahead pulldown list.
3. Enter **Offset 0.550 m** for Ahead.
4. Select the **Create new Pier Line** tool. The **Name and Description Editor: Pier Line** dialog appears.

5. Enter Pier Name **Abutment A**. Click **OK** to continue.

6. Select the **Bearing/Azimuth/Skew/DMS Display Mode** tool.

Hint Select the tool several times as required, until the Bearing is displayed. Notice the Bearing direction of the pier lines. They are the same and equal to **S 23^ 51’ 37.34” W.** To view the Skew Angle, select the **Bearing/Azimuth/Skew/DMS Display Mode** tool, until the Skew angle is displayed in Degree, Minutes and Seconds

CREATE “ABUTMENT B”

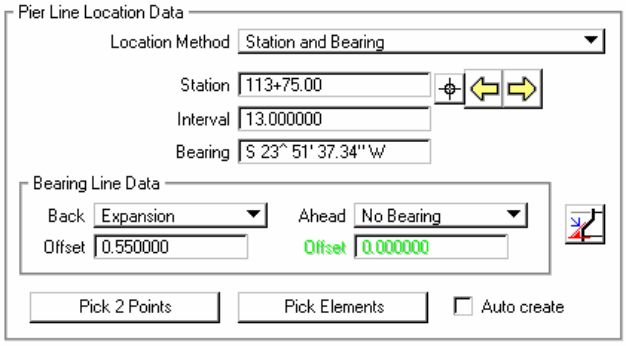
In this exercise the Station and Bearing option is used.

It was decided the “Abutment B” is to be located 13.00m along the baseline from the C.L. Bent.

Create Pier Line for “Abutment B”

1. Select **C. L. Bent** icon.

Under Pier Lines Location Data group box:



2. Select **Station and Bearing** from the Location Method pulldown list.
3. Enter **13.0m** in the Interval key-in field.
4. Enter Bearing direction **S 23 51 37.34 W.**
5. Select once the **Add Interval Station** tool.

Define Bearing Line Data

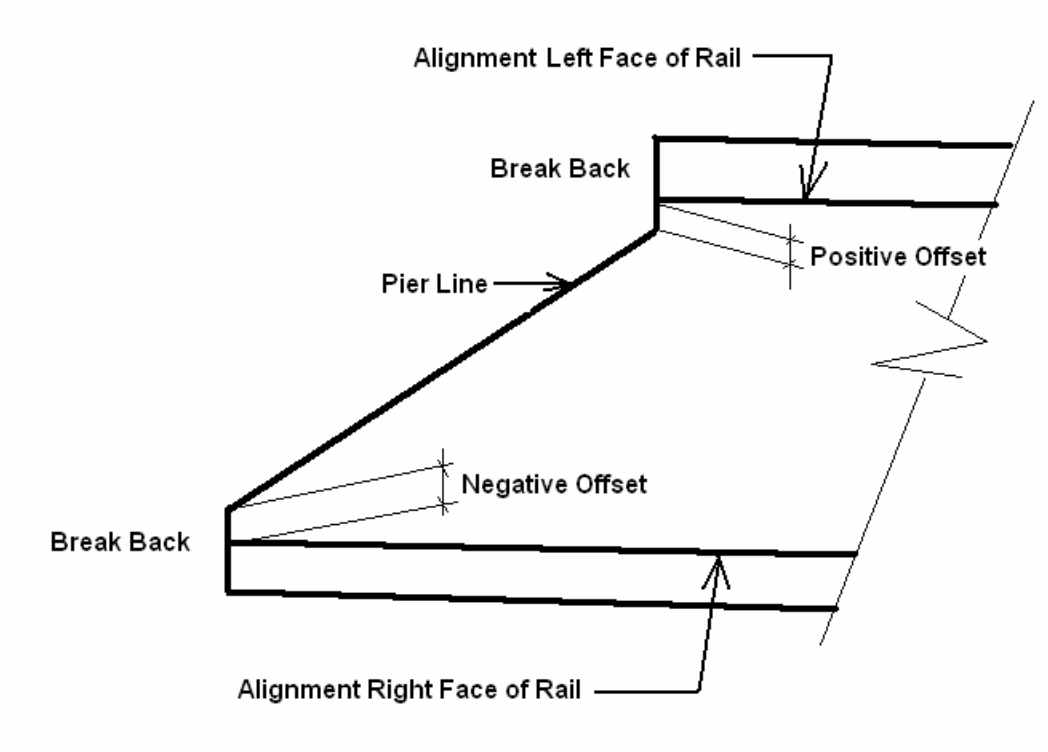
Under the Bearing Line Data group box:

1. Select **Expansion** from the Back pulldown list.
2. Enter **Offset 0.550m** for the Back.
3. Select **No Bearing** from the Ahead pulldown list.

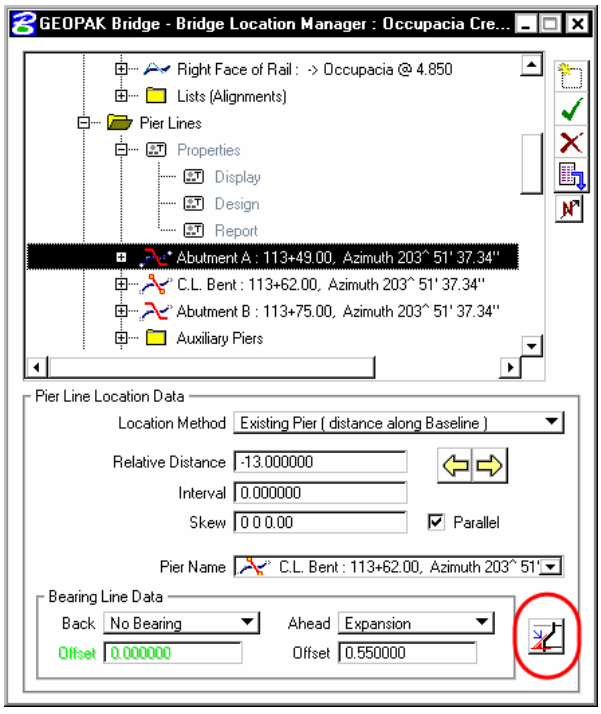
4. Select the **Create new Pier Line** tool.
5. The **Name and Description Editor: Pier Line** dialog appears.
6. Enter Pier Name “**Abutment B”**. Click **OK** to proceed.

BREAK BACKS

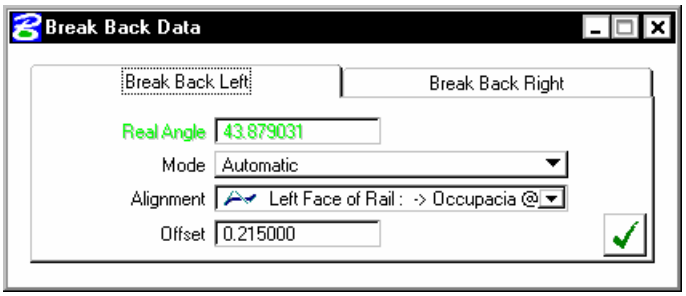
When Pier skew angles exceed a minimum required angle, the deck corners are modified by adding a break. This is called Break Back.



The Break Backs are defined in the Bridge Location Manager under the Pier Folders at each pier line. You need to select the Break-Back Specifications tool under the Pier line Location Data.



The Break Back Data dialog appears as shown below. There are two tabs to define the break backs: One tab to define the left side and another one to define the right side.

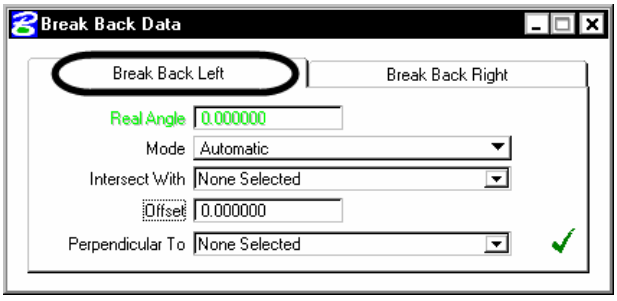


The Mode pulldown list will allow you to Automatic place, turn On and to turn Off a break back. The Alignment pulldown list is to select the reference alignment and an offset key-in field to start the break. The offset is measured positive when the distance is to the right of the reference alignment.

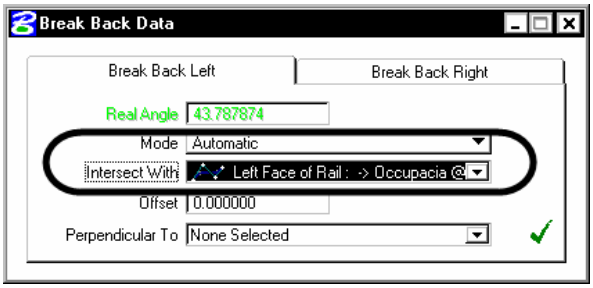
Place Break Backs in the Left and Right in Abutment A

1. Under the Pier lines folder, Select the **Abutment A** icon.

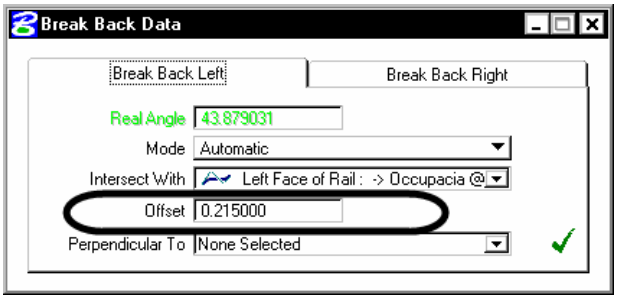
2. Under Pier Line Location Data, select **Break-Back Specifications** tool. The break Back Data dialog appears.



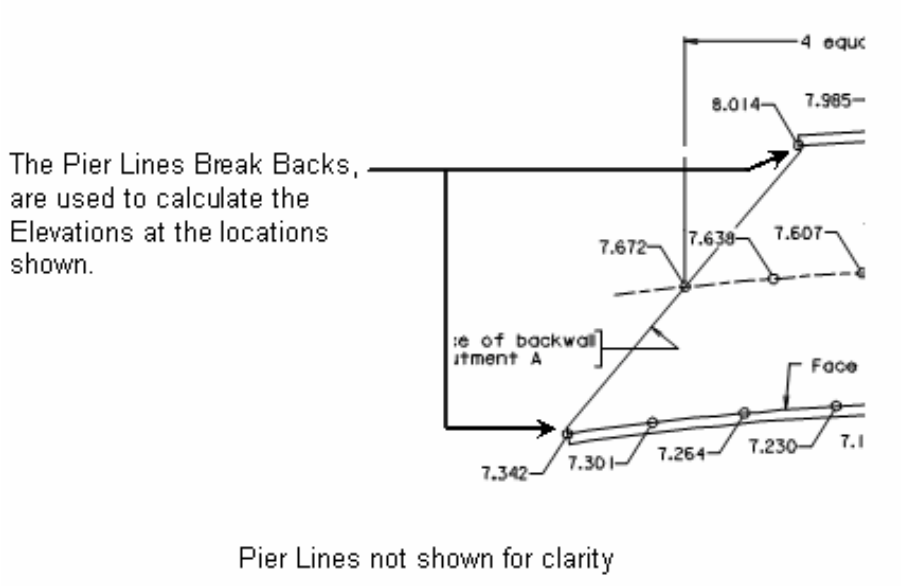
3. Select **Left Face of Rail** icon from the Intersect With pulldown list.



4. In the offset field type **.215m** (positive to indicate towards the right side of the selected alignment).



5. Select the **Modify Pier Line** tool to update the changes. Notice that the pier line is modified to show the break back.



Pier Lines not shown for clarity

Repeat the same steps to add a break back on the right side of the deck.

6. Select the **Break Back Right** tab.
7. Select **Right Face of Rail** from the Intersect With pulldown list.
8. Enter Offset value **-.215m**.
9. Select the Modify Pier Line tool.

Place Break Backs in the Left and Right side in Abutment B

1. Select **Abutment B** icon.
2. Under Pier Line Location Data, select **Break-Back Specifications** tool.
3. Select the **Break Back Left** tab.
4. Select the **Left Face of Rail** from the Intersect With pulldown list.
5. Enter Offset value **.215m**. in the offset key-in field.
6. Select the **Modify Pier** tool.

Repeat the same steps to add a break back on the right side of the deck.

7. Select the **Break Back Right** tab.
8. Select **Right Face of Rail** from the Intersect With pulldown list.
9. Enter Offset value **-.215m**.
10. Select the **Modify Pier** tool.

CREATE BEAM LAYOUTS AND BEAM LINES FOR “EXT. BEAMS SPAN A AND B”

Two beam layout Groups need to be created. The Exterior girders are defined by the short chord of baseline at offsets of 4.6 m in both spans A and B. The Interior girders are defined by beam lines parallel to the short chords of the baseline, but the beam spacing for Span A is different than for the Span B.

CREATE EXTERIOR BEAMS LAYOUT FOR “EXT. BEAMS SPAN A AND B”

Create Exterior Beam Layout for “Ext. Beams Span A and B”

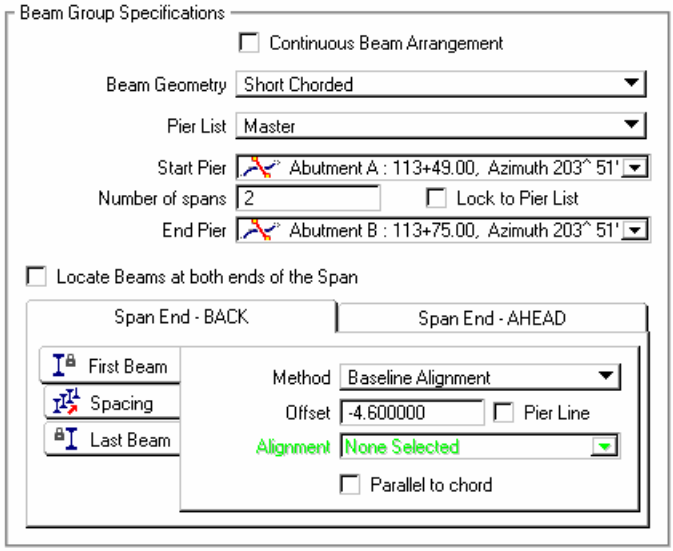
1. Select **Beam Layouts** folder in the Bridge items list.
2. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
3. **Name and Description Editor: Beam Layout Group** dialog appears.
4. Enter Name **“Ext. Beams Span A and B”**. Click **OK** to proceed.

CREATE EXTERIOR BEAM LINES FOR “EXT. BEAMS SPAN A AND B”

Define the First Beam

1. Select beam layout **Ext. Beams Span A and B**. The dialog expands.

Under the Beam Group Specifications group box:



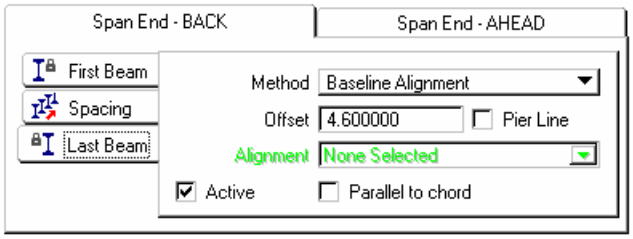
2. Select **Short Chorded** from the Beam Geometry pulldown list.
3. Select **Abutment A** icon from the Start Pier pulldown list.
4. Select **Abutment B** icon from End Pier pulldown list.
5. Click **First Beam** tab to define the First Beam.
6. Select **Baseline Alignment** from the Method pulldown list.

Note In this example, beams lines are placed per span using the Short Chord of concentric curves to the baseline. As a result, beams are not necessarily parallel to each other. If you want to place beams lines parallel to the Short Chord of the Baseline, you need to select the **Parallel to chord** option.

7. Change **Offset** to **-4.6m** (negative is to the left of the Baseline).

Define the Last Beam

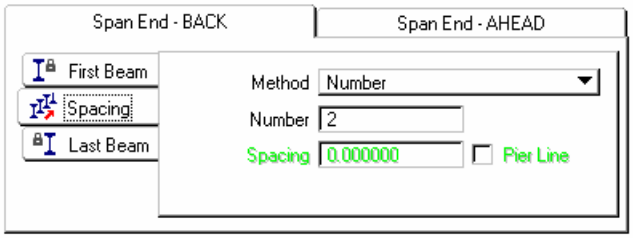
Under the Beam Group Specifications group box:



1. Click **Last Beam** tab to define the Last Beam
2. Enable the **Active** option to define the Last Beam.
3. Select **Baseline Alignment** from the Method pulldown list.
4. Change the **Offset** to **4.6m** (positive is to the right).

Define the Beam Spacing

1. Click the **Spacing** tab to define the Beam Spacing.



2. Select **Number** from the Method pulldown list.
3. Enter **2** in the Number key-in field.

Note The number is defined as the total number of beams in the group.

4. Select the **Modify Beam Line** tool to update the information.

Note Notice the beams are added to the design file.

CREATE INTERIOR BEAMS LAYOUT FOR “INT. BEAMS SPAN A AND B”

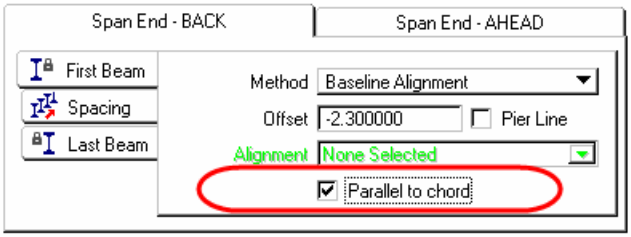
In this exercise you will use the **Ext. Beams Layout Group** already created as a template to create a new beam group.

CREATE INTERIOR BEAM LINES FOR “INT. BEAMS SPAN A AND B”

Define the First Beam

1. Select Beam Layout icon **Ext. Beams Span A and B icon.**

Under the Beam Group Specifications group box:



Note The Start Pier Abutment A and the End Pier Abutment B icons are already selected.

2. Click **First Beam** tab to define the First Beam.
3. Select **Baseline Alignment** from the Method pulldown list.
4. Change Offset to **-2.3 m**
5. Under the First Beam tab, enable the **Parallel to chord** option.

Note In this example, the interior beams will be placed parallel to the Short Chord of the Baseline.

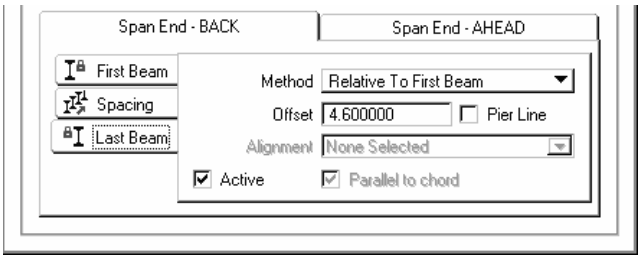
Define the Last Beam

1. Click **Last Beam** tab to define the Last Beam.

Note It is not necessary to define the Last Beam when all beams are parallel to each other. Under the Spacing tab, there is a method available for Exact Spacing and Number. The Spacing can be a negative value, indicating that beams are spaced towards the left of the first beam.

2. Enable the **Active** option to define the Last Beam.
3. Select **Relative to First Beam** from the Method pulldown list.

Note Notice that under the Last Beam tab, the Parallel to Chord option appears ghosted. It is assumed that the beams lines are parallel to each other.

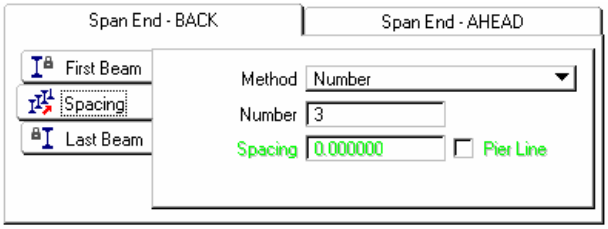


Bottom Portion of the dialog shown

4. Change the **Offset** to **4.6m.**

Define the Beam Spacing

1. Click the **Spacing** tab to define the Beam Spacing.



2. Select **Number** from the Method pulldown list.
3. Enter **3** in the Number key-in field.

Create Interior Beam Layout for "Int. Beams Spans A and B"

1. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > Select **Item**.
2. Name and Description Editor: Beam Layout Group dialog appears.
3. Enter Name **Int. Beams Span A and B**. Click **OK** to proceed

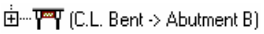
Note	Notice that all beams are drawn in the design file and are parallel to each other. Also, notice that the Exterior Beams names are Beam A and Beam B and for the Interior Beams the names are Beam A, Beam B and Beam C. You need to rename the beams so that the Exterior beams become Beam A and Beam E and the Interior beams become Beam B, Beam C and Beam D.

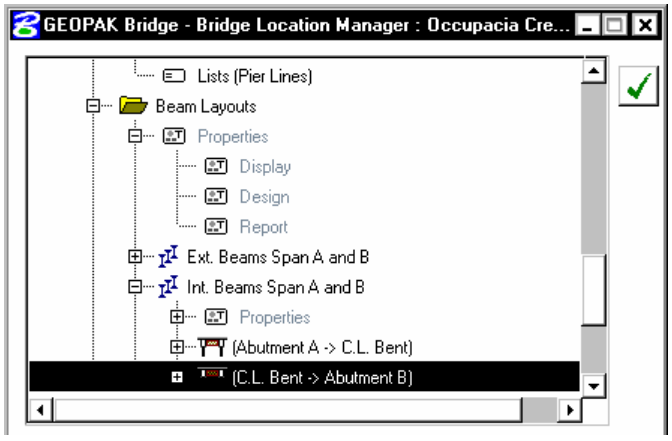
MODIFY A BEAM LAYOUT WITHIN A SPAN

This exercise is to modify the second span beam spacing. Use the **Use Local Beam layout specifications in this span** option.

Modify the First Beam in Span B

1. Under the Beam Layouts folder, select **Int. Beams Span A and B** icon.
2. Click the **Plus Sign** icon to expand the tree.
3. Select the **CL Bent -> Abutment B** icon.

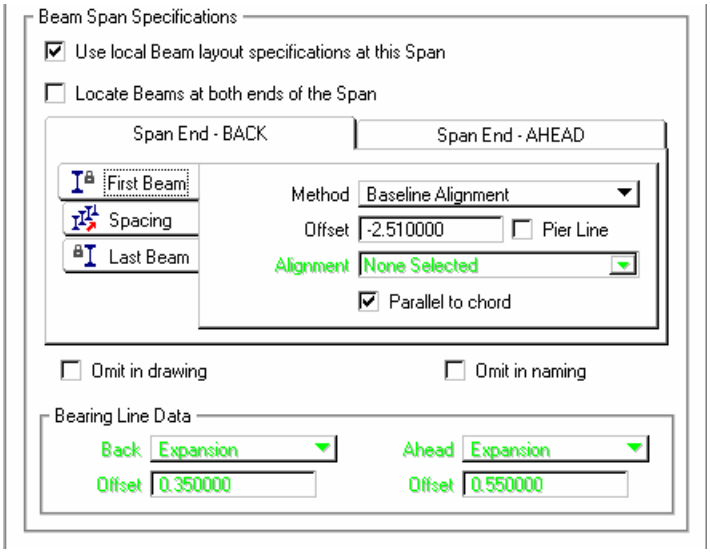




Upper part of the dialog shown

Under the Beam Span Specifications group box:

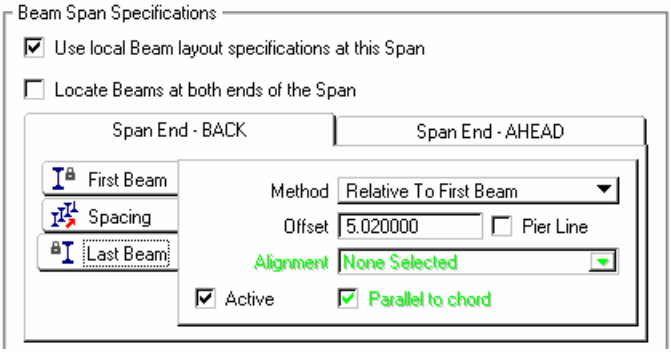
4. Enable the **Use Local Beam layout specifications in this span** option. The dialog options now appear active.



5. Click **First Beam** tab to define the First Beam.
6. Change **Offset** to **-2.51m.**

Modify the Last Beam in Span B

Under the Beam Span Specifications group box:

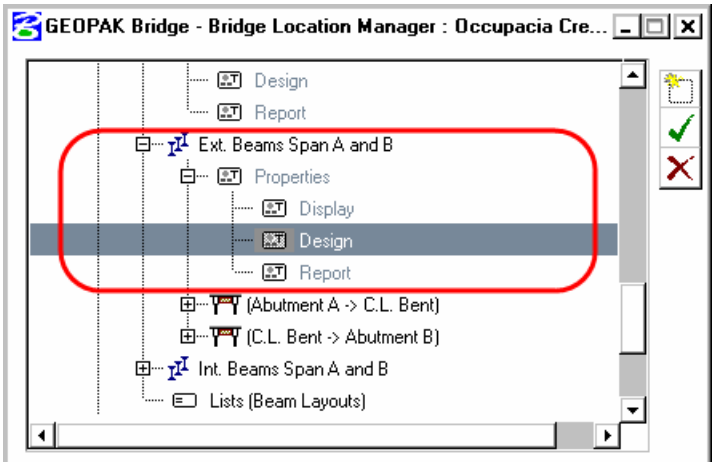


1. Click **Last Beam** tab to define the Last Beam.
2. Change the **Offset** to **5.02m.**
3. Select the **Modify Beam Line** tool to update the changes.

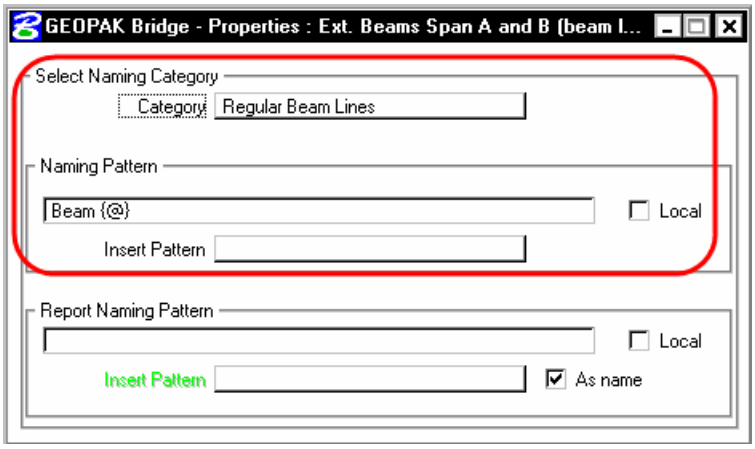
RENAME THE EXTERIOR BEAM LINES

Rename Exterior "Beam B" to "Beam E"

1. Select the **Ext. Beams Span A and B** icon and expand the tree.
2. Under the Properties icon, select the **Design** icon.

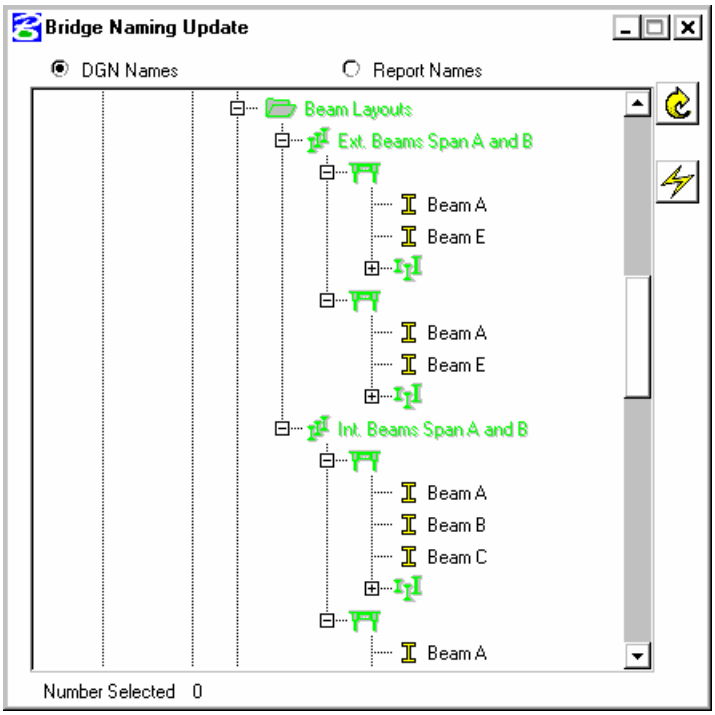


3. **Double Click** on the Design icon. The GEOPAK Bridge properties dialog appears.
4. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.



5. Under the Naming Pattern group box, change Beam {@} to **Beam {A,E}.**
6. Close the **GEOPAK Bridge Properties** dialog. The Bridge Naming tools appears.
7. Select the **Update Naming Sequence** tool. The Bridge Naming Update dialog appears.

8. Select **Raname all groups** tool from the right side of the dialog.



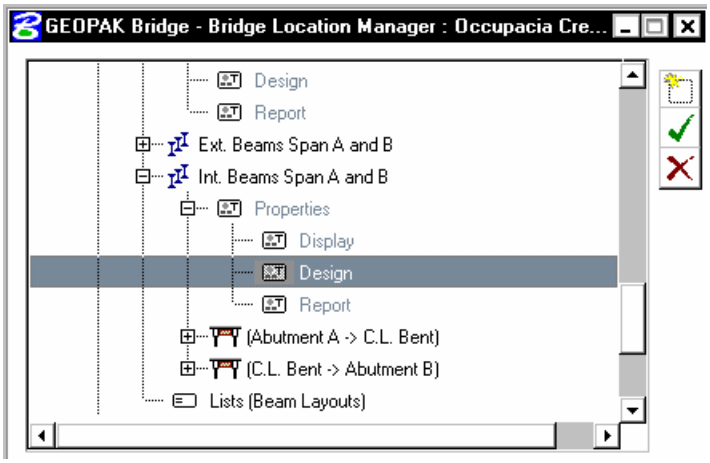
Note Notice that the Exterior Beams were renamed accordingly.

Close the Bridge Naming Update dialog box.

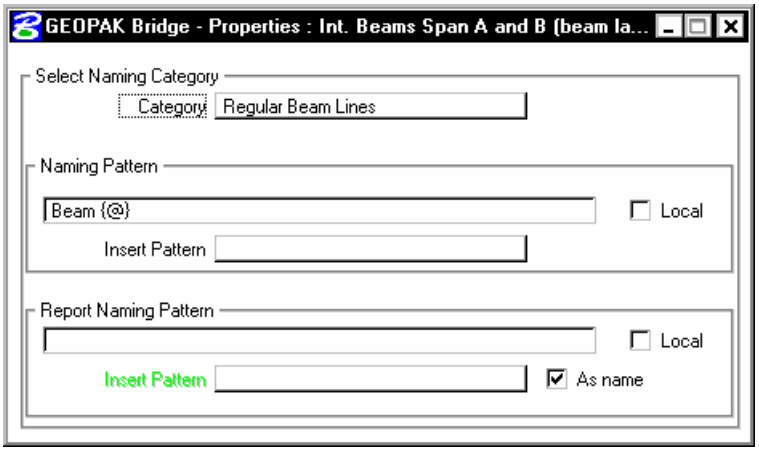
RENAME THE INTERIOR BEAM LINES

Rename Interior Beams A thru C to Beams B thru D

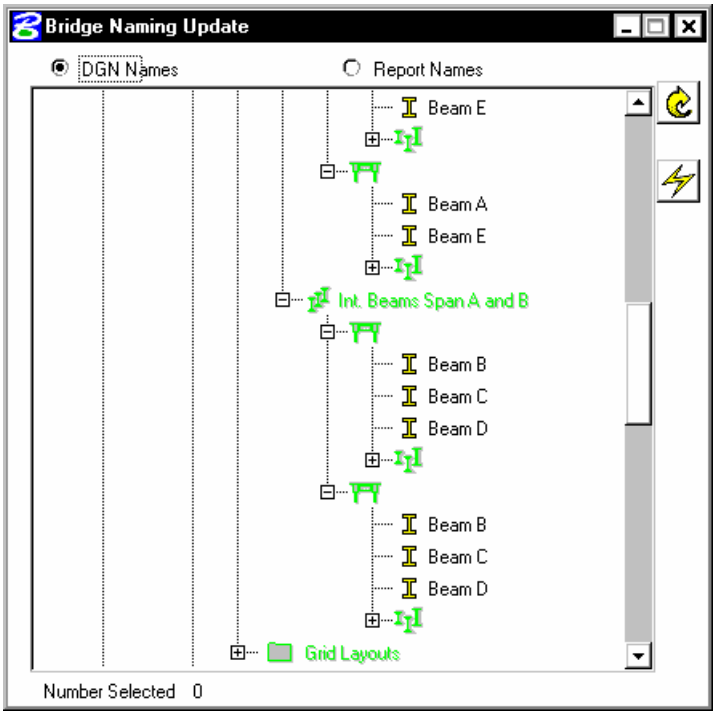
1. Select the **Int. Beams Span A and B** icon and expand the tree.
2. Under the Properties icon, select the **Design** icon.



3. Double Click on the Design icon. The GEOPAK Bridge - Properties dialog appears.
4. Under the Select Naming Category group box, select Regular Beam Lines from the Category pulldown list.



5. Under the Naming Pattern group box, change Beam {@} to Beam {B-D}.
6. Close the GEOPAK Bridge Properties dialog. The Bridge Naming tools appears.
7. Select the Update Naming Sequence tool. The Bridge Naming Update dialog appears.
8. Select Raname all groups tool from the right side of the dialog.



Note Notice that the Interior Beams were renamed accordingly.

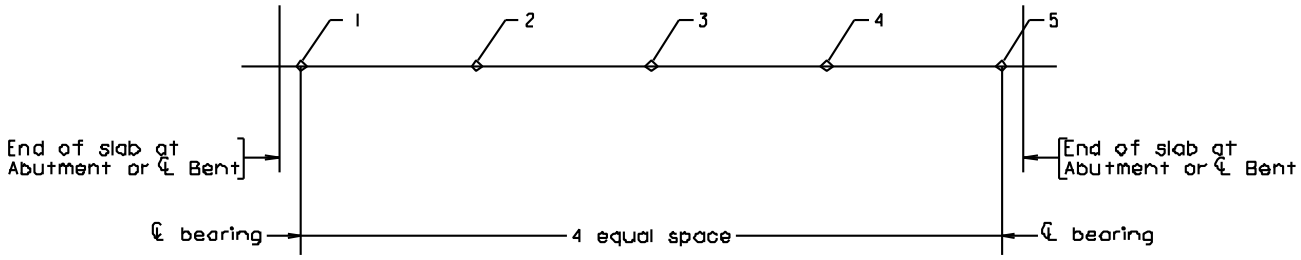
Close the Bridge Naming Update dialog box.

CREATE GRID LAYOUTS AND GRID LINES FOR CALCULATING ELEVATIONS

For more information refer to **Create Grid Lines for Calculating Elevations** in Chapter 1 or in the On-Line Help **(Applications>GEOPAK>BRIDGE>Help).**

DECK ELEVATIONS ALONG BEAM LINES

In the exercise Beam Lines are divided in four equal spaces between Bearing Lines as shown below.



PLAN

Points showing top of slab elev.

Table of Elevations for Span A and B are shown below.

TOP OF SLAB ELEV. ALONG ℄ BEAM						
Span	Beam	1	2	3	4	5
a	A	7.984	7.952	7.927	7.909	7.899
	B	7.815	7.783	7.759	7.743	7.735
	C	7.661	7.622	7.592	7.570	7.555
	D	7.512	7.467	7.430	7.401	7.380
	E	7.350	7.304	7.266	7.238	7.220
Span	Beam	1	2	3	4	5
b	A	7.893	7.870	7.854	7.845	7.844
	B	7.730	7.708	7.693	7.687	7.688
	C	7.549	7.521	7.501	7.489	7.485
	D	7.372	7.338	7.312	7.295	7.286
	E	7.212	7.178	7.153	7.137	7.130

Table from existing plans shown

SET OR REVIEW GRID LAYOUTS-GRID HEIGHTS PROPERTIES

Different properties options are available to Display, Design and Reporting Grid Layouts.

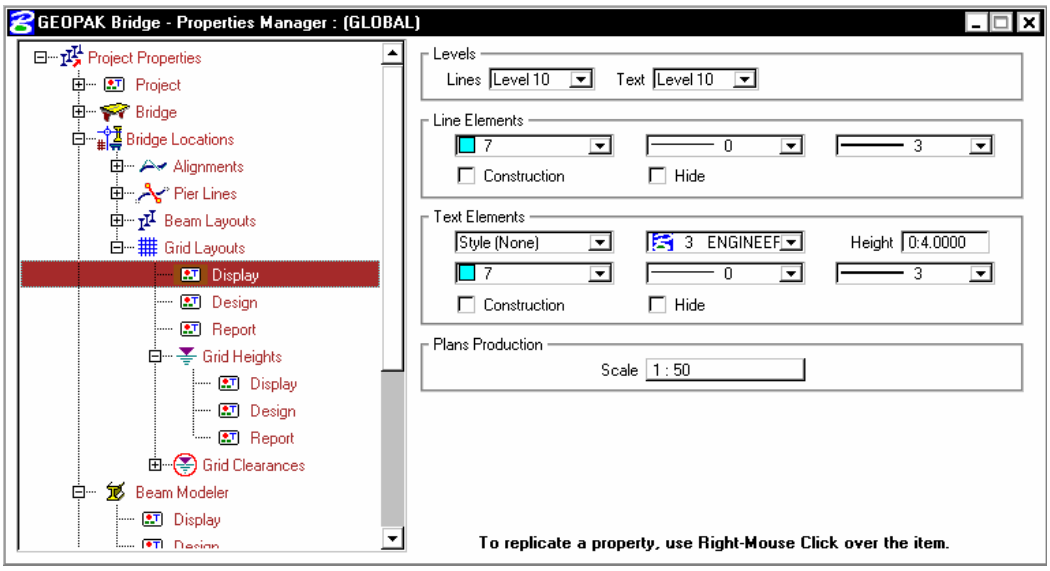
Set or Review Grid Layouts Display Properties

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.

Note The properties shown in the GEOPAK Bridge – Properties Manager dialog are from the default properties stored in the default template. The default values are automatically transferred from the default template to the current project when a Bridge Database is created.

2. Under Bridge Locations select Grid Layouts icon. Under Grid Layouts select the **Display** icon. The dialog changes as shown below.

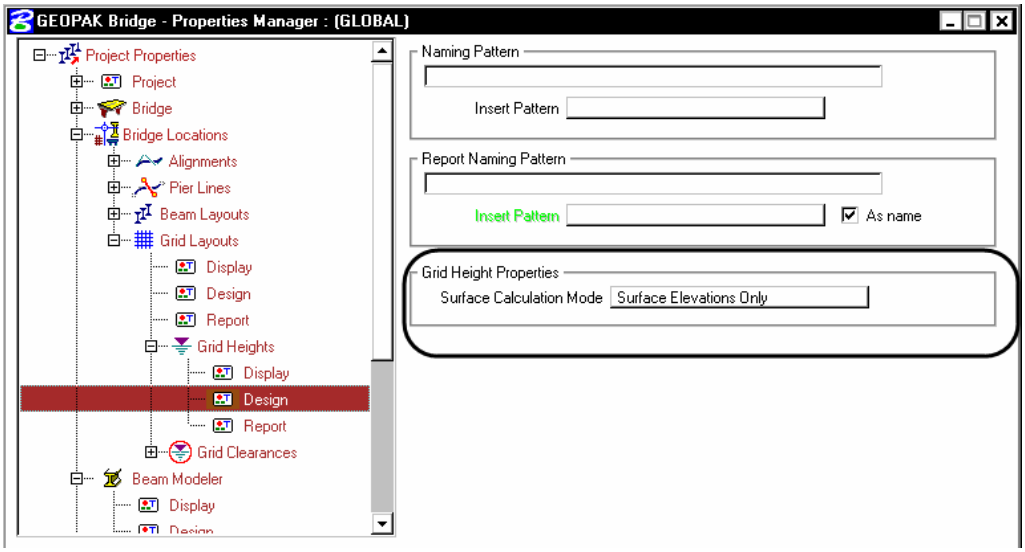
Hint Notice that the Project Properties tree can be collapsed and expanded by clicking on the **+** or **–** icons. You can use the vertical scroll bar to browse the tree.



The defaults settings under Levels, Line Elements, Text Elements and Plans Production should be the same as the ones shown above.

Set or Review Grid Layouts Grid Heights Design Properties

1. Under Bridge Locations select Grid Layouts icon. Under Grid Layouts select the Grid Heights icon and under the Grid Heights icon select the **Design** icon. The dialog changes as shown below.

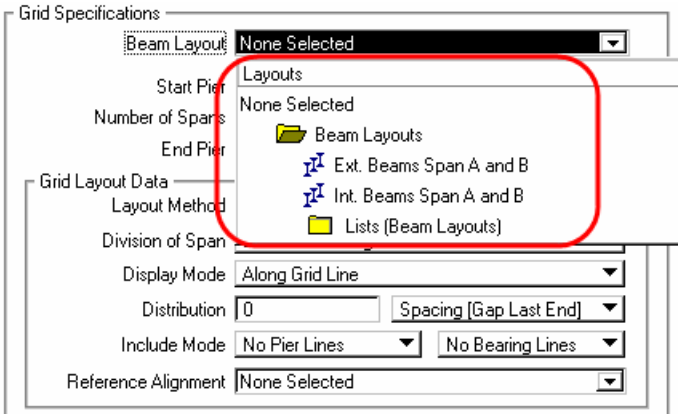


2. Check that under the Grid Height Properties, the **Surface Elevations Only** from the Surface Calculation Mode pulldown list is selected.

3. Click the **X** top right corner to close the dialog.

CREATE GRID LAYOUTS AND GRID LINES FOR “BEAMS SPAN A AND B”

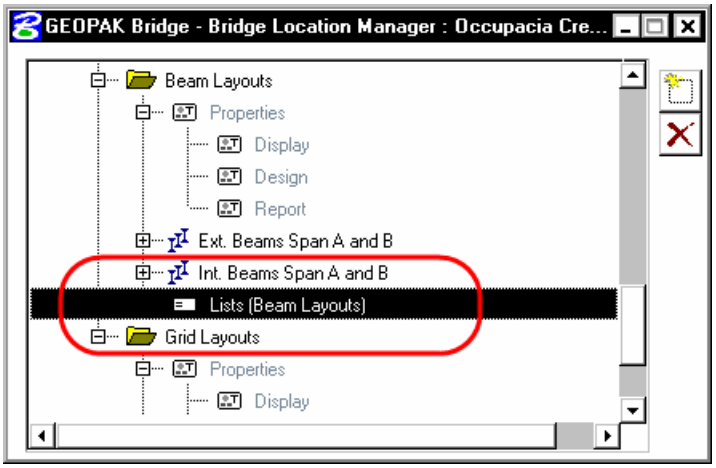
In this example you have created two groups of beams: One for the Interior beams and another for the Exterior beams. When a Grid Layout is created, you need to select a Beam Layout from the Beam Layout pulldown list under the Grid Specifications group box.



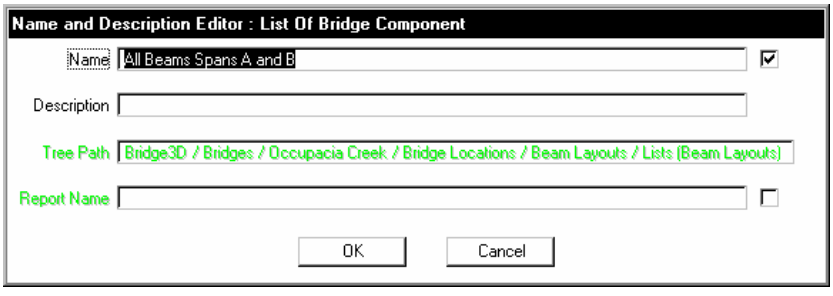
Since the Beam Layouts are not grouped (using the Lists [Beam Layouts]), you will need to create separate Grid Layouts per each Beam Layout created. To avoid this situation, you need to create a Beam Layout List first.

Create List [Beam Layout] “All Beams Span A and B”

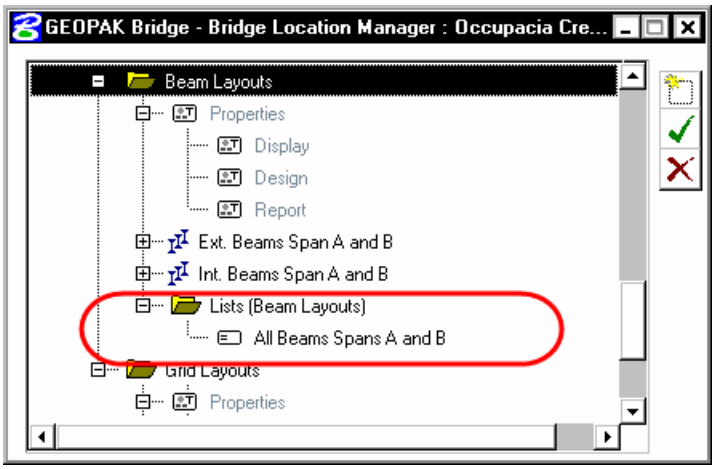
1. Under the Beam Layouts icon select the **List [Beam Layouts]** icon.



2. Select the **Create List** tool from the right side of the dialog.
3. The **Name and Description Editor: Grid Group** dialog appears.
4. Enter Name “**All Beams Span A and B**”

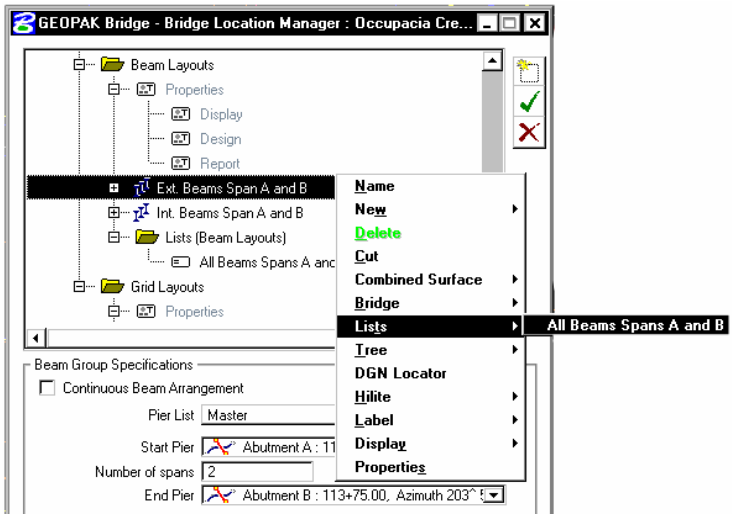


5. Click **OK** to continue. The Bridge Location Manager changes as shown below:



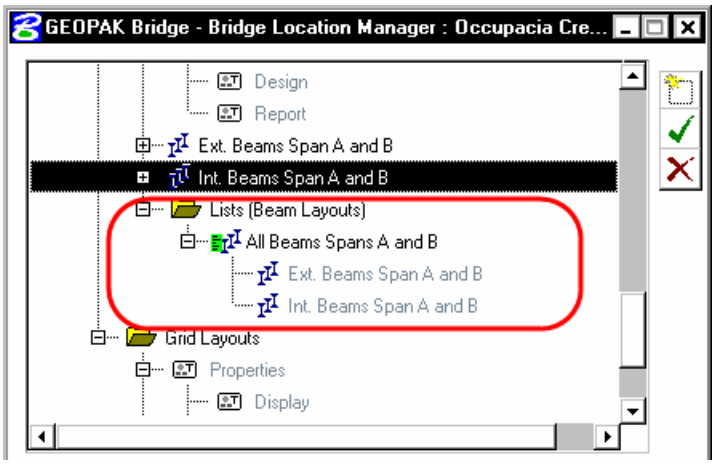
6. Under the Beam Layouts icon, select the **Ext. Beams Span A and B** icon.

7. Right mouse click anywhere within the Bridge Tree list. Select **Lists** > **All Beams Spans A and B**.



8. Under the Beam Layouts icon, select the **Int. Beams Span A and B** icon.

9. Right mouse click anywhere within the Bridge Tree list. Select **Lists** > **All Beams Spans A and B**. The dialog changes as shown below:



CREATE GRID LAYOUT AND GRID LINES FOR “ALL BEAMS SPAN A AND B”

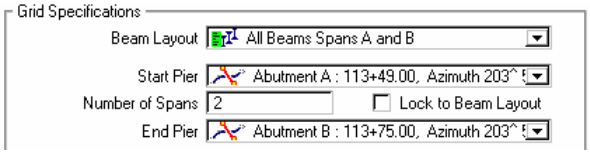
Create Grid Layout “All Beams Spans A and B”

1. Select the **Grid Layouts** folder in the Bridge Location Manager.
2. A **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**.
3. The **Name and Description Editor: Grid Group** dialog appears.
4. Enter name “**All Beams Spans A and B**”. Click **OK** to proceed.

Create Grid Lines for “All Beams Spans A and B”

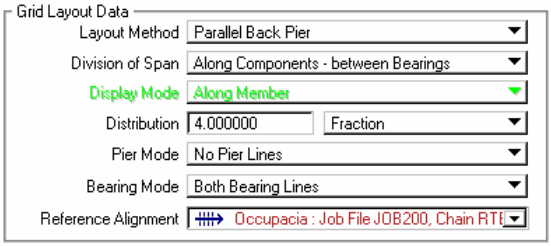
1. Under the Grid Layouts folder, select **All Beams Spans A and B** icon. The dialog expands.

Under the Grid Specifications group box:



2. Select **All Beams Spans A and B** icon from the Beam Layout pulldown list.
3. Select **Abutment A** from the Start Pier pulldown list.
4. Select **Abutment B** icon from the End Pier pulldown list.

Under the Grid Layout Data group box:



5. Select **Parallel Back Pier** from the Layout Method pulldown list
6. Select **Along Component between Bearings** from the Division of Span pulldown list.

Note Deck Levels are calculated along each individual component.

7. Enter Distribution value **4** and select **Fraction** from the Distribution pulldown list.
8. Select **No Pier Lines** from the Pier Mode pulldown list.
9. Select **Both Bearing Lines** from the Bearing Mode pulldown list.

10. Select **Occupacia** icon from the Reference Alignment pulldown list.

At the bottom of the Grid Specifications box:

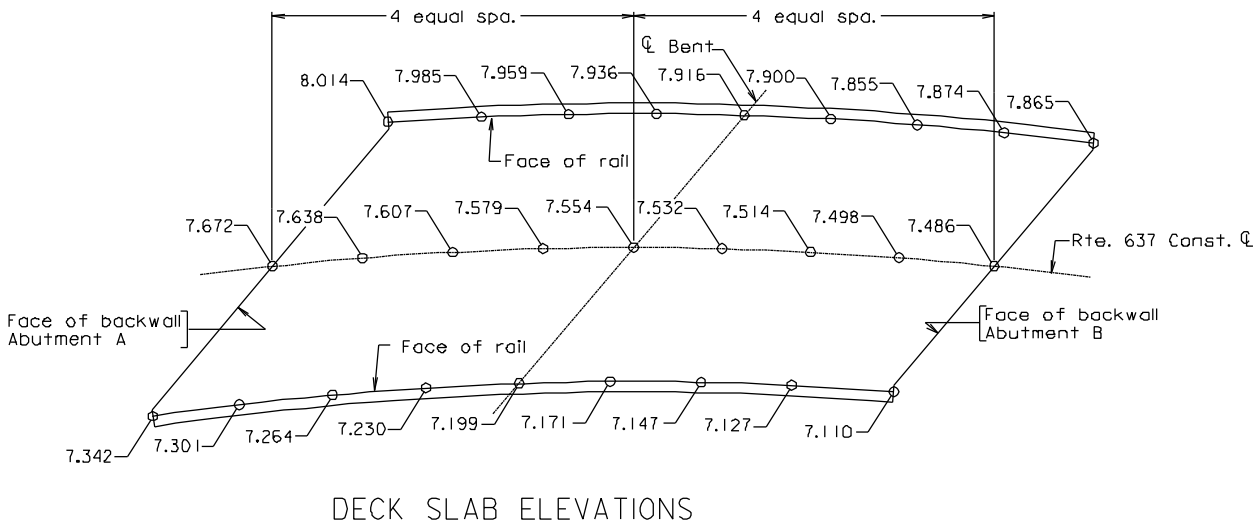
11. Select **None Selected** from the Alignments pulldown list.
12. Select **Road Shapes** icon from the Elevation Surface pulldown list.
13. Select **None Selected** from the Clearance Surface pulldown list.

14. Select the **Modify Grid** tool to update the changes.

Note Elevations are now calculated and drawn in the DGN file. If Elevation values are not displayed, execute a Fit View on the MicroStation window.

CREATE GRID LAYOUTS AND GRID LINES FOR “FACE OF RAILS AND BASELINE”

Face of Rails and Baseline are divided in four equal spaces between Pier Lines to calculate the Deck Elevations.

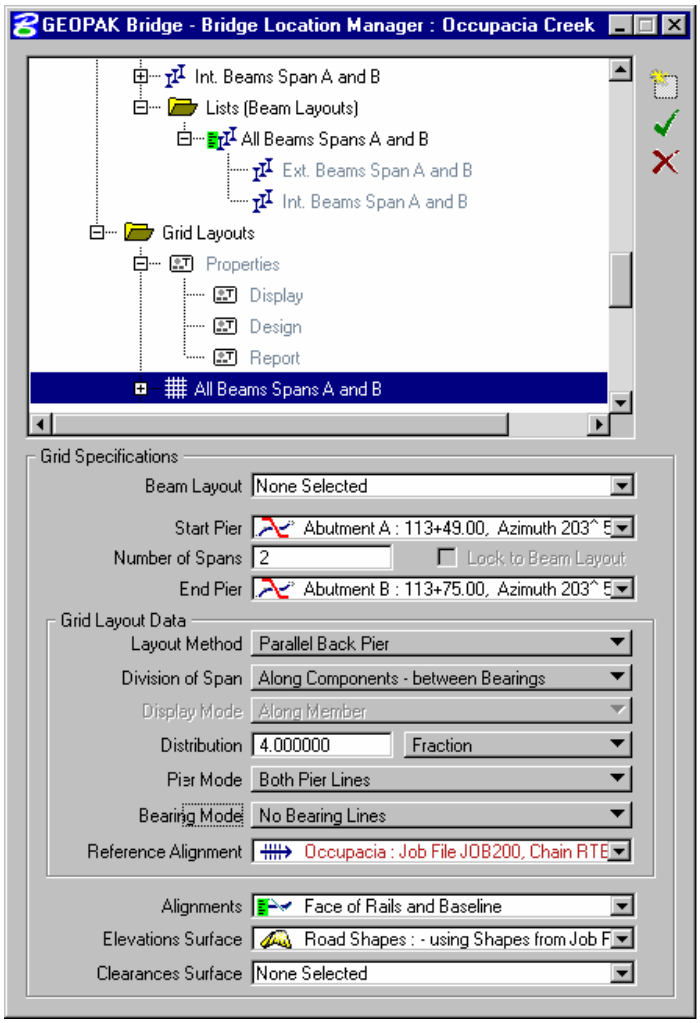


DECK SLAB ELEVATIONS

Deck Elevations required at locations shown

Create Grid Lines for “Face of Rails and Baseline

Continue working in the Bridge Location Manager dialog box.



1. Under the Grid Layouts folder , select **All Beams Span A and B** icon.
2. Under the Grid Specifications group box, select **None Selected** from the Beam Layout pulldown list.

Under the Grid Layout Data group box:

3. Select **Along Component** b**etween Piers** from the Division of Span pulldown list.
4. Select **Both Piers Lines** from the Pier Mode pulldown list.
5. Select **No Bearing Lines** from the Bearing Mode pulldown list.
6. Under the Grid Specifications group box, select **Face of Rails and Baseline icon** from the Alignments pulldown list.

Note The Face of Rails and Baseline will be included in the calculations

7. **Right mouse-click** anywhere within the Bridge tree list. Select **New > Item**. The **Name and Description Editor: Grid Group** dialog appears.
8. Enter name **Face of Rails and Baseline**. Click **OK** to proceed.

Note Elevations are calculated and displayed in the DGN file.

CREATE REPORTS

PROCEDURE

Reports are created by using both the **Properties Manager** and the **Reports Manager**.

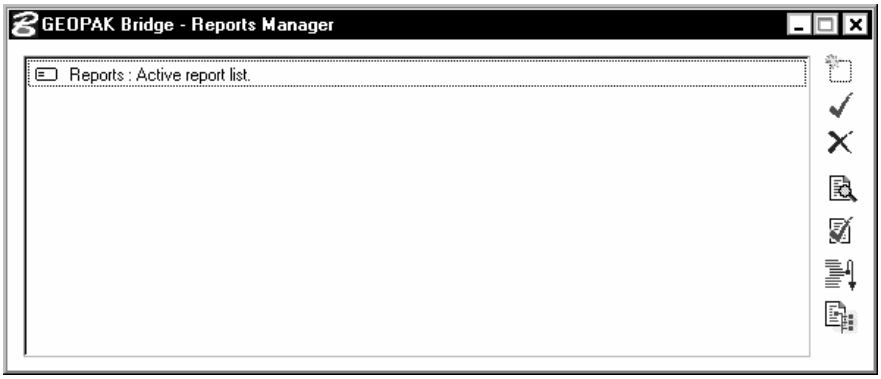
1. The Reports Manager is where output files are managed.
2. The Properties Manager tool is where reports are activated and where Report Templates are selected.

REPORTS MANAGER

The Report Manager is used to manage the output of Text, CSV and XML files. It is also used to manage the updating, deleting, re-sequencing and displaying of reports.

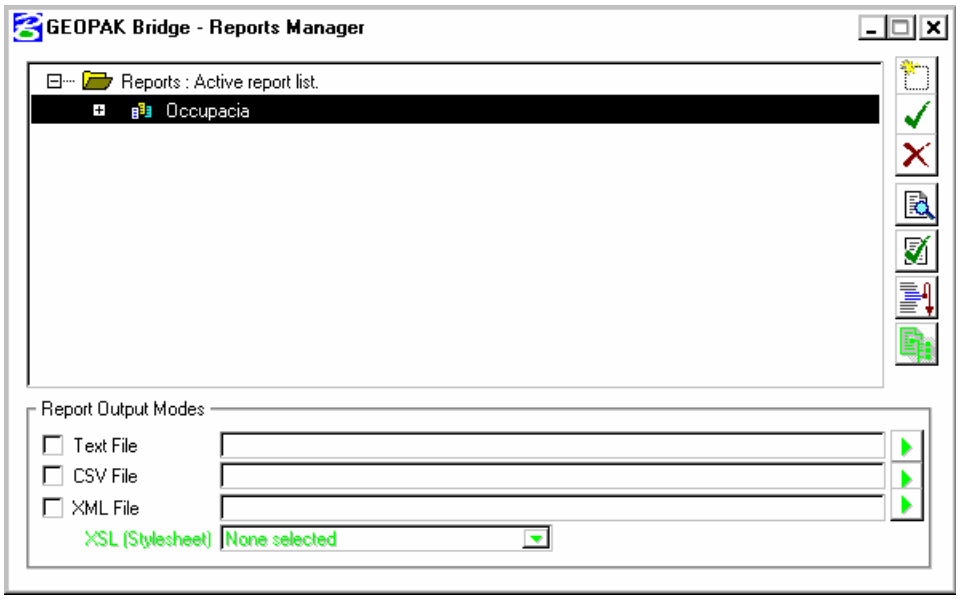
Create a Report Set

1. Select the **Reports Manager** tool from the GEOPAK Bridge tools palette. The GEOPAK Bridge – Reports Manager dialog appears.

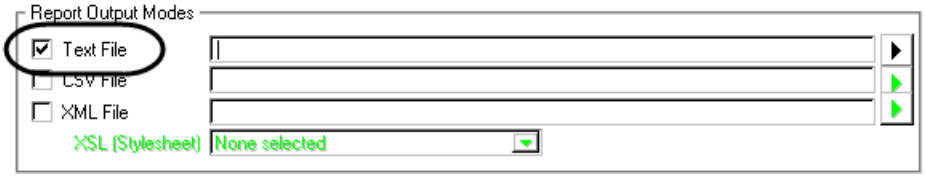


2. Select the **Create Reports set** tool.
3. The **Name and Description Editor: Bridge Component** dialog appears. Enter Name **"Occupacia"**.
4. Click **OK** to proceed.

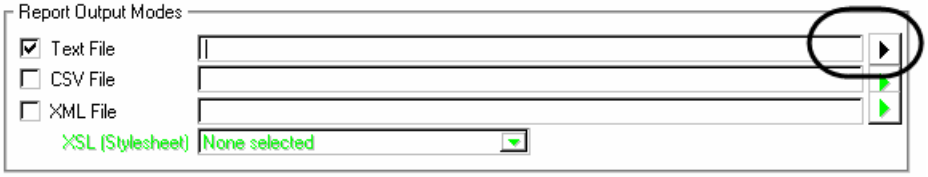
5. Select the **Occupacia** icon. The dialog expands.



6. Under the Report Output Modes group box, enable the **Text File** option.

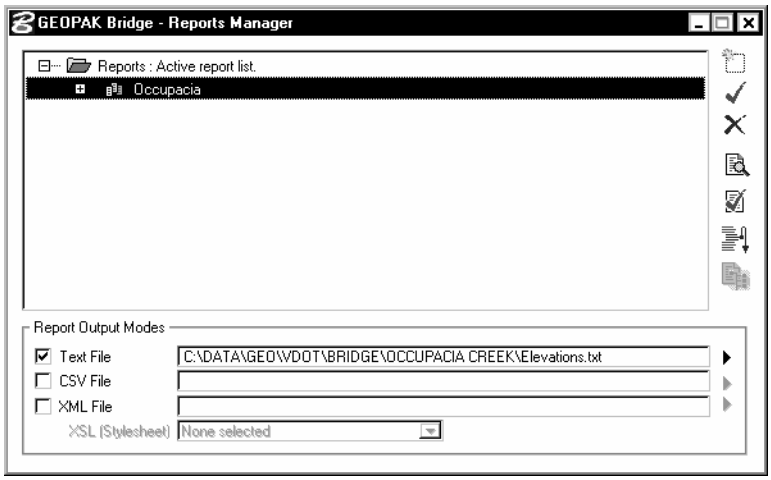


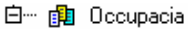
7. Select the **Select Text File** tool.



8. The default directory appears. Under Files, enter **Elevations**.
9. Click **OK** to continue.

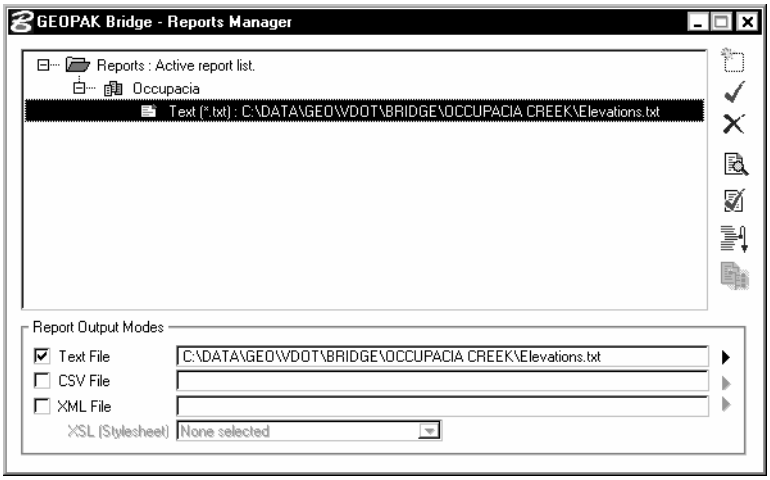
10. Select the **Modify Report Set** tool to update the changes.





11. Expand the **Occupacia** tree. Select the Text icon as shown below:

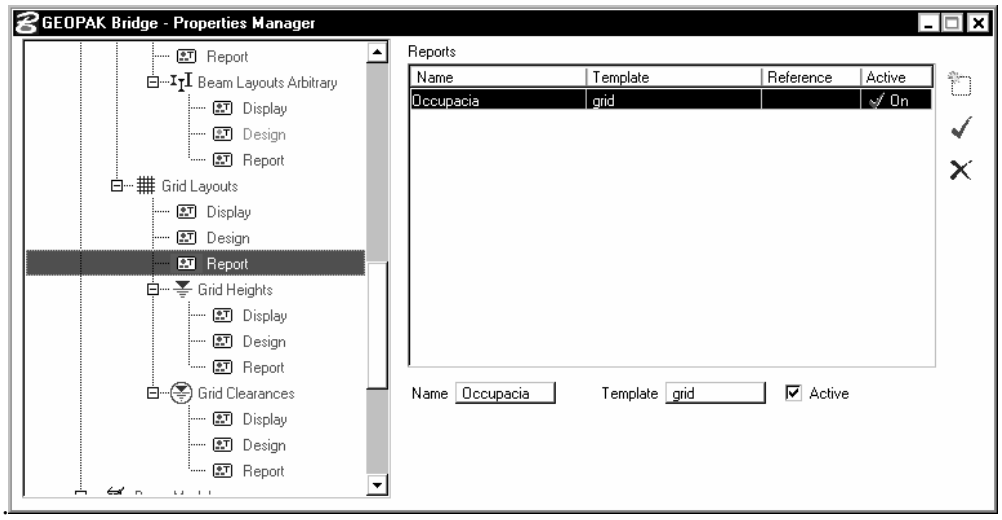
Warning **DO NOT CLOSE THE REPORTS MANAGER DIALOG**. We need to proceed with the Properties Manager to enable the reports properties.



ACTIVATE REPORTS IN THE BRIDGE PROPERTIES

Activate Grid Layouts Report

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.
2. Under the **Grid Layouts** icon, select the **Reports** icon.



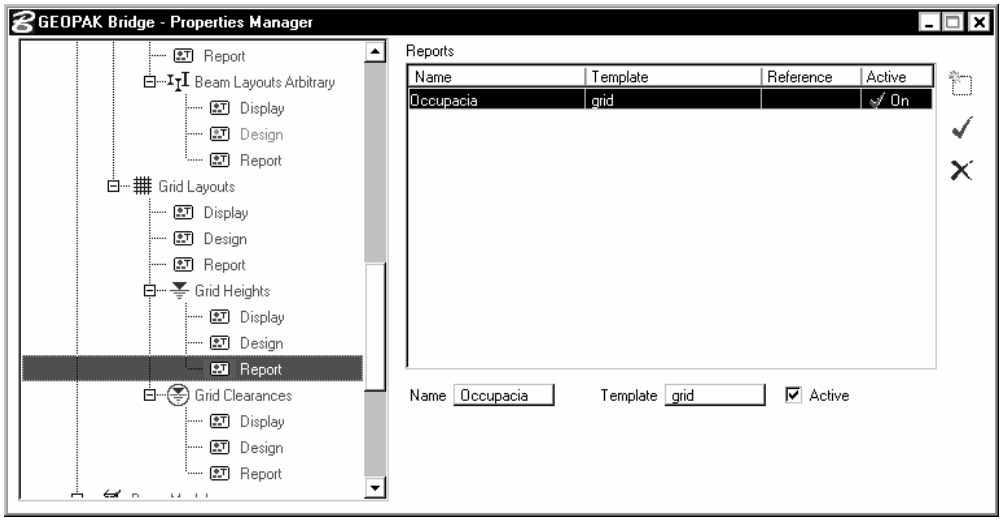
Global Bridge Properties dialog shown

3. Under the Reports window, select **Occupacia** from the Name pulldown list.

4. Select **Modify Report** tool from the right side of the dialog.

Activate Grid Heights Report

1. Under the **Grid Heights** icon, select the **Reports** icon
2. Under the Reports window, select **Occupacia** from the Name pulldown list.
3. Select **Modify Report** tool from the right side of the dialog.



Report activated for Grid Heights shown

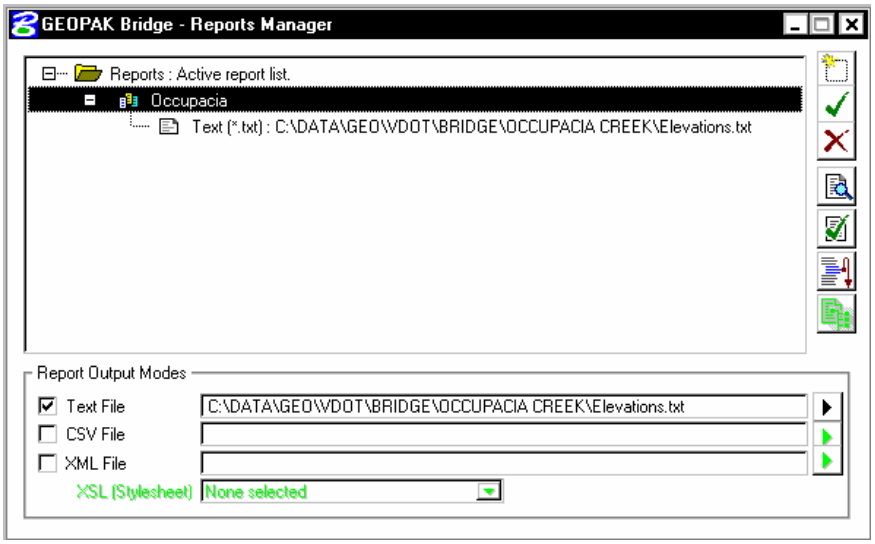
6. **Close** the Bridge Properties dialog.

UPDATE REPORT

When reports are activated in the Bridge Properties dialog, the Report Manager processes the report.

Update Report

1. Proceed to locate the Reports Manager dialog.



2. Select the **Update Report** tool. Wait for processing.

Note The report is automatically displayed. To view the report at any time, select the Display Report tool.

The Grid Report is partially shown below.

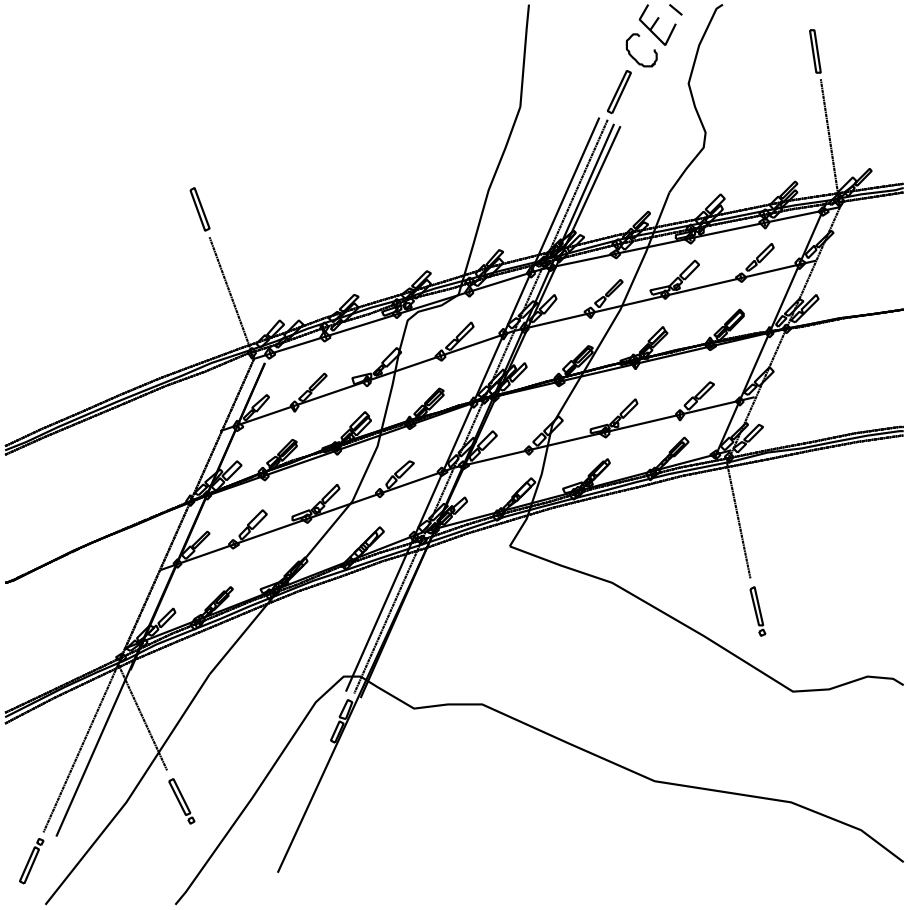
Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Beam A	99652.097	50286.068	7.983	113+54.21	-4.567	7.618
Beam A	99654.412	50286.787	7.956	113+56.55	-4.485	7.597
Beam A	99657.424	50287.722	7.927	113+59.59	-4.446	7.572
Beam A	99660.437	50288.657	7.908	113+62.64	-4.485	7.549
Beam A	99663.005	50289.454	7.898	113+65.23	-4.578	7.532
Beam E	99646.764	50274.012	7.349	113+44.76	4.641	7.720
Beam E	99649.175	50274.948	7.309	113+47.45	4.741	7.689
Beam E	99652.313	50276.165	7.267	113+50.95	4.788	7.650
Beam E	99655.450	50277.382	7.237	113+54.44	4.741	7.616
Beam E	99658.125	50278.420	7.219	113+57.42	4.627	7.589
Beam B	99650.754	50283.032	7.815	113+51.96	-2.182	7.640
Beam B	99653.113	50283.850	7.787	113+54.41	-2.136	7.616
Beam B	99656.182	50284.914	7.760	113+57.61	-2.149	7.588
Beam B	99659.252	50285.978	7.742	113+60.80	-2.245	7.562
Beam B	99661.869	50286.886	7.734	113+63.51	-2.393	7.543

Part of Grid Report Shown

Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Occupacia	99648.772	50279.911	7.671	113+49.00	-0.000	7.671
Occupacia	99651.799	50281.094	7.637	113+52.25	0.000	7.637
Occupacia	99654.855	50282.199	7.606	113+55.50	0.000	7.606
Occupacia	99657.940	50283.223	7.578	113+58.75	0.000	7.578
Occupacia	99661.049	50284.167	7.553	113+62.00	0.000	7.553
Left Face of Rail	99651.346	50286.098	8.013	113+53.54	-4.850	7.625
Left Face of Rail	99654.368	50287.157	7.984	113+56.62	-4.850	7.596
Left Face of Rail	99657.415	50288.142	7.959	113+59.70	-4.850	7.571
Left Face of Rail	99660.486	50289.050	7.936	113+62.79	-4.850	7.548
Left Face of Rail	99663.578	50289.883	7.916	113+65.87	-4.850	7.528
Right Face of Rail	99646.106	50273.487	7.343	113+43.91	4.850	7.731
Right Face of Rail	99649.141	50274.815	7.302	113+47.36	4.850	7.690
Right Face of Rail	99652.212	50276.060	7.264	113+50.81	4.850	7.652
Right Face of Rail	99655.316	50277.219	7.230	113+54.26	4.850	7.618
Right Face of Rail	99658.451	50278.292	7.199	113+57.70	4.850	7.587

The Design file should appear as shown below.

Warning If Elevation values are not displayed, execute a Fit View of the MicroStation window.



Un-Rotated Plan view of Bridge shown

Ellerslie Ave. Bridge

OBJECTIVES

Develop the Bridge model for Ellerslie Ave. Bridge.

The alignment is on a horizontal curve with a radius of 9654.24 feet. The bridge is on a hump vertical curve and is crowned at ¼" per foot. The substructure units are all parallel. Each has a different skew because of the curvature. The span layout is 47'-76'-47' continuous steel rolled beams. A constant 8'-0" beam spacing is used, and the beams are laid out parallel to the long chord. Beams E and F (the center beams) are each 4'-0" offset from the long chord. Because the horizontal curve is so flat (the middle ordinate is approximately 4½"), the outside edges of the deck were made straight (instead of following the curvature). However, the faces of the sidewalk curb follow the curvature. Therefore, the sidewalk width varies.

LAYOUT PROCEDURE

Orientation (skew angle) and location (station) of Pier 1.

1. a. Orientation of Pier 1: In order to minimize the bridge length, substructure units are usually aligned approximately parallel to the railroad tracks or roadway underneath. In this example, both sets of tracks are in a horizontal curve. The designer constructed a straight line that would approximate the C/L of the tracks. The C/L of Pier 1 is set parallel to this line. At this time the skew angle is not known. Since the bridge baseline is horizontally curved, the skew of Pier 1 will not be known until its location is set.

   b. Location of Pier 1: The location is chosen to satisfy the requirements (horizontal clearance, clearance to avoid shoring, etc.) given in the Office Practice. Locations of utilities or existing ditches may also influence the pier location. In this example, the designer chose station 50+72.00.

   c. Skew Angle of Pier 1: The Pier 1 C/L is placed at station 50+72.00 at the alignment determined in step 1(a). The skew angle at Pier 1 (angle between C/L pier and a radial line) is measured. In this example, the skew angle is 12°-42'-41".

2. Orientation of Other Substructure Units: In order to keep all the beams the same length, all of the substructure units are kept parallel to each other (this is only true for straight beams). Since the orientation of Pier 1 is already known, all other substructure units are placed parallel to Pier 1.

3. Beam Layout: Since the horizontal curve is very flat, the first choice is to use straight beams instead of curved. Since the alignment is curved and the beams are straight, a chord is used to reference the beams. The long chord is used to lay out the beams. The long chord is a line running from the intersection of the baseline and End of Slab at Abut. A and the intersection of the baseline and End of Slab at Abut. B. All beams are parallel to the long chord.

   Note Because the abutments are integral, End of Slab was used. For conventional abutments, use Face of Backwall.

4. Check Angle Between C/L Pier 1 and Long Chord (and adjust if necessary): The angle between C/L Pier 1 and the long chord is determined. In this example, it is 12°-29'-10". This angle is used on the Curved Bridge Layout, Framing Plan, and in the plan view on the substructure sheets. This is the angle the Contractor uses to lay out the substructure units. You should adjust the orientation of Pier 1 so that this angle is an even 11°. This slightly reduces the minimum horizontal clearances, but the clearances still meet all requirements. The skew angle at Pier 1 now changes to 11°-13'-32". All other substructure units must be re-aligned so they are parallel to Pier 1. The skew angle can now be determined for all other substructure units.

   Note You could just as easily choose 12° or 10°, as long as all clearance requirements are met.

5. Face of Sidewalk Curbs: In order to match the approach face of curbs, the face of sidewalk curbs on the bridge is offset 30'-0" radial from the baseline. The baseline and face of sidewalk curb lines follow concentric curves.

6. Layout Outside Edge of Deck: Because the horizontal curvature is slight, the outside edges of the deck can be made straight. This simplifies design and construction. As with the beams, the edges of deck are parallel to the long chord. Because the horizontal curve is to the right, the middle ordinate (approximately 4½") is to the left of the long chord. Therefore, the minimum offset between the long chord and the left edge of deck is:

   0.375' middle ordinate

   30.0' baseline to face of sidewalk curb

   7.5' min. sidewalk width

   1.33' width of rail

   39'-2 ½" total

   The designer chose to use 39'-3".

   To keep the bridge symmetrical, the same offset is used for the right edge of deck. You must verify that the minimum sidewalk width on the right side does not fall below 7'-6".

REFERENCE MATERIAL

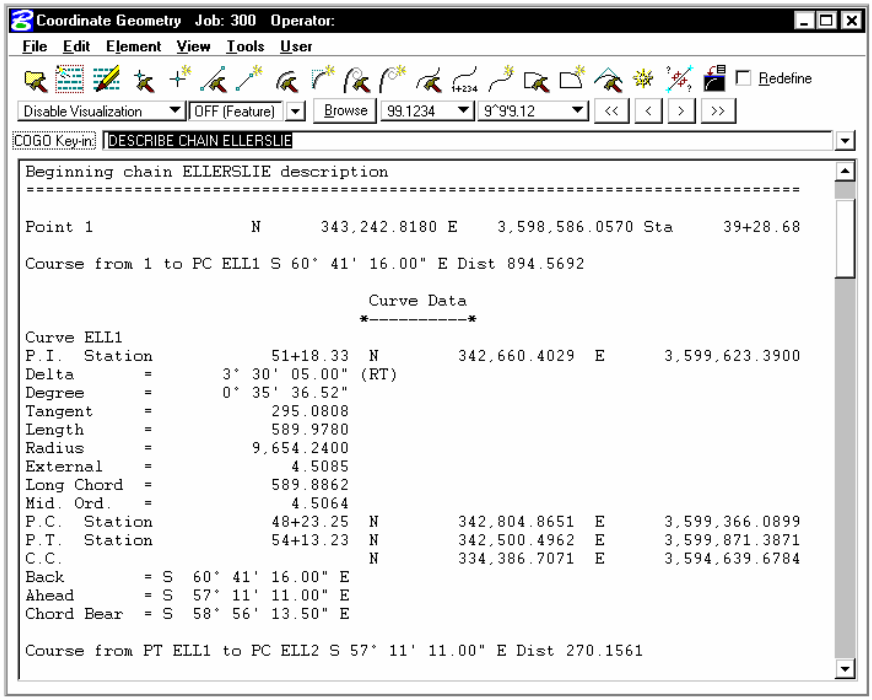
Units: English

Bridge Modeling DGN file available: C:\DATA\GEO\VDOT\Bridge\ELLERSLIE AVE\EleerslieBridge3D.dgn

Steel Girders

GPK file available: **JOB300**

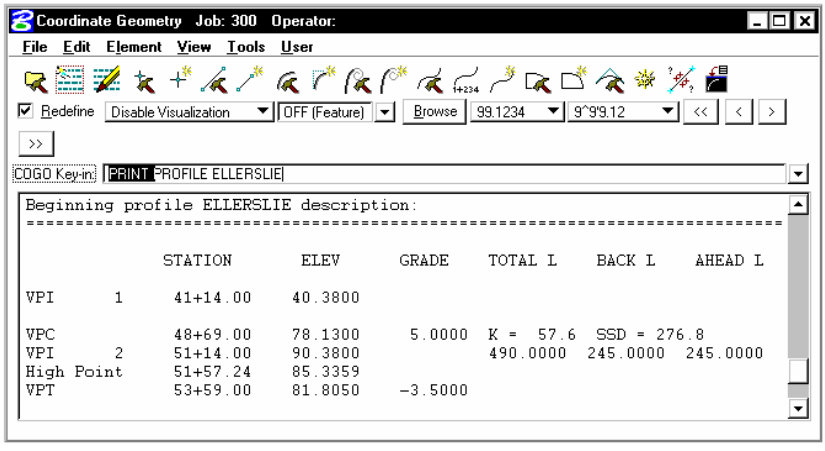
Horizontal Alignment: **ELLERSLIE**



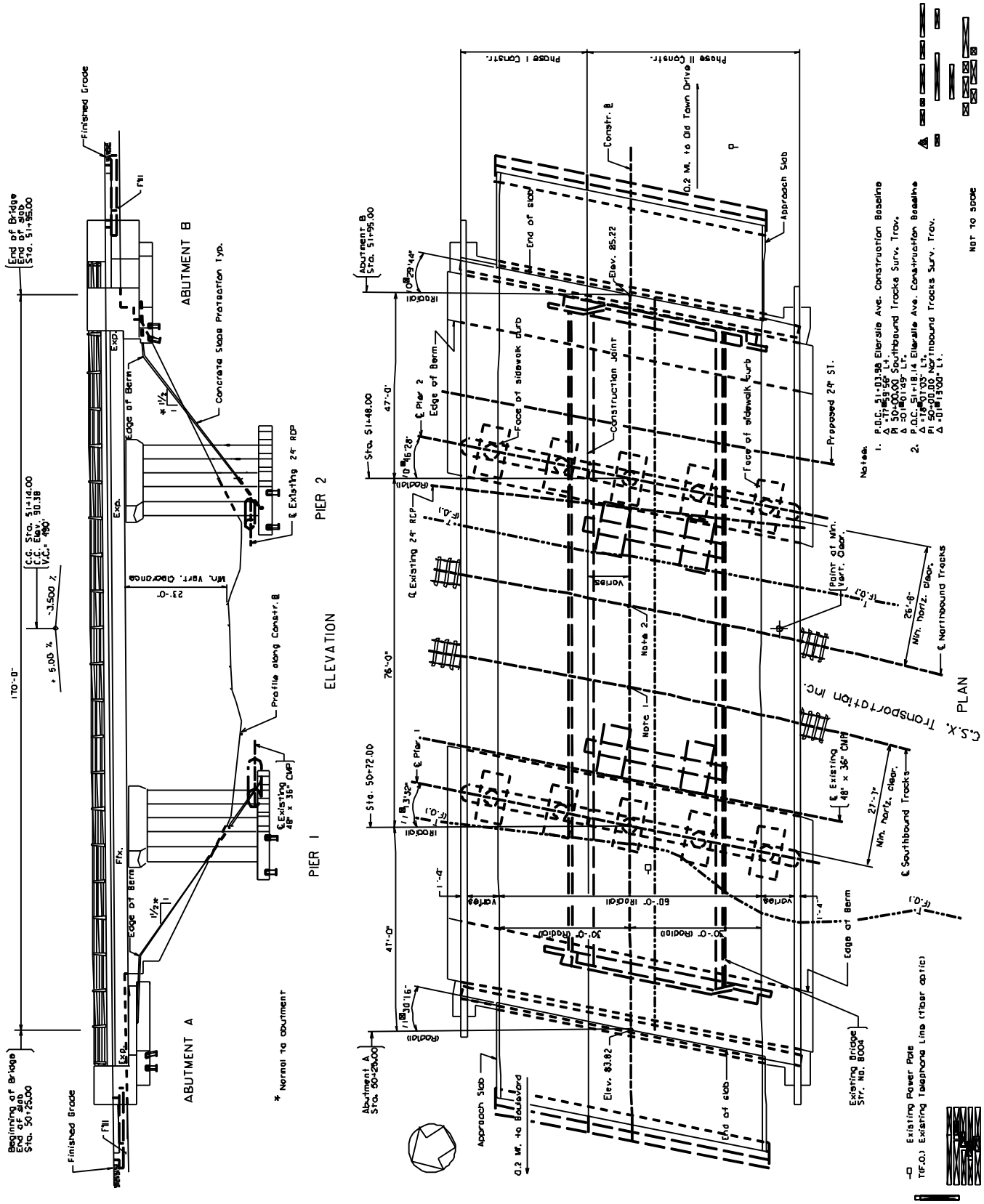
Profile Grade Line available: **Ellerslie**

Shapes available: **Shapes.dgn**

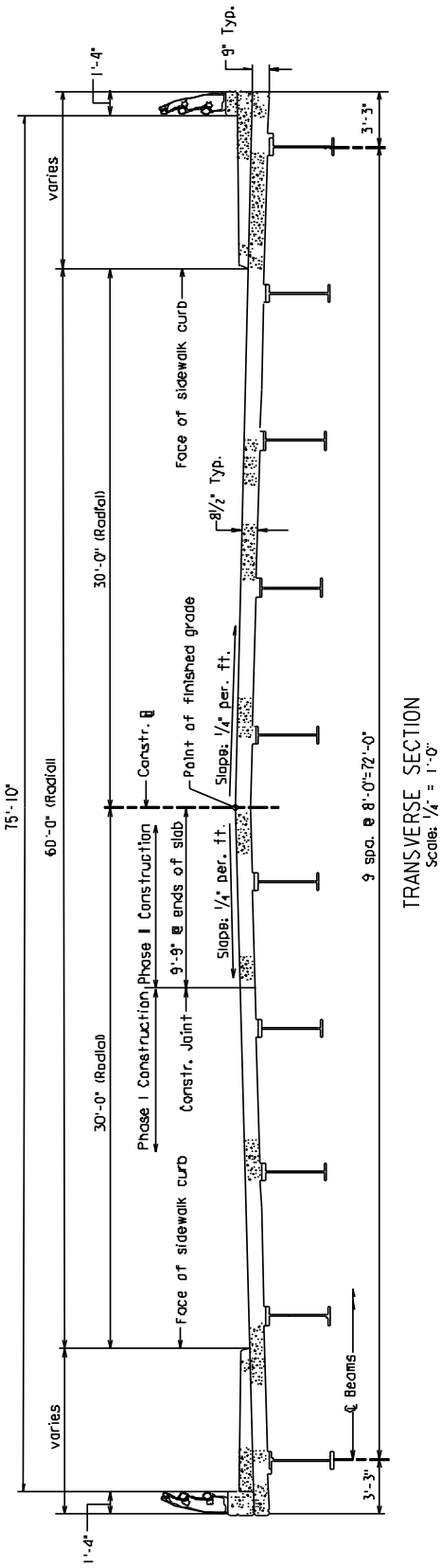
Cross Slope: **2.08 % CROWNED**



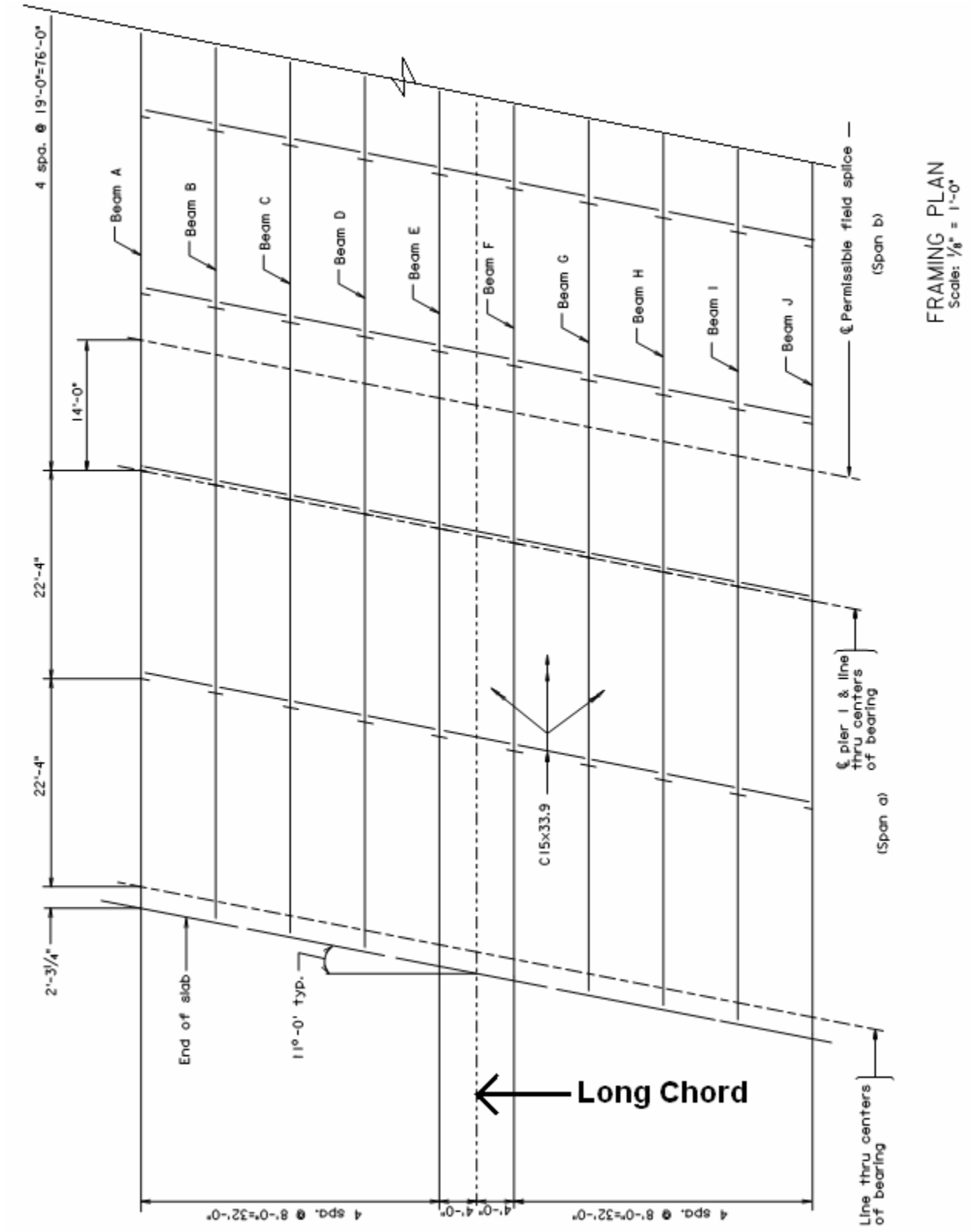
PLAN VIEW AND SECTION ON C.L.



TRANSVERSE SECTION



BEAM LAYOUT (BEAMS PARALLEL TO LONG CHORD)



STARTING BRIDGE

Open EllerslieBridge3D.dgn and Attach Shapes.dgn file as Reference

1. **Open > C:\DATA\Geo\VDOT\Bridge\Ellerslie Ave\ EllerslieBridge3D.dgn**
2. Select **References** tool.
3. Select **Attach Reference** tool.
4. Select **C:\DATA\Geo\VDOT\Bridge\Ellerslie Ave\Shapes.dgn**
5. Enter for Logical Name **Shapes.**
6. Click **OK**.
7. Close the **References** dialog box.

Select the Road Project Using the Road Project Manager

1. Select the Road Project Manager tool. The Project Manager dialog box appears.
2. Under the Directories list box, select **C:\DATA\GEO\VDOT\BRIDGE**.
3. Under the Projects list box, select **Ellerslie.prj**. The Project Users dialog box appears.

Note Record in your manual, the Job Number shown in the dialog.

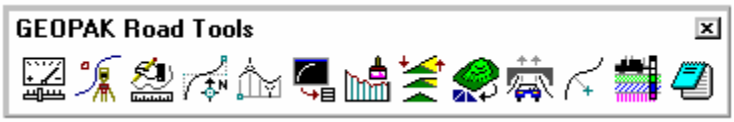
4. Under the Project Users list box select your name from the list of users.

Warning If your name is not available, contact your project administrator.

5. Click **OK** to continue.
6. Minimize the **Road Project** dialog box.

Check the Shapes Data and Record the CHAIN name

1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Road Tools**).



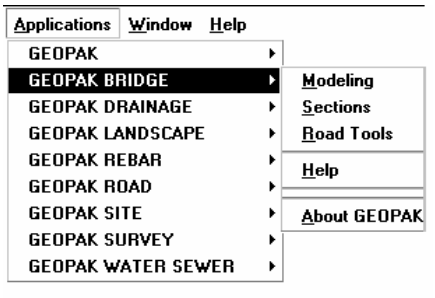
2. Select the **Shape Manager** tool from the GEOPAK Road tools palette.

3. Select the **Shape Analyst** tool from the Superelevation Shape Manager Tools palette. The Shape Analyst dialog appears.
4. Enable the **Display Only** option.
5. Click the **Dynamic** button. Proceed to indicated DP and move the mouse cursor within the shapes area. Notice the values displayed in the dialog

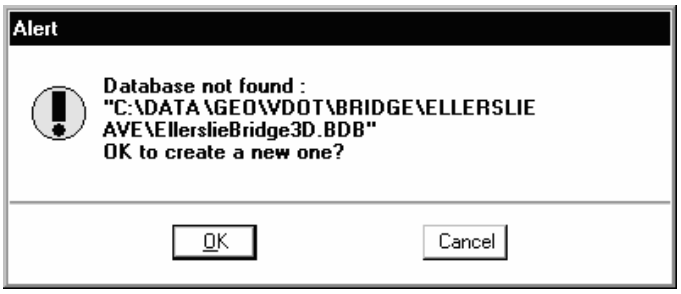
Write in your training manual, the name of CHAIN that appears in the **Chain** pull down list. You will make references to this chain later in this chapter

Starting GEOPAK Bridge

1. Select GEOPAK BRIDGE (MicroStation**: Applications >GEOPAK BRIDGE > Modeling**).

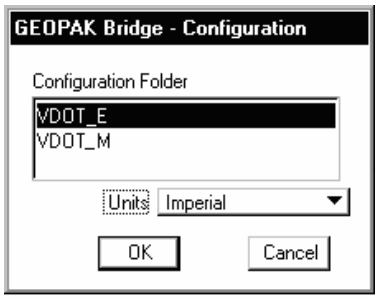


Note If the database is not available, a new one is created.



2. Click **OK** to proceed.

3. Select the Configuration Folder **VDOT_E**. Select **Imperial** from the Units pulldown.



Bridge Configuration selection dialog

4. Click **OK**. An Information box appears informing that a Default Bridge database is created.

5. Click **OK** to proceed. The Bridge tools appear as shown below.

Bridge Tools

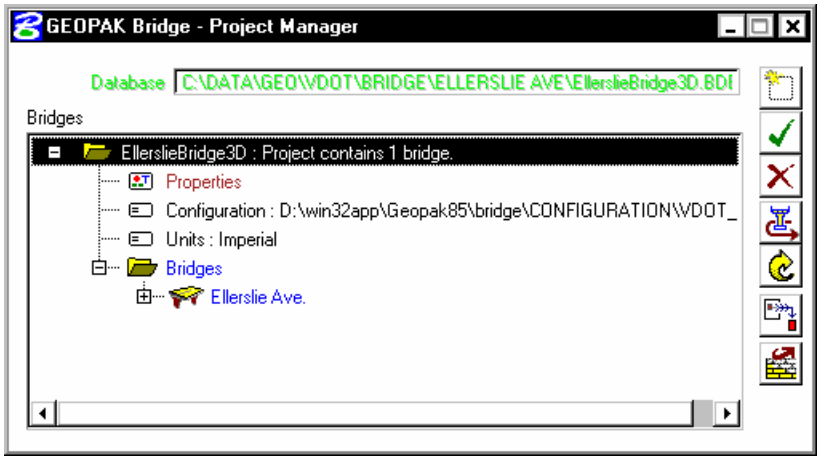
STARTING BRIDGE MODELING

CREATING A NEW BRIDGE

Create a new Bridge

TOOL	DESCRIPTION
	Project Manager

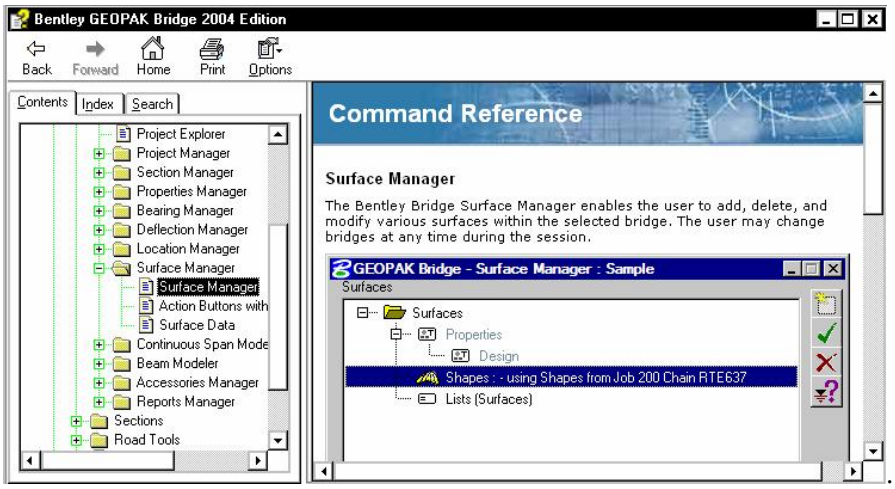
1. Select the **Project Manager** tool from the GEOPAK Bridge tools palette.



2. Select the **Create Bridge** tool.
3. The **Name and Description Editor: Bridge** dialog appears. Enter Name "**Ellerslie Ave.**"
4. Click **OK** to proceed.

CREATE A BRIDGE SURFACE

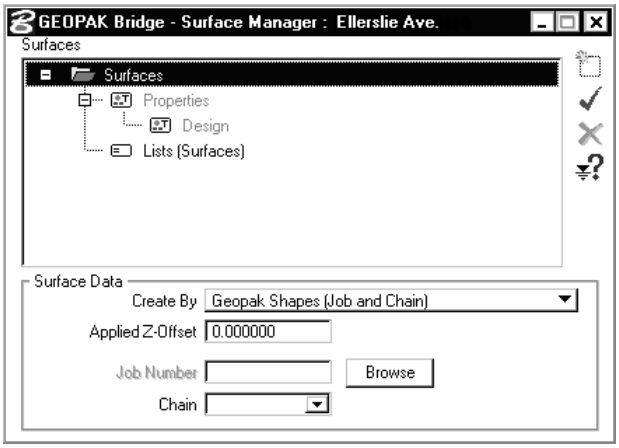
For more information refer to **CREATE A BRIDGE SURFACE** in Chapter 1 or in the On-Line Help (MicroStation: **Applications>GEOPAK>BRIDGE>Help).**



Create a Bridge Surface

TOOL	DESCRIPTION
	Surface Manager
	Display Z Levels

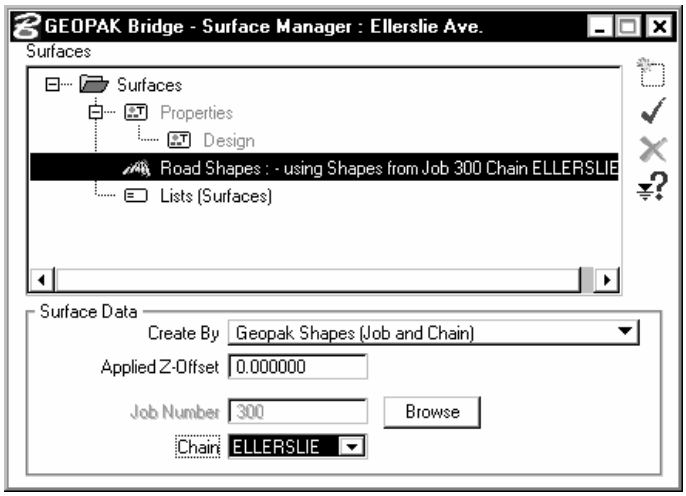
1. Select the **Surface Manager** tool from the GEOPAK Bridge tools palette.
2. Select the **Surfaces** Folder. The Surface Manager dialog expands.



Under Surface Data group box:

3. Select **GEOPAK Shapes (Job and Chain)** from the Create By pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\ELLERSLIE AVE\.**
5. Select **Job300**.
6. Select **Ellerslie** from the Chain pulldown list.
7. **Right mouse-click** anywhere within the Bridge tree list. Select **New**> **Item**.

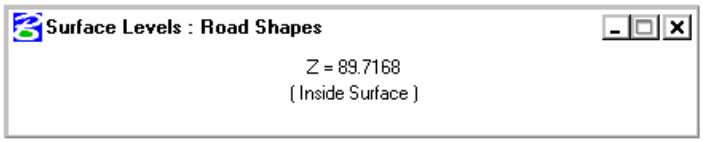
8. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Road Shapes"**.
9. Click **OK** to proceed.



Surface Manager Dialog shown

10. Select the **Display Z Levels** tool to browse Z Levels of the selected surface.

Hint Move the cursor over the surface selected in the list and the corresponding elevations are displayed in the Surface Levels dialog.

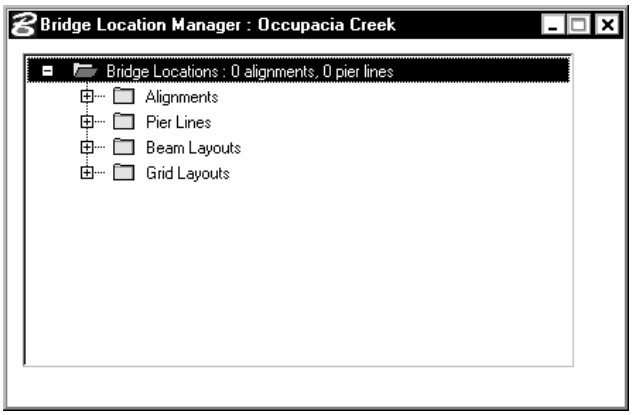


11. Close the **Surface Levels** and the **Surface Manager** Dialog boxes.

CREATE/MANAGE BRIDGE LOCATION (ALIGNMENTS, PIER LINES, BEAM LAYOUTS AND GRIDS)

When the **Bridge Location Manager** tool is selected the Bridge Location Manager dialog appears.

After a Bridge is created, folders for Alignments, Pier Locations, Beam Layouts and Grid Lines appear in the Bridge Location Manager. The Bridge Location Manager displays a tree view of these folders. The Bridge Location Manager dialog expands automatically when the alignments or pier lines folder are selected.



Bridge Location Manager and Folders shown

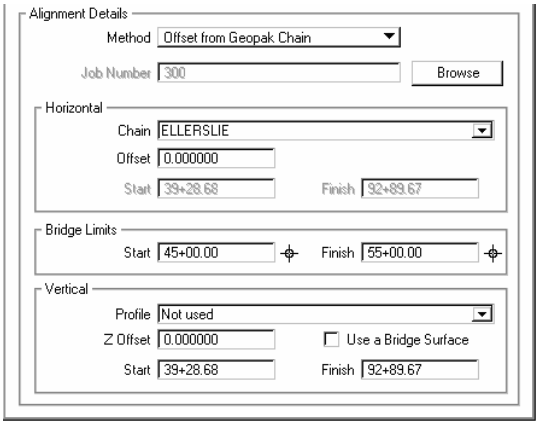
CREATE BRIDGE ALIGNMENTS

Five alignments are created to define the Left Edge, Right Edge, Baseline of the Bridge, Left Face of Curb and the Right Face of Curb.

Create Bridge Alignment "Ellerslie Ave." (Bridge Baseline)

TOOL / OPTION	DESCRIPTION
	Bridge Location Manager

1. Select the **Bridge Location Manager** tool from the GEOPAK Bridge tools palette.
2. Select the **Alignments** folder. The dialog expands.



Expanded portion of the dialog shown

Under the Alignment Details group box:

3. Select **Offset from GEOPAK Chain** from the Method pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\ELLERSLIE AVE**.
5. Select **Job300.**

Under the Horizontal group box:

6. Select **Ellerslie** from the Chain pulldown list.
7. Enter Offset **0.00**

Under the Bridge Limits group box:

8. Select the **Indicate Start Limit** tool. Indicate a Data Point just inside the beginning of the Shapes. If you wish type **45+00.00** (or 4500.00) in the Start key-in field.
9. Select **the Indicate Finish Limit** tool. Indicate a Data Point just inside the end of the Shapes. If you wish type **55+00.00 (or 5500.00)** in the Finish key-in field.
10. Under the Vertical group box, select **Not used** from the Profile pulldown list
11. **Right mouse-click** anywhere within the Bridge tree list**.** Select **New > Item**.
12. The **Name and Description Editor: Alignment** dialog appears. Enter Name "**Ellerslie Ave**."
13. Click **OK** to continue.

Set Alignment as Baseline

TOOL / OPTION	DESCRIPTION
	Set alignment as Baseline

1. Under the Alignments folder, select the **Ellerslie Ave** icon.
2. Select the **Set alignment as Baseline** tool.

Create Face of Curbs Alignments

Create the Right and Left Face of Curb. For Method, select **Offset from Baseline**. The only change required is the offset value as shown in table below.

Note Prior to creating an Alignment, set the Method and Offset

1. Under the Alignment Details group box, select **Offset from Baseline** from the Method pulldown list
2. Under the Horizontal group box, change the **Offset** as indicated in table below.
3. Select the **Create Alignment** tool.
4. The **Name and Description Editor: Alignment** dialog appears.
5. Enter **Name** of Alignments are as Indicated in table below.
6. Click **OK** to proceed
7. Repeat the same process to create the remaining alignments shown below.

Alignment Name	Method	CHAIN/Alignment/Baseline	Offset (+ or -)
Left Face of Curb	Offset from Baseline	Default to Bridge Baseline	-30.00
Right Face of Curb	Offset from Baseline	Default to Bridge Baseline	30.00

Create the "C/L Railroad" Alignment

Create the C/L Tracks Alignment. This alignment can be used when creating a Pier Line (Intersect Alignment method) at the intersection of the Bridge Baseline and the intersecting alignment.

1. Under the Alignment Details group box, select **Offset from GEOPAK Chain** from the Method pulldown list.

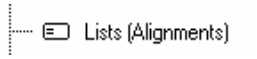
Under the Horizontal group box:

2. Select **RAILROAD** from the Chain pulldown list.
3. Check that the Offset is set to **0.00**.
4. Select the **Create Alignment** tool.
5. The **Name and Description Editor: Alignment** dialog appears.
6. Enter Name **"C/L Railroad"**. Click **OK** to proceed.

Create Alignment List "Face of Curbs and Baseline"

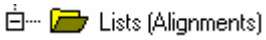
This concept allows for creating groups of alignments. In this exercise an alignment list **Face of Curbs and Baseline** is created. The List is later included in the calculation for Deck Elevations.

1. Select the **List (Alignments)** icon.

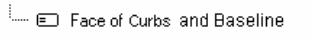


2. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
3. The **Name and Description Editor: List of Alignment** dialog appears.
4. Enter Name **Face of Curbs and Baseline**. Click **OK** to proceed.

Note A Folder **Lists (Alignments)** and **Face of Curbs and Baseline** icons are automatically created.



5. Select the **Face of Curbs and Baseline** icon.



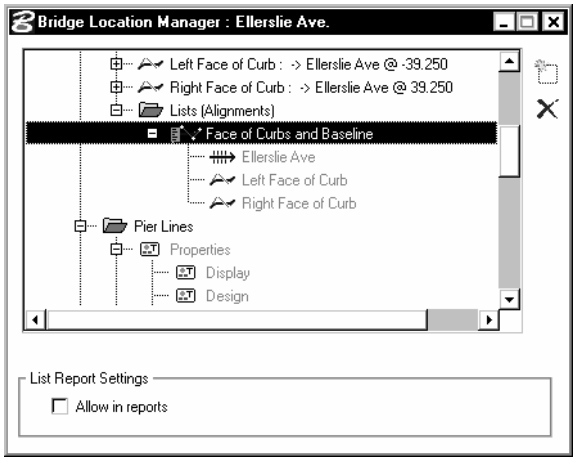
6. Right mouse-click anywhere within the Bridge tree list. Select **Lists** > **Add All**.

Note Since all created Alignments are added to the list, alignments that do not describe a Face of Curb or the Baseline should be deleted.

7. Expand the Tree for this List. Click the **Plus Sign** icon.

Note The **Delete** tool is also available for selection in the right side of the dialog.

8. Remove the **C/L Railroad** alignments from the list using the same procedure.



Alignment List "Face of Curbs and Baseline" shown

CREATING PIER LINES AND BEARINGS LINES IN THE BRIDGE LOCATION MANAGER

There are several methods available to locate a Pier Line:

- By **Station and Skew angle** (the Skew Angle can be in degrees, or enable the **DMS** option to define the Skew in degrees, minutes and seconds-space between degrees, minutes and seconds is required)
- By Station and Bearing
- By Station and Azimuth
- By Alignment Intersection
- By selecting an Existing Pier
- By Picking two Points
- By Picking Elements (MicroStation lines)

At each Pier Line location, Bearing Line Data back and ahead of the pier line is defined by entering offset values (normal distances) to the pier line and by the selecting the bearing type - Expansion or Fixed support.

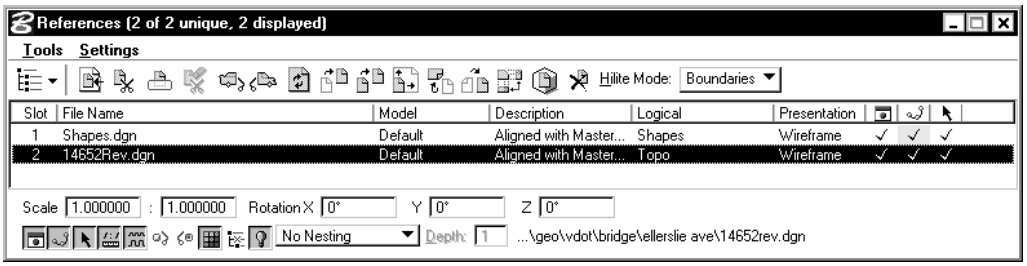
The first pier line that needs to be defined is the Interior pier so it can be used as a reference to create the locations and directions of Abutment A and Abutment B. In this exercise, the Topo.dgn file shows the local conditions and is used in determining the preliminary location and skew angle of the interior pier.

The location and direction of the Interior Pier is first defined by drawing a MicroStation line running through the middle of the Creek. The MicroStation line element is then analyzed by Bridge to create the preliminary pier line.

When the pier line is located, you can review the Station, Skew, Bearing, Azimuth data, using the **Bearing/Azimuth/Skew/DMS Display Mode** tool. You can also change the Station, or Skew, or Bearing values as required and select the Update Pier Line tool to finalize the changes to the Pier Line location.

Prepare Reference File "14652Rev.dgn" (Topo file)

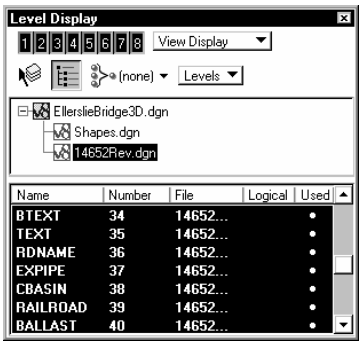
1. Select the **References** tool. Locate it in the MicroStation Primary Tools.
2. Select **Attach Reference** tool.



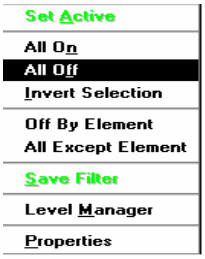
3. Select the file **C:\DATA\GEO\VDOT\BRIDGE\ELLERSLIE AVE\14652Rev.dgn**
4. Enter Logical Name **Topo.**
5. Click **OK**.

Prepare Level Display

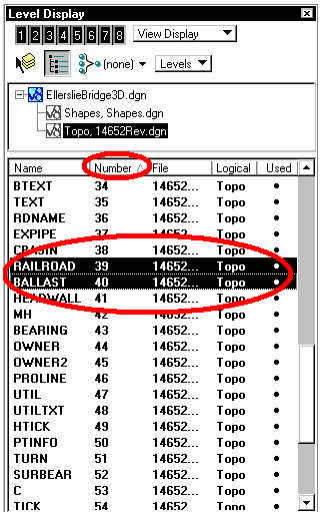
1. Select the MicroStation **Display Level** tool.



2. Select the **14652Rev.dgn** icon as shown above.
3. **Right mouse-click** anywhere within the Level Display list. Select option **All Off.**



4. **Turn On** Levels **Ballast** and **Railroad** by locating them in the Display list and highlighting the Level.



5. **Close** the Level Display dialog box.

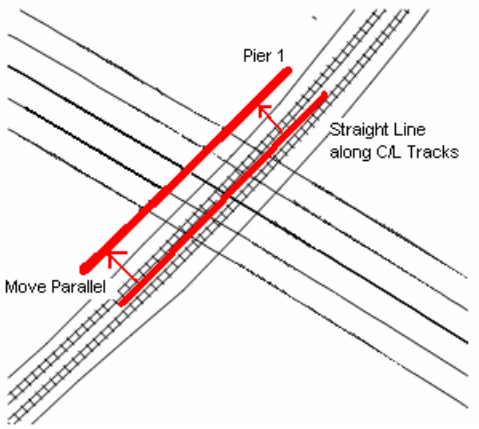
CREATE “PIER 1”

The purpose of this exercise is to create a Bridge Pier line from an existing MicroStation line.

Create Preliminary Location of Interior ” Pier 1”

1. **Draw a straight Line** that approximates the C/L of the tracks near the vicinity of the intersection of the Bridge Baseline and the C.L. of the Railroad tracks.

Note In this step, a line has been already drawn for uniformity of the Class. **Turn On Level 46**.



2. **Move** the line **Parallel 38.0 ft** towards the left side. As shown above.

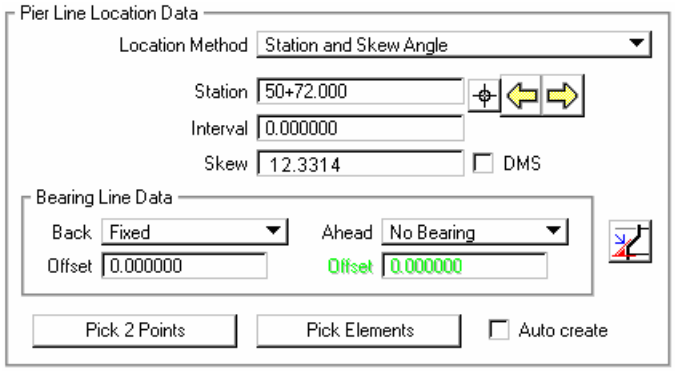
Note This line is located at 38.0 ft to comply with design Clearance requirements.

3. Select the **Pier Lines** folder. The dialog expands.

Under Pier Lines Location data group box:

4. Select **Station and Skew Angle** from the Location Method pulldown list.
5. Click **Pick Elements**.
6. Select the MicroStation Line. **Accept** the selection.
7. Select the **Create new Pier Line** tool.
8. The **Name and Description Editor: Pier Line** dialog appears. Enter Name **Pier 1.** Click **OK** to continue.
9. Under the Pier Line Location Data group box, change the station value to **50+72.00**.

Note Assume you decide that for this example, the **Station** was **50+72.00**.



Define Bearing Line Data

Under the Bearing Line Data group box:

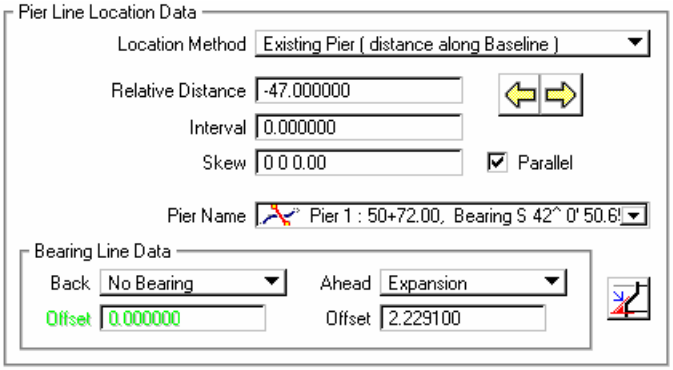
1. Select **Fixed** from the Back pulldown list.
2. Enter Offset **0.0**.
3. Select **No Bearing** from the Ahead pulldown list.
4. Select the **Modify Pier Line** tool to update the changes.

CREATE “ABUTMENT A”

Create Pier Line “Abutment A” Pier Line

It is decided “Abutment A” is to be located **47 ft** along the baseline from Pier 1. Use the Existing Pier option.

Under Pier Lines Location Data group box:



1. Select **Existing Pier (distance along Baseline)** from the Location Method pulldown list.
2. In the **Relative Distance** key-in field, enter **-47 ft**.
3. Enable the **Parallel** option (parallel to existing pier).

Note Enabling the Parallel option forces the Skew key-in field value to change to zero. The Skew value in this situation specifies an additional skew added to that of the Existing Pier.

4. Select **“Pier 1”** icon from the Pier Name pulldown list.

Define Bearing Line Data

Under the Bearing Line Data group box:

1. Select **No Bearing** from the Back pulldown list.

Note The Offset value defaults to zero.

2. Select **Expansion** from the Ahead pulldown list.
3. Enter **Offset 2.2291 ft** for Ahead (this corresponds to the offset of 2’-3 ¼” adjusted normal to the End of Slab).
4. Select the **Create new Pier Line** tool.
5. The **Name and Description Editor: Pier Line** dialog appears.
6. Enter Pier Name **Abutment A**.
7. Enter Description **End of Slab**. Click **OK** to continue.

8. Select the **Bearing/Azimuth/Skew/DMS Display Mode** tool to set the display view to Bearing, Azimuth, Skew, or DMS.

Note Select the **Bearing/Azimuth/Skew/DMS Display Mode** tool and click several times. Notice in the dialog tree next to each pier name, the value changes each time the **Bearing/Azimuth/Skew/DMS Display Mode** tool is selected.

CREATE REMAINING PIER LINES

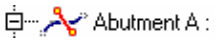
Create Pier Lines for "Pier 2" and "Abutment B"

Proceed to create "Pier 2" and "Abutment B" pier lines using the information shown in the table below. Note that the Stations are measured along the Baseline. "Pier 2" is to be located **76.0 ft**. from "Pier 1" and "Abutment B" is to be located **123.0 ft.** from Pier 1.

The only changes required are the Relative distance and the Bearing Line Data.

Pier Line Name	Pier 2	Abutment B
Pier Location Method	Existing Pier (distance along Baseline)	Same as for Pier 2
Relative Distance	76 ft	123 ft
Bearing Back type	Expansion	Expansion
Bearing Back Offset	0.0	2.2291
Bearing Ahead type	No Bearing	No Bearing
Bearing Ahead Offset	0.0	0.0
Pier Description	-	End of Slab

1. Select existing pier **Abutment A** icon.



2. Under the Pier Line Data group box, change the **Relative Distance.**
3. Under the Bearing Line Data group box, change the **Bearing Line Data**.

4. Select the **Create new Pier Line** tool.
5. The **Name and Description Editor: Pier Line** dialog appears.
6. Enter Pier **Name**.
7. Click **OK** to continue.
8. Repeat these steps to create the additional pier lines.

CREATE LONG CHORD, LEFT EDGE AND RIGHT EDGE ALIGNMENTS

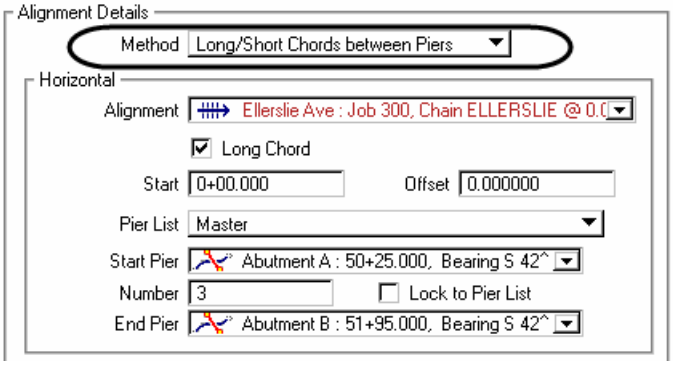
From the previous exercise, you created the Abutment A and Abutment B pier lines. Now it is possible to create the Long Chord, Left Edge and Right Edge alignments, using the **Long/Short Chords between piers method**. The Left Edge and Right Edge alignments are parallel to the Long Chord.

The Long Chord alignment is required later in this example, to review the angle between the Long Chord and Pier 1 center line.

Create the Long Chord Alignment

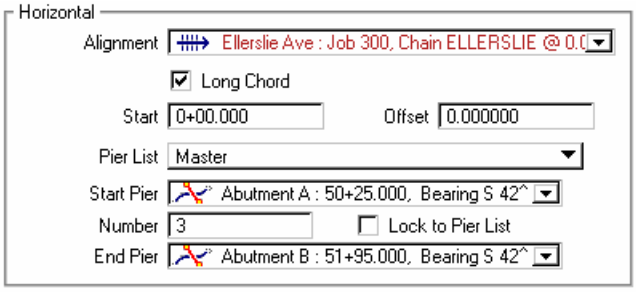
1. Select the **Alignments** folder.

Under the Alignment Details group box:



2. Select **Long/Short Chord between Piers** from the Method pulldown list.

Under the Horizontal group box:



3. Select **Ellerslie Ave** Alignment from the pulldown list.
4. Enable the **Long Chord** option.
5. Check that the Offset is set to **0.0**.
6. Select **Abutment A** icon from the Start Pier pulldown list.
7. Select **Abutment B** icon from the End Pier pulldown list.

8. Select the **Create Alignment** tool.
9. The **Name and Description Editor: Alignment** dialog appears.
10. Enter Name "**Long Chord"**.
11. Click **OK** to proceed.

Create the Deck Left and Right Edge Alignments.

1. Select the **Alignments** folder.
2. Under the Alignment Details group box, select **Long/Short Chord between Piers** from the Method pulldown list.

Under the Horizontal group box:

3. Select **Ellerslie Ave** Alignment from the pulldown list.
4. Enable the **Long Chord** option.
5. Enter the **Offset** as shown in Table below.
6. Select **Abutment A** from the Start Pier pulldown list.
7. Select **Abutment B** from the End Pier pulldown list.

8. Select the **Create Alignment** tool.
9. The **Name and Description Editor: Alignment** dialog appears.
10. Enter **Name** of Alignment as shown in Table below.
11. Click **OK** to proceed.
12. Repeat the same process to create the remaining alignments shown in the table below.

Alignment Name	Method	Offset (+ or -)
Left Edge	**Long/Short Chord between Piers**	-39.2500
Right Edge	**Long/Short Chord between Piers**	39.2500

REVIEW ANGLE BETWEEN LONG CHORD AND PIER 1 CENTER LINE

As previously stated, the original design of this example used the Long Chord procedure to define the skew angle of the first pier. Therefore, pier lines must be created before the **Long/Short Chord between Piers** method is used.

This process is an iterative one. In the preliminary stage, after the first pier is located, Abutment A, Pier 2 and Abutment B are first located. With the station of the piers finalized, you can proceed to review the angle between Pier 1 and the Long Chord and make the final determination on the skew angle of Pier 1.

Assume you decide the angle between the Chord and Pier 1 is to be rounded off.

Use the MicroStation **Measure Angle Between Lines** tool to measure the angle between the Long Chord and Pier 1 centre line.

Check Angle Between the Long Chord and "Pier 1" Center Line

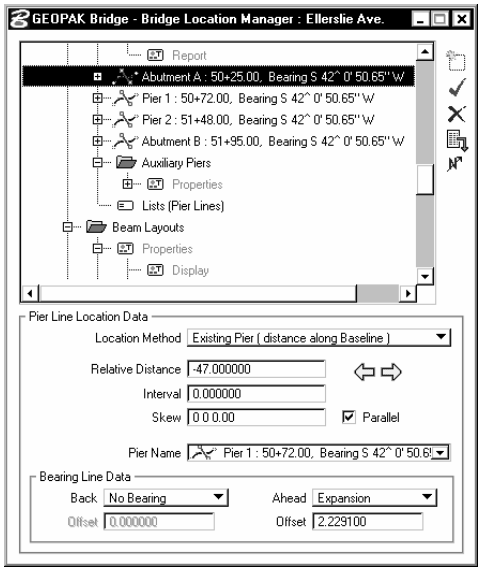
1. Select the **MicroStation Measure Angle Between Lines** tool. Select the Long Chord and Pier 1 center line elements.

Note The angle between the Chord and the pier line reads 77^ 53' 39". Subtracting 90^ from 77^ 53' 39" equals 12^ 6' 21" (which is the skew angle between the Long Chord and the Pier Line). Therefore, the bearing direction of "Pier 1" needs to be adjusted by 1^ 6' 21" thereby maintaining an 11^ difference.

2. Select **Pier 1** icon from the Bridge tree list.
3. Under the Pier Location Data group box, change the Skew value to 11^ 13' 32.04".

Note Under the Pier Lines Location Data, the skew angle reads 12^ 19' 53.04". Subtract 1^ 6' 21" from 12^ 19' 53.04" equals to 11^ 13' 32.04". This value is the final Skew Angle of Pier 1. Since the Abutment A, Pier 2 and Abutment B were located based on Pier 1, their skew angles will update automatically.

4. Select the **Modify Pier Line** tool to update the changes. The Bridge Location Manager should appear as follows.



5. Select the **Update the Bridge Drawing** tool. Locate it in the Bridge Drawing Update tools.

CREATING BEAM LAYOUTS AND BEAM LINES

CREATE BEAM LAYOUTS FOR "BEAMS SPAN A THRU C"

Girders are continuous and beam lines are parallel to the Long chord.

Create Layout for "Beams Span A thru C"

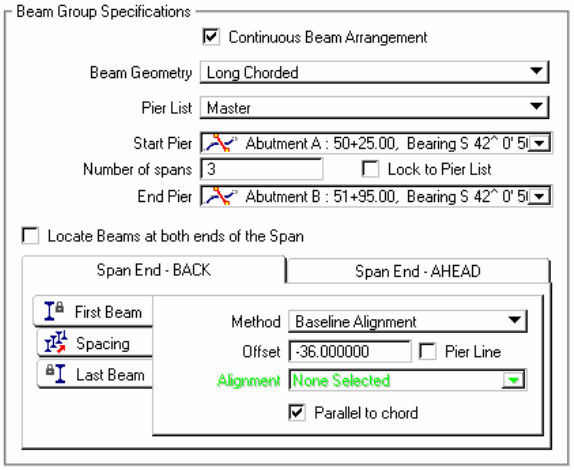
1. Select **Beam Layouts** folder.
2. Select the **Create Beam Line** tool.
3. The **Name and Description Editor: Beam Layout Group** dialog appears.
4. Enter Name "**Beams Span A thru C"**. Click **OK** to continue

CREATE BEAM LINES FOR "BEAMS SPAN A THRU C"

Define the First Beam

1. Select beam layout **Beams Span A thru C** icon. The dialog expands.

Under the Beam Group Specifications group box:



2. Enable the **Continuous Beam Arrangement** option.
3. Select **Long Chorded** from the Beam Geometry pulldown list.
4. Select **Abutment A** icon from the Start Pier pulldown list.
5. Select **Abutment B** icon from the End Pier pulldown list.
6. Click **First Beam** tab to define the First Beam.
7. Select **Baseline Alignment** from the Method pulldown list.

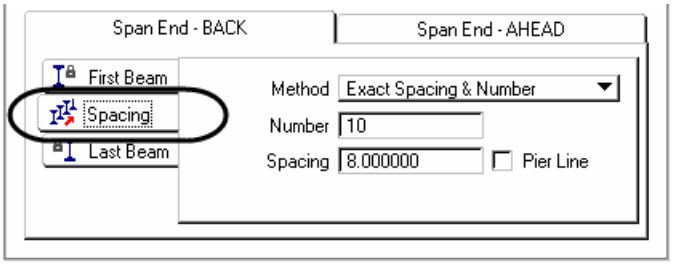
Note In this example, all the beams are placed parallel to the Long Chord of the baseline at a zero offset. Therefore, you MUST enable the Parallel to Chord option.

8. Change **Offset** to **-36.0 ft**
9. Under the First Beam tab, enable the **Parallel to chord** option.

Note It is not necessary to define the Last Beam when all beams are parallel to each other. Under the Spacing tab, select method **Exact Spacing and Number**. The Spacing can be a negative value, indicating beams are spaced towards the left of the first beam. Other options are available as discussed in earlier chapters.

Define the Beam Spacing

10. Click the **Spacing** tab to define the Beam Spacing.



11. Select Method **Exact Number and Spacing**.
12. Enter Number **10** in the Number field.
13. Enter Spacing **8.0** in the Spacing field.
14. Select the **Modify Beam Line** tool to update the changes.

Note Beams appear in the design file. They are parallel to each other.

SET GRID LAYOUTS PROPERTIES

Different properties options are available to Display, Design and Reporting Grid Layouts.

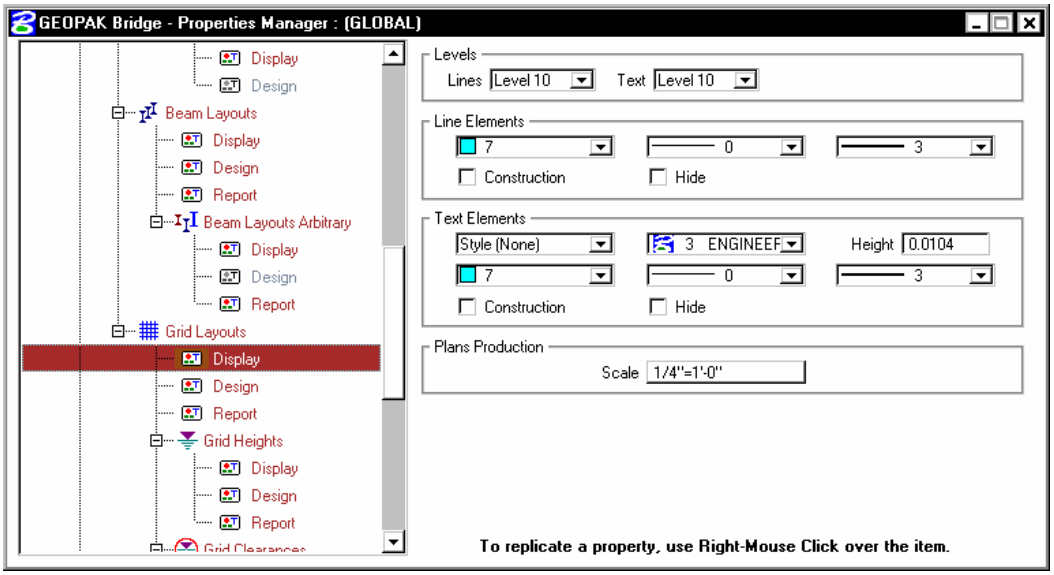
Set or Review Grid Layouts Display Properties

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.

Note The properties shown in the GEOPAK Bridge – Properties Manager dialog are from the default properties stored in the default template. The default values are automatically transferred from the default template to the current project when a Bridge Database is created.

2. Under Bridge Locations select **Grid Layouts** icon. Under Grid Layouts select the **Display** icon. The dialog changes as shown below.

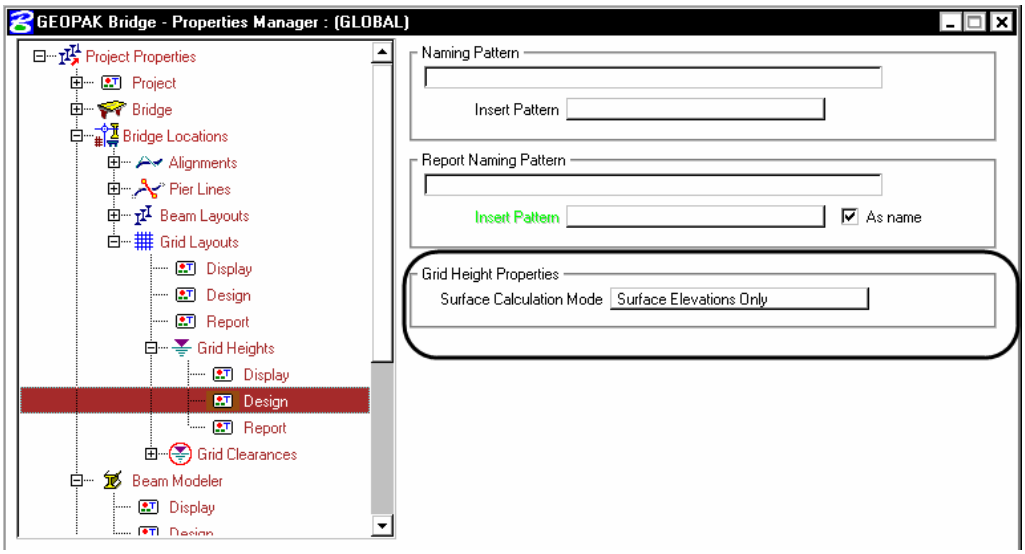
Hint Notice that the Project Properties tree can be collapsed and expanded by clicking on the **+** or **–** icons. You can use the vertical scroll bar to browse the tree.



The defaults settings under Levels, Line Elements, Text Elements and Plans Production should be the same as the ones shown above.

Set or Review Grid Layouts Grid Heights Design Properties

1. Under Bridge Locations icon select the **Grid Heights** icon > **Design** icon. The dialog changes as shown below.



2. Check that under the Grid Height Properties, the **Surface Elevations Only** from the Surface Calculation Mode pulldown list is selected.

3. Click the **X** top right corner to close the dialog.

CREATE GRID LAYOUTS AND GRID LINES FOR BEAMS

One Grid layout Group is created in this exercise. The Elevations shown in the pictures depicted below were extracted from existing plans.

Point	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
Beam A	83.29	83.47	83.64	83.80	83.94	84.07	84.25	84.40	84.51	84.57	84.60	84.59	84.57	84.54	84.50	84.44
Beam B	83.42	83.61	83.78	83.94	84.08	84.21	84.40	84.55	84.66	84.73	84.76	84.76	84.74	84.71	84.67	84.61
Beam C	83.55	83.74	83.92	84.08	84.22	84.36	84.55	84.71	84.82	84.89	84.93	84.93	84.91	84.89	84.85	84.79
Beam D	83.68	83.87	84.05	84.22	84.37	84.50	84.70	84.86	84.98	85.05	85.09	85.10	85.08	85.06	85.02	84.97
Beam E	83.81	84.01	84.19	84.35	84.51	84.64	84.85	85.01	85.13	85.22	85.26	85.26	85.25	85.23	85.19	85.14
Beam F	83.77	83.97	84.15	84.32	84.47	84.61	84.81	84.98	85.11	85.19	85.24	85.25	85.25	85.23	85.20	85.15
Beam G	83.57	83.77	83.95	84.12	84.28	84.42	84.63	84.80	84.93	85.02	85.07	85.08	85.08	85.07	85.04	84.99
Beam H	83.37	83.57	83.75	83.92	84.08	84.23	84.44	84.62	84.75	84.85	84.90	84.92	84.92	84.90	84.88	84.84
Beam I	83.16	83.37	83.55	83.73	83.89	84.04	84.26	84.43	84.57	84.67	84.73	84.75	84.75	84.74	84.72	84.68
Beam J	82.96	83.16	83.35	83.53	83.70	83.84	84.07	84.25	84.39	84.50	84.56	84.58	84.59	84.58	84.55	84.52

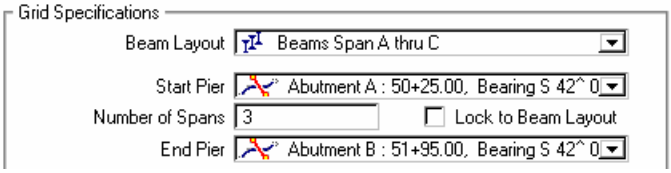
TOP OF SLAB ELEVATIONS ALONG ℄ BEAMS
(Elevations shown at fifth points along each span)

Create Grid Layout for "Spans A thru C"

1. Select the **Grid Layouts** folder in the Bridge Location manager.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name "**Spans A thru C"**. Click **OK** to proceed.

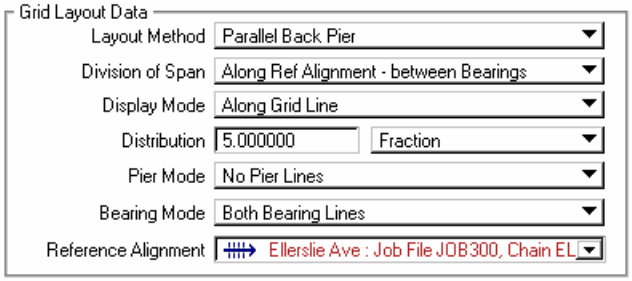
Create Grid Lines for "Spans A thru C"

1. **Select** the Grid Layout **Spans A thru C** icon. The dialog expands.
2. Under the Grid Specifications group box, select **Beams Span A thru C** from the Beam Layout pulldown list.



Note Notice that under the Grid Specifications the Start Pier, Number of Spans and End Pier are automatically selected. The information was extracted from the data that was used when the Beam Layout Spans A thru C was created

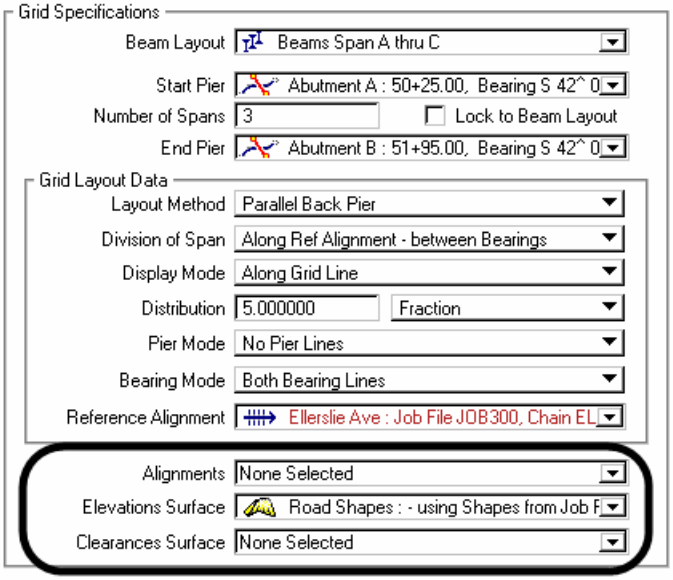
Under the Grid Layout Data group box:



3. Select **Parallel Back Pier** from the Layout Method pulldown list.
4. Select **Along Ref Alignment - between Bearings** from the Division of Span pulldown list.

5. Select **Along Grid Line** from the Display Mode pulldown list.
6. Enter Distribution **5** and select **Fraction** from the Distribution pulldown list.
7. Select **No Pier Lines** from the Pier Mode pulldown list
8. Select **Both Bearing Lines** from the Bearing Mode pulldown list.
9. Select **Ellerslie Ave** from the Reference Alignment pulldown.

At the bottom of Grid Specifications box:



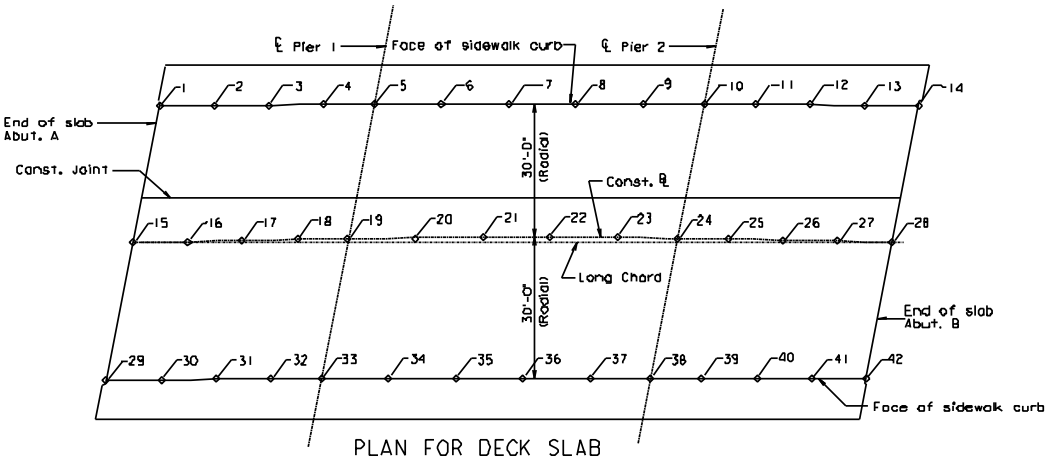
10. Select **None Selected** from the Alignments pulldown list.
11. Select **Road Shapes** from the Elevation Surface pulldown list.
12. Select the **Modify Grid** tool to update the changes.

Note Elevations are now calculated and drawn in the DGN file. If Elevation values are not displayed, execute a Fit View of the MicroStation window.

CREATE GRID LAYOUTS AND GRID LINES FOR “FACE OF CURBS AND BASELINE”

In this exercise, Faces of Curb are divided in four equal spaces between Pier Lines at Span A and C, and five equal spaces in Span B.

One Grid layout Group is created in this exercise. The Second span needs to be modified since the number of Grid lines is different than in the exterior spans.



PLAN FOR DECK SLAB ELEVATIONS

DECK ELEVATIONS					
Point	Elevation	Point	Elevation	Point	Elevation
1	83.34	15	83.82	29	83.06
2	83.58	16	84.08	30	83.33
3	83.80	17	84.32	31	83.57
4	84.00	18	84.53	32	83.80
5	84.17	19	84.71	33	84.00
6	84.36	20	84.92	34	84.22
7	84.51	21	85.08	35	84.40
8	84.62	22	85.20	36	84.54
9	84.69	23	85.29	37	84.64
10	84.71	24	85.33	38	84.70
11	84.71	25	85.34	39	84.71
12	84.68	26	85.32	40	84.71
13	84.63	27	85.28	41	84.68
14	84.55	28	85.22	42	84.63

Table from existing plans shown

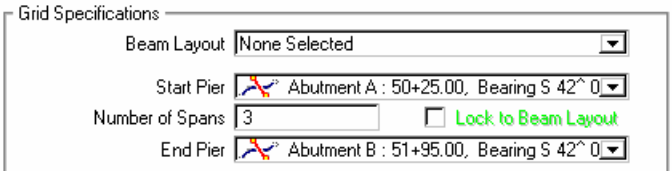
Create Grid Layout for “Face of Curbs and Baseline”

1. Select the **Span A thru C** icon under the Grid Layouts folder. The information is used as basis to create a new layout.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name **Face of Curbs and Baseline**.
5. Click **OK** to proceed.

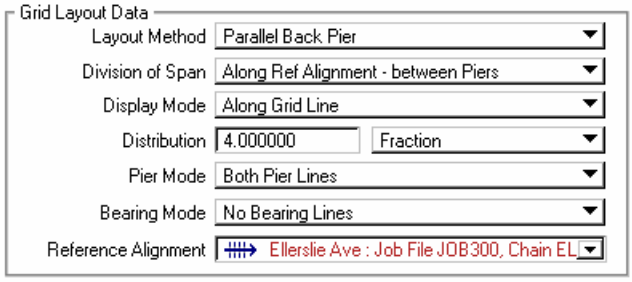
Create Grid Lines for “Face of Curbs and Baseline”

The grid layout **Face of Rails and Baseline** icon is automatically highlighted and the dialog remains expanded. Few changes are required here.

1. Under the Grid Specifications group box, select **None Selected** from the Beam Layout pulldown list.



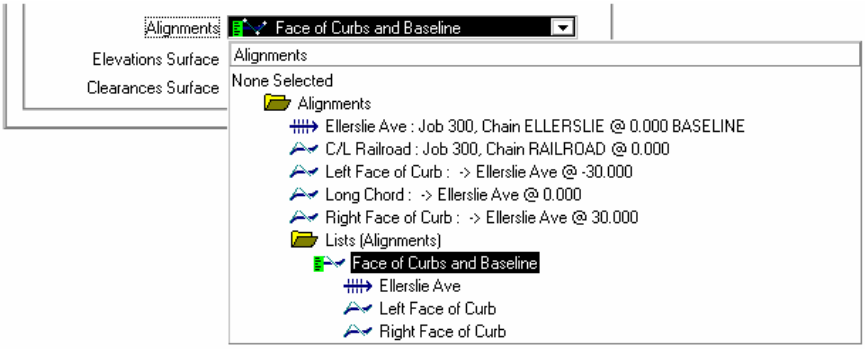
Under the Grid Layout Data group box:



2. Select **Along Ref Alignment - between Piers** from the Division of Span pulldown list.
3. Enter Distribution **4**.
4. Select **Both Pier Lines** from the Pier Mode pulldown list.
5. Select **No Bearing Lines** from the Bearing Mode pulldown list.

Under the Grid Specifications group box:

6. Select **Face of Curbs and Baseline** icon from the Alignments pulldown list as shown below.



7. Select the **Modify Grid** tool to update the changes.

Note Automatically, the Elevations are calculated and drawn in the DGN file. Notice Span B has only four Grid lines. In this exercise, Span B requires 5 equal spaces.

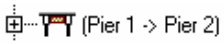
MODIFY A GRID LAYOUT WITHIN A SPAN

Modify the Interior Grid Layout in Span B between Pier 1 to Pier 2

This exercise is to modify the second span Grid distribution by using the **Use local Grid specifications at this span** option.

1. Select **Face of Curbs and Baseline** icon.

2. Expand the Tree for this Grid by Clicking the **Plus Sign** icon.
3. Under the **Face of Curbs and Baseline** icon, select **[Pier 1 -> Pier 2]** icon (the second span).



4. Under the Grid Specifications group box, enable the **Use local Grid specifications at this span** option.
5. Under the Grid Layout Data group box, enter Distribution **5**.

6. Select the **Modify Grid** tool to update the changes**.**

CREATE REPORTS

For more information refer to REPORTS in Chapter 1 or in the On-Line Help MICROSTATION **(Applications>GEOPAK>BRIDGE>Help)**.

REPORTS MANAGER

The Report Manager is used to manage the output of Text, CSV and XML files. It is also used to manage the updating, deleting, re-sequencing and displaying of reports

PROCEDURE

Reports are created by using both the **Properties Manager** and the **Reports Manager**.

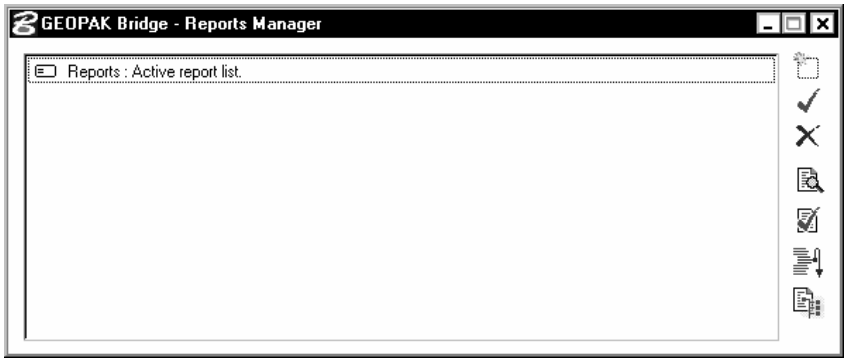
1. The Reports Manager is where output files are managed.
2. The Properties Manager tool is where reports are activated and where Report Templates are selected.

REPORTS MANAGER

The Report Manager is used to manage the output of Text, CSV and XML files. It is also used to manage the updating, deleting, re-sequencing and displaying of reports.

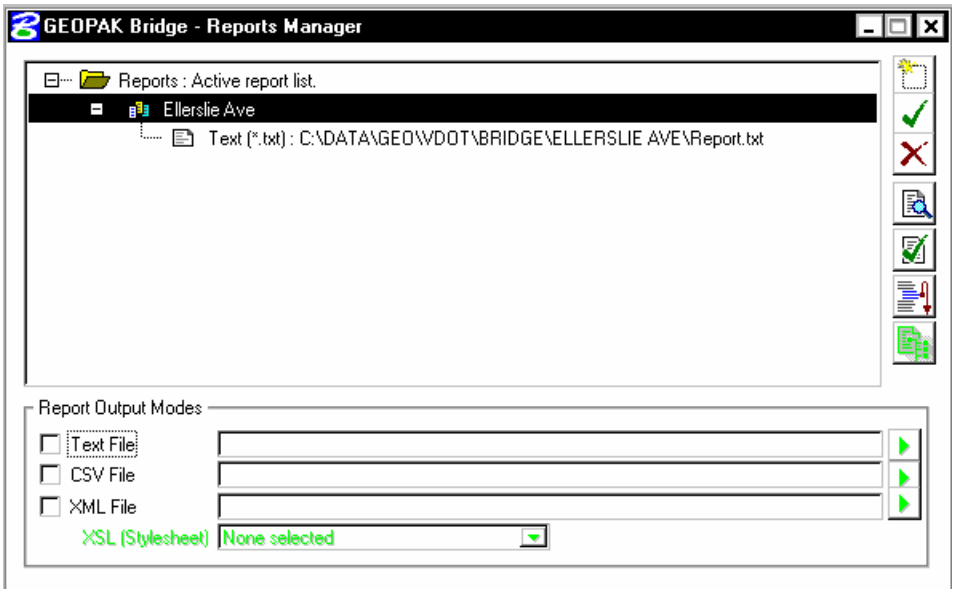
Create a Report Set

1. Select the **Reports Manager** tool from the GEOPAK Bridge tools palette. The GEOPAK Bridge – Reports Manager dialog appears.

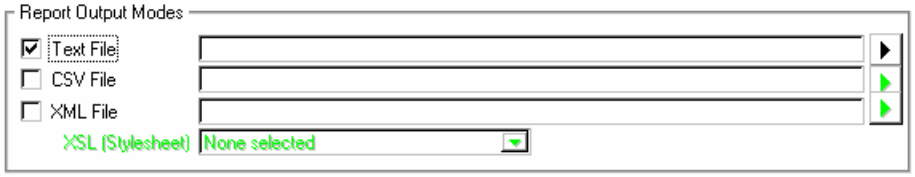


2. Select the **Create Reports Set** tool.
3. The Name and Description Editor: Bridge Component dialog appears. Enter Name "**Ellerslie Ave.**".
4. Click **OK** to proceed.

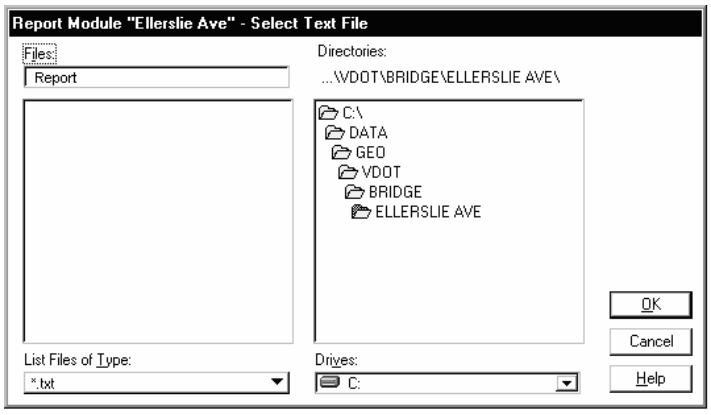
5. Select the **Ellerslie Ave** icon. The dialog expands.



6. Under Report Output Modes, enable the **Text File** option.

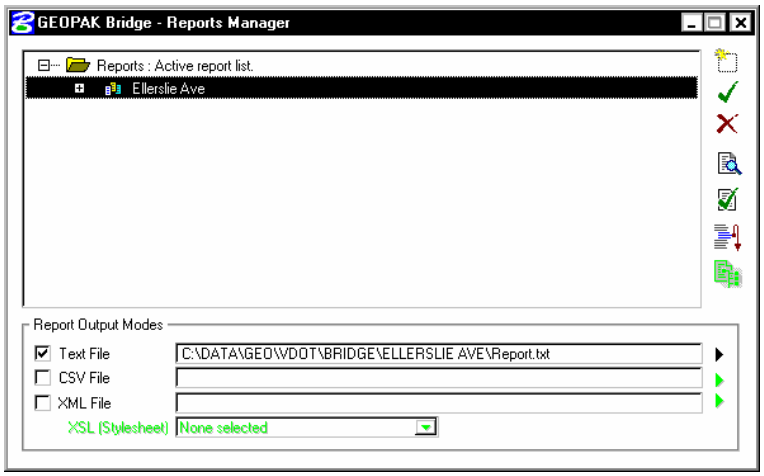


7. Select the **Select Text File** tool. The default directory appears. Under Files enter **"Report"**.



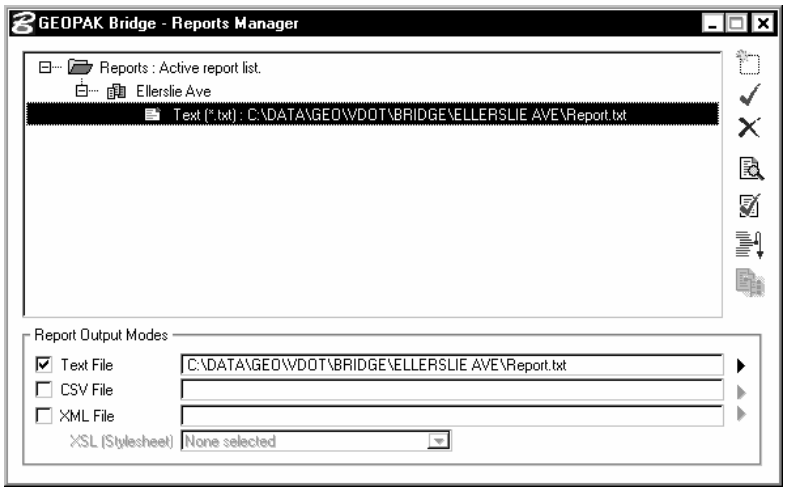
8. Click **OK** to continue.

9. Select the **Modify Reports Set** tool to update the changes.



10. Expand the **Ellerslie Ave.** tree. Select the Text icon as shown below:

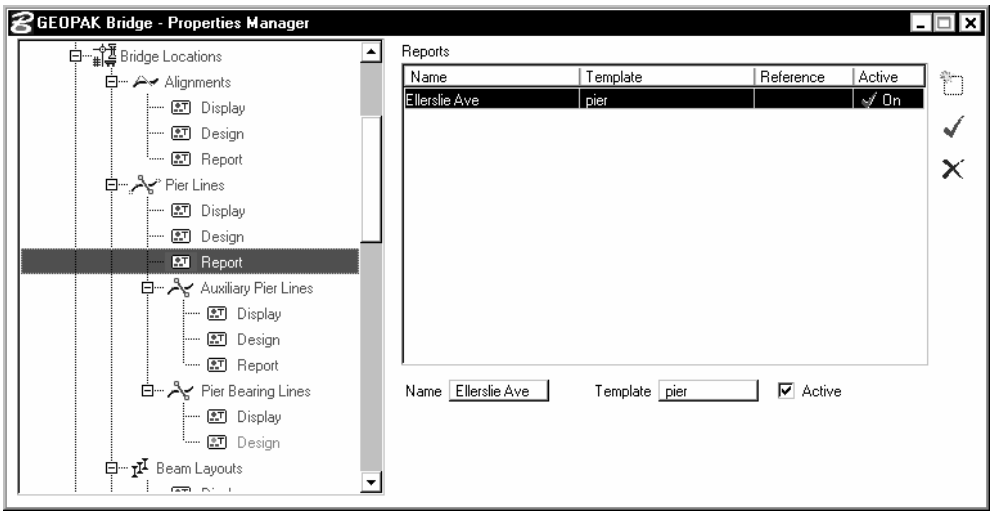
Warning **DO NOT CLOSE THE REPORTS MANAGER DIALOG**. We need to proceed with the Properties Manager to enable the reports properties.



ACTIVATE REPORTS IN THE BRIDGE PROPERTIES

Activate Pier Lines Report

1. Select the **Properties Manager** tool from the GEOPAK Bridge tools palette.
2. Under the Bridge Locations icon, select the **Pier Lines** icon.
3. Under the **Pier Lines** icon select the **Reports** icon



Global Bridge Properties dialog shown

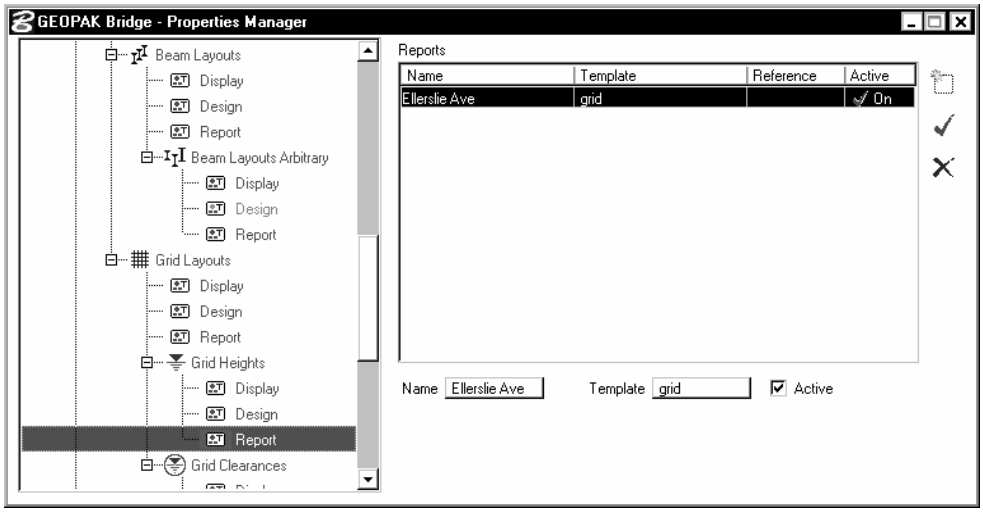
4. Under Reports window, select **Ellerslie Ave** from the Name pulldown list.
5. Select **Modify Report** tool from the right side of the dialog.

Activate Grid Layouts Report

1. Under the Grid Layouts icon, select the **Reports** icon.
2. Under the Reports window, select **Ellerslie Ave** from the Name pulldown list.
3. Select **Modify Report** tool.

Activate Grid Heights Report

1. Under the **Grids Heights** icon, select the **Report** icon.
2. Under Reports window, select **Ellerslie Ave** from the Name pulldown list.
3. Select **Update Report** tool.



Report activated for Grid Heights shown

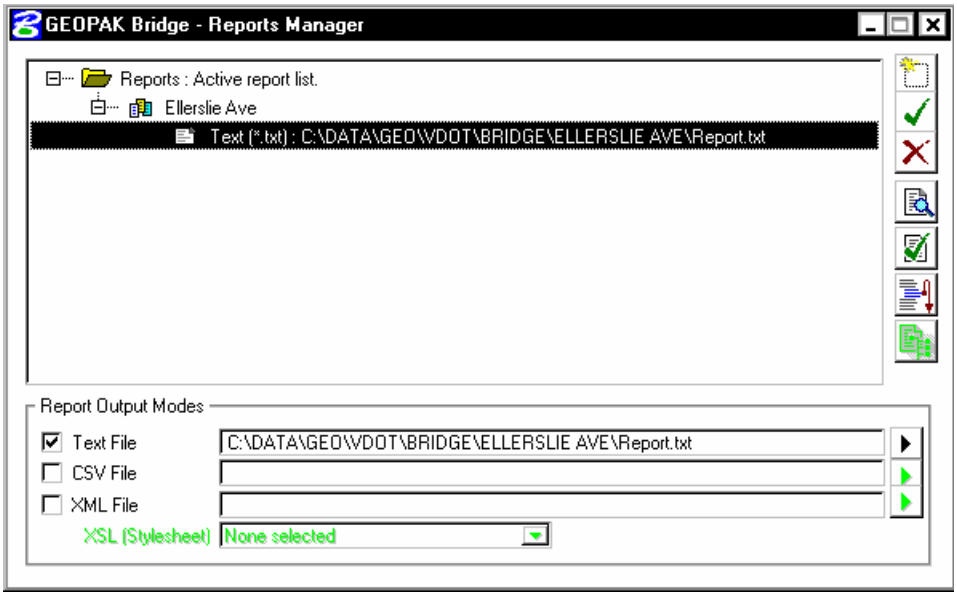
4. **Close** the Bridge Properties dialog.

UPDATE REPORT

When reports are activated in the Bridge Properties dialog, the Report Manager processes the report.

Update Report

1. Proceed to locate the Reports Manager dialog.



2. Select the **Update Report** tool. Wait for processing.

Note The report is automatically displayed. To view the report at any time, select the Display Report tool.

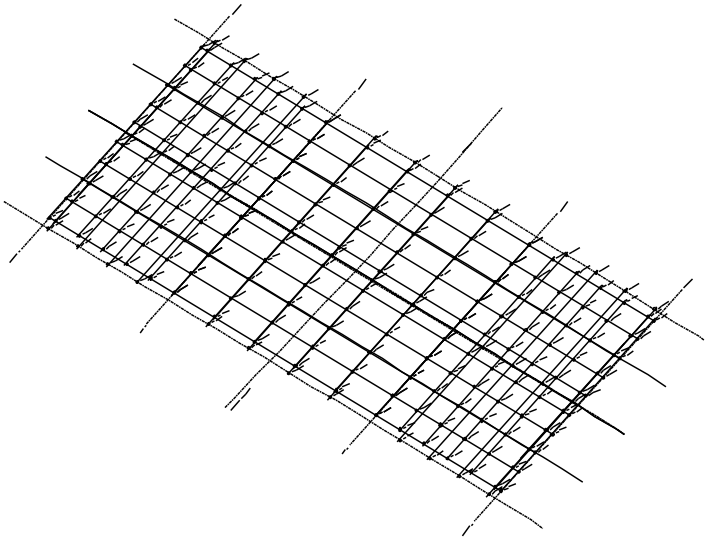
The Grid report is partially shown below.

Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Grid No.1	(Located at Bearing)					
Beam A	3599567.457	342730.341	83.283	50+34.55	-35.922	84.030
Beam B	3599562.002	342724.286	83.415	50+32.94	-27.934	83.996
Beam C	3599556.548	342718.231	83.545	50+31.32	-19.947	83.961
Beam D	3599551.093	342712.176	83.676	50+29.70	-11.960	83.925
Beam E	3599545.638	342706.121	83.806	50+28.08	-3.973	83.889
Beam F	3599540.184	342700.066	83.769	50+26.46	4.013	83.852
Beam G	3599534.729	342694.011	83.566	50+24.83	11.999	83.815
Beam H	3599529.274	342687.956	83.362	50+23.20	19.985	83.778
Beam I	3599523.819	342681.901	83.158	50+21.57	27.970	83.740
Beam J	3599518.365	342675.845	82.953	50+19.94	35.956	83.701
Grid No.2						
Beam A	3599575.111	342725.740	83.467	50+43.45	-35.856	84.213
Beam B	3599569.656	342719.685	83.601	50+41.84	-27.867	84.181
Beam C	3599564.202	342713.630	83.735	50+40.23	-19.878	84.149
Beam D	3599558.747	342707.574	83.868	50+38.62	-11.890	84.116
Beam E	3599553.292	342701.519	84.001	50+37.01	-3.902	84.082
Beam F	3599547.837	342695.464	83.963	50+35.39	4.086	84.048
Beam G	3599542.383	342689.409	83.763	50+33.77	12.074	84.014
Beam H	3599536.928	342683.354	83.563	50+32.15	20.061	83.979
Beam I	3599531.473	342677.299	83.360	50+30.53	28.048	83.943
Beam J	3599526.019	342671.244	83.158	50+28.90	36.035	83.907

Part of Grid Report Shown

The design file should appear as shown below.

Warning If Elevation values are not displayed, Fit View the MicroStation window.



Un-Rotated Plan view of Bridge shown

University Blvd. Bridge

OBJECTIVES

Develop the Bridge model for University Blvd Bridge.

The horizontal alignment is on a tangent and the bridge is on a hump vertical curve. There is Superelevation transition to the right of the baseline for part of span and the rest of the bridge is crowned at ¼" per foot. There is no skew. The span layout is 130'-176'-169' continuous steel plate girders. The bridge has an open longitudinal joint in the raised median. Girder D is offset 3'-1½" left of the baseline, and girder E is offset 3'-4" right of the baseline. The rest of the girders are spaced at 10'-2".

REFERENCE MATERIAL

Units: Imperial

Steel Girders

Profile:

CG Sta. 38+00.000 EL 391.94 VC = 975.00 g1 4.55 % g2 -4.2 %

GPK file available: **JOB400**

Shapes available: **Shapes.dgn**

Survey Base Line available: **UBLVD**

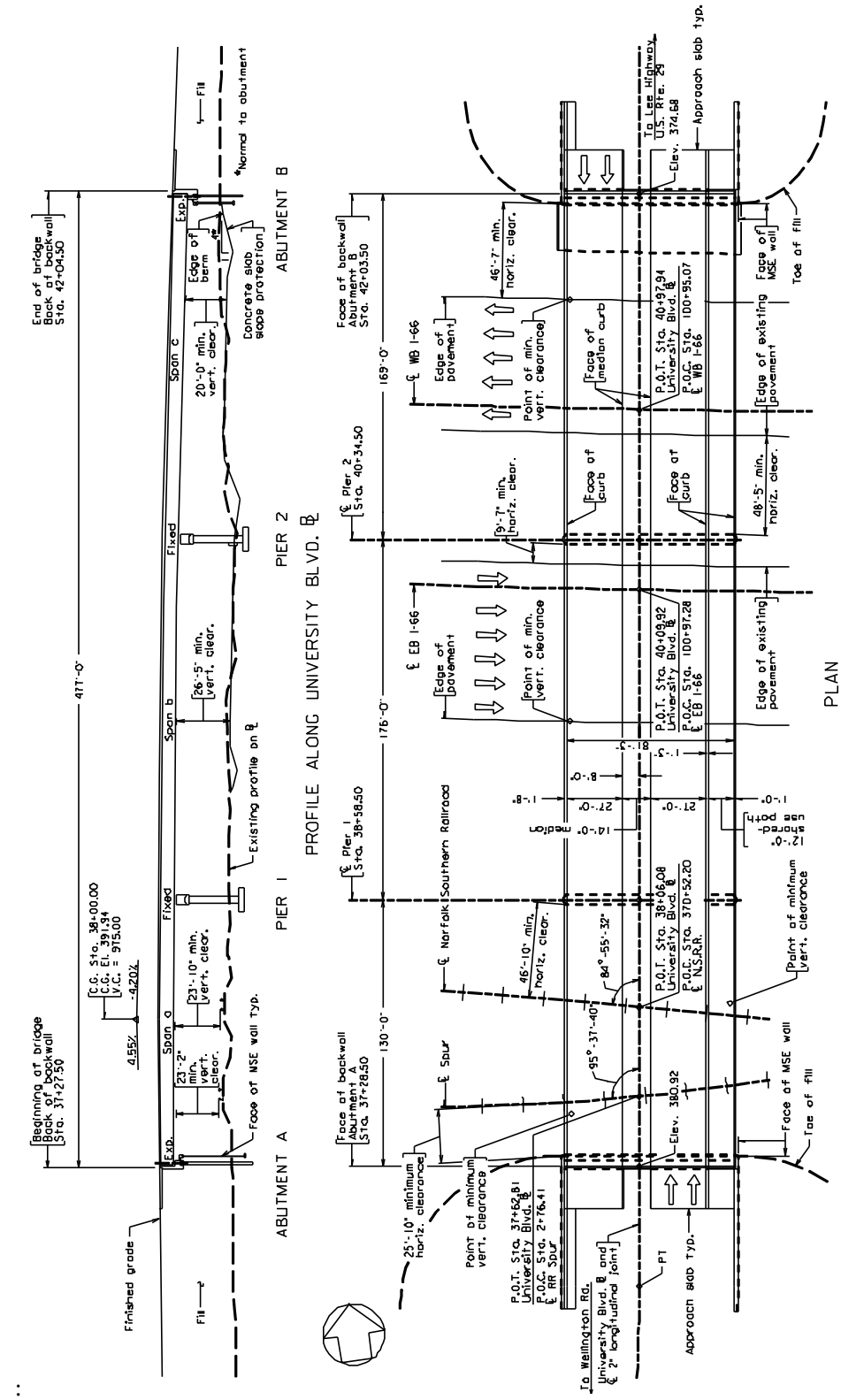
Profile Grade Line available: **UBDVD**

Cross Slope: **2.08% CROWNED ***

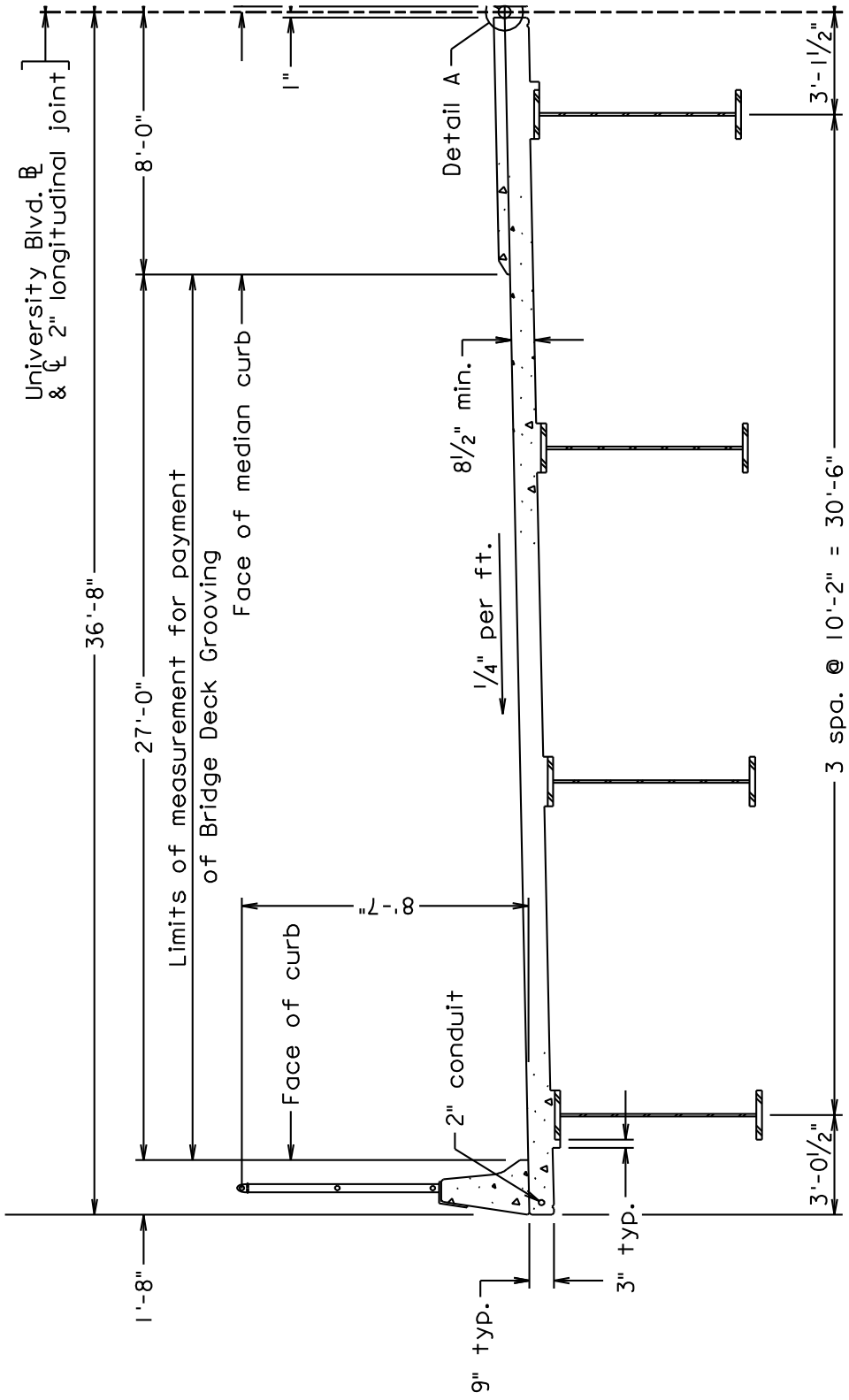
Note	* North Bound bridge cross slope Varies from -1.511 % @ Sta. 37+28.50 to -2.08 % @ Sta. 37+53.67

Modeling DGN file available: C:\DATA\GEO\VDOT\Bridge\University Blvd\University3D.dgn

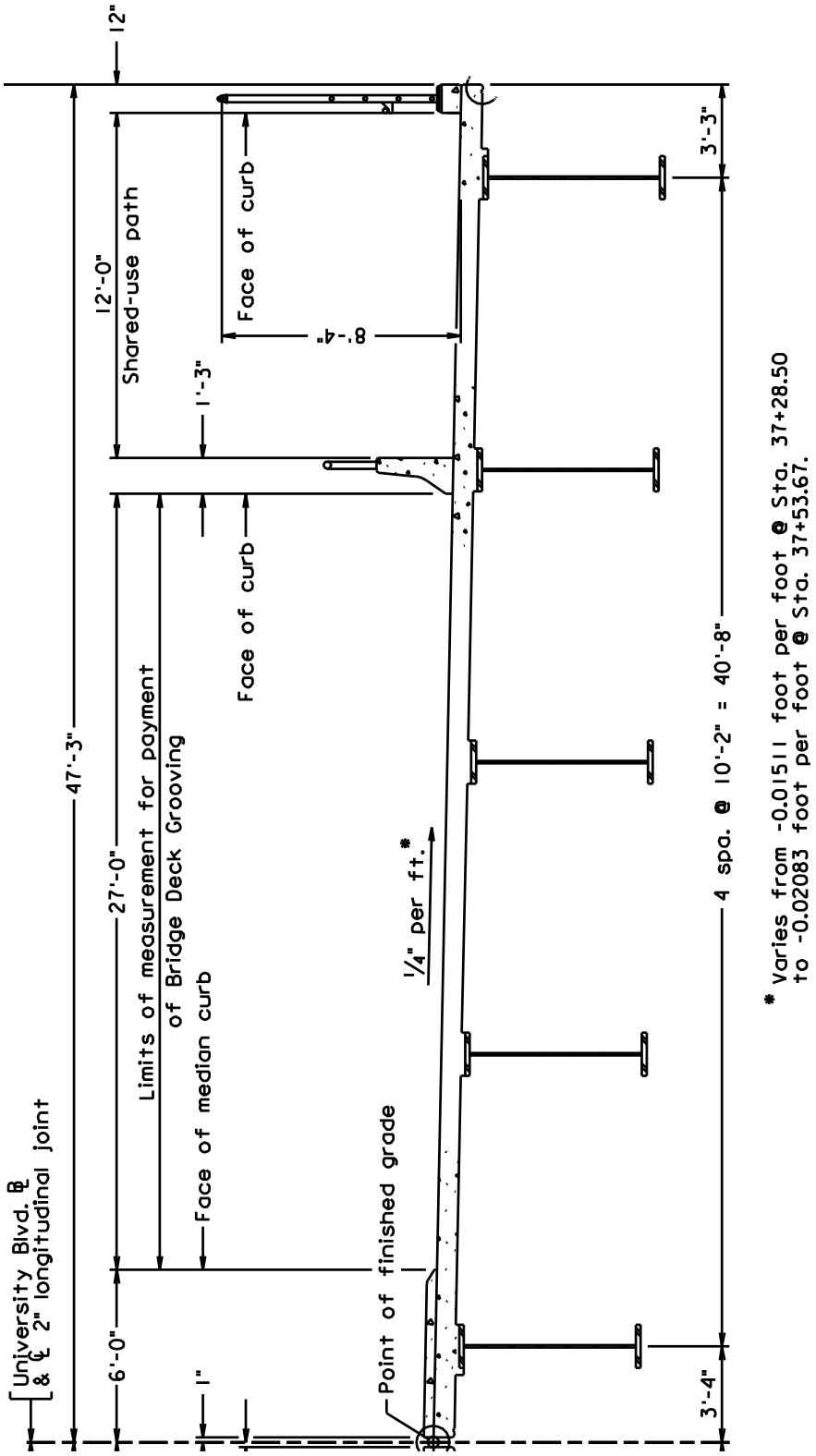
PLAN VIEW AND SECTION ON C.L.



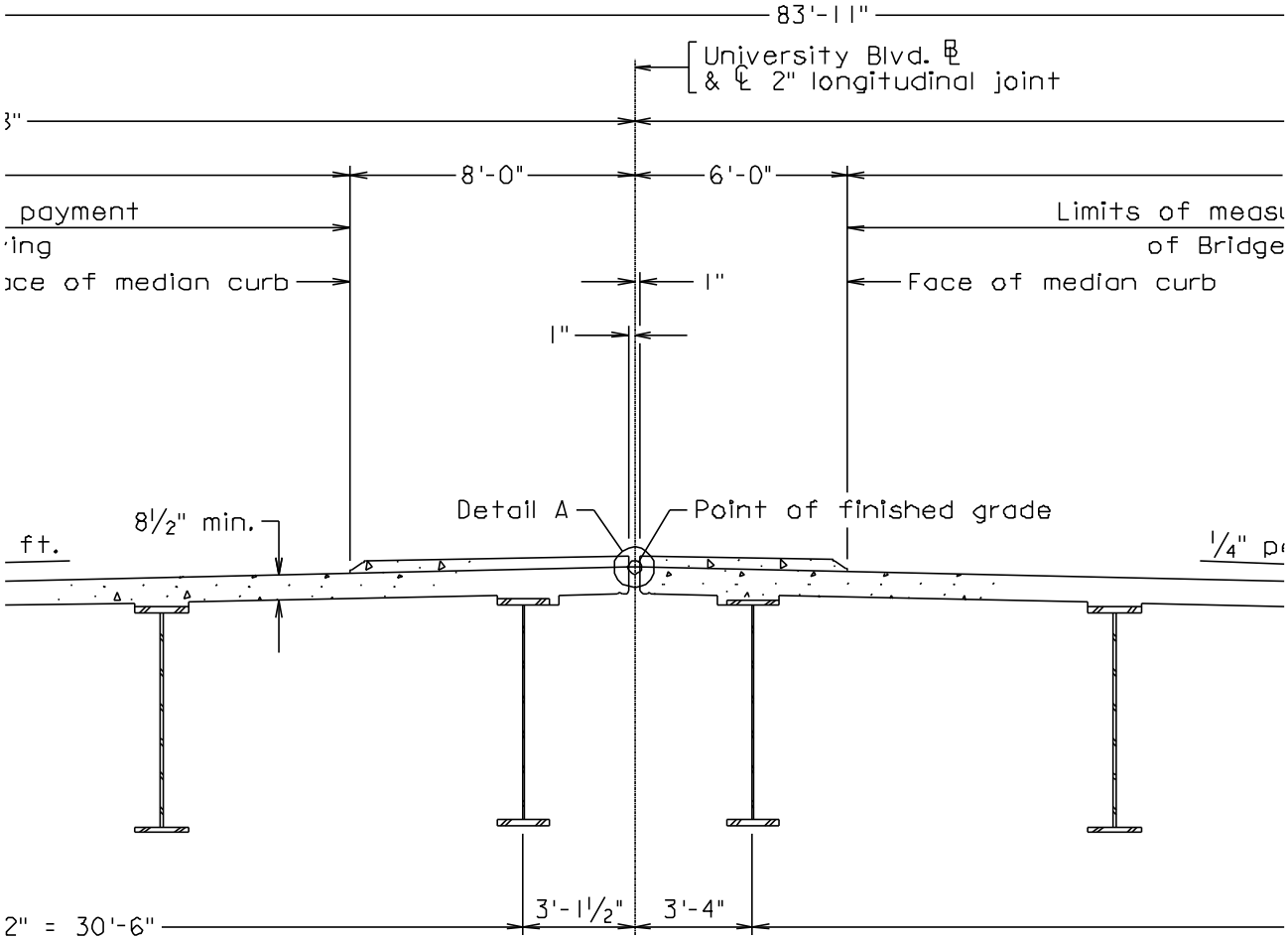
TRANSVERSE SECTION (SOUTH BOUND BRIDGE SHOWN)



TRANSVERSE SECTION (NORTH BOUND BRIDGE SHOWN)



DETAIL BETWEEN NORTH AND SOUTH BOUND

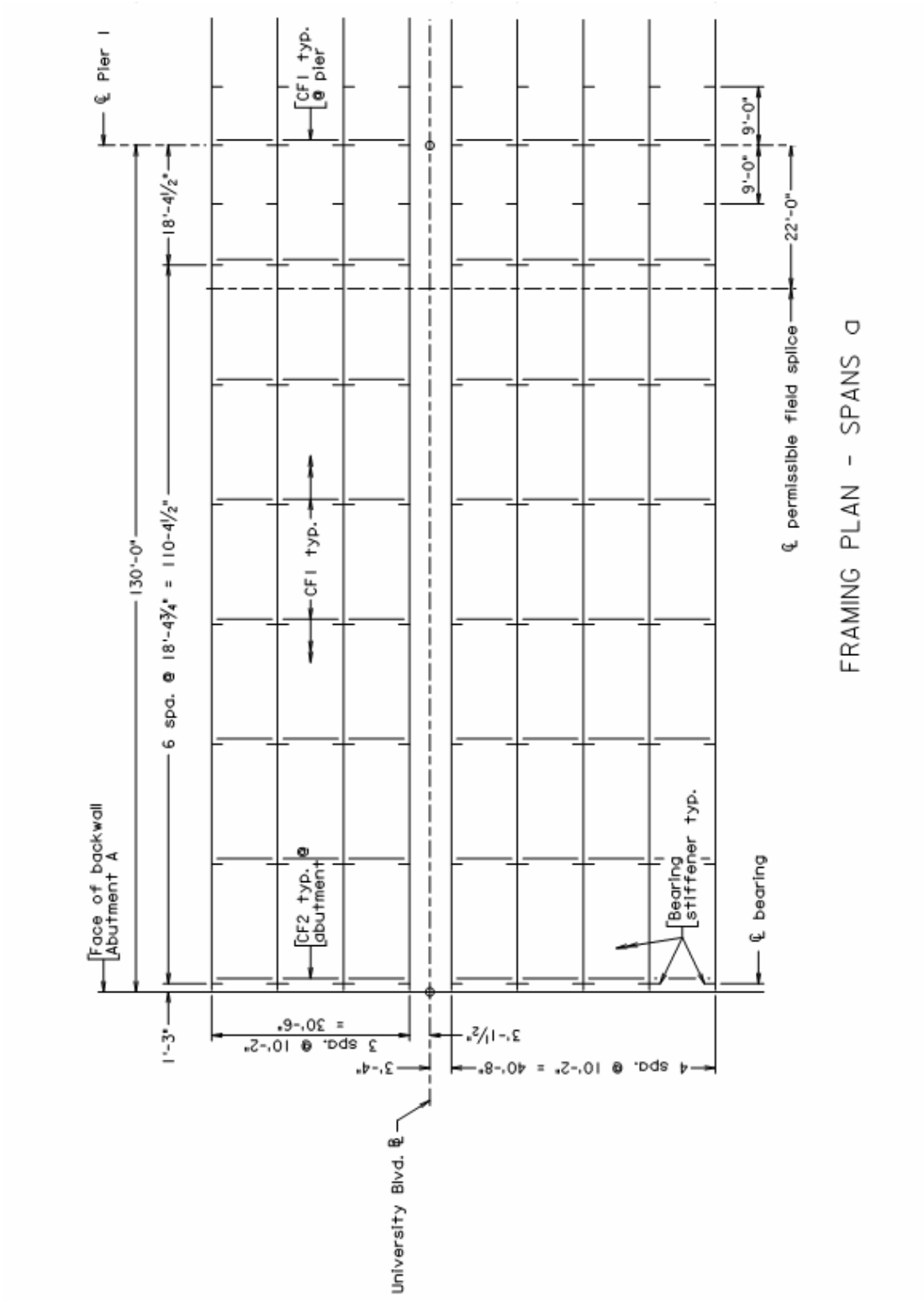


TRANSVERSE SECTION

Scale: ¼" = 1'-0"

Partial Section 2" opening shown

FRAMING PLAN SPAN A



STARTING THE BRIDGE MODEL FOR THE SOUTH BOUND

Open University3D.dgn and Attach as Reference the Shapes.dgn file

1. Open **C:\Data\Geo\VDOT\Bridge\University Blvd\University3D.dgn**
2. Select **References** tool.
3. Select **Attach Reference** tool.
4. Select **C:\Data\Geo\VDOT\Bridge\University Blvd\Shapes.dgn**
5. Enter for Logical Name **Shapes.**
6. Click **OK**.
7. Close the **References** dialog box.

Select the Road Project Using the Road Project Manager

1. Select the Road Project Manager tool. The Project Manager dialog box appears.
2. Under the Directories list box, select **C:\DATA\GEO\VDOT\BRIDGE**.
3. Under the Projects list box, select **University.prj**. The Project Users dialog box appears.

Note Record in your manual, the Job Number shown in the dialog.

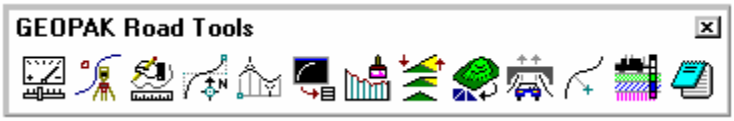
4. Under the Project Users list box select your name from the list of users.

Warning If your name is not available, contact your project administrator.

5. Click **OK** to continue.
6. Minimize the **Road Project** dialog box.

Check the Shapes Data and Record the CHAIN name

1. Select GEOPAK BRIDGE (**MicroStation: Applications>GEOPAK BRIDGE>Road Tools**).



2. Select the **Shape Manager** tool from the GEOPAK Road tools palette.

3. Select the **Shape Analyst** tool from the Superelevation Shape Manager Tools palette. The Shape Analyst dialog appears.
4. Enable the **Display Only** option.
5. Click the **Dynamic** button. Proceed to indicated DP and move the mouse cursor within the shapes area. Notice the values displayed in the dialog

Write in your training manual, the name of CHAIN that appears in the **Chain** pull down list. You will make references to this chain later in this chapter

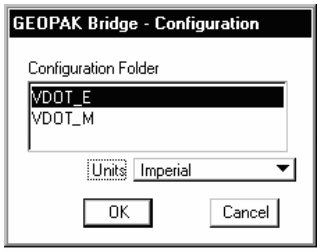
Starting GEOPAK Bridge

1. Select GEOPAK BRIDGE (MicroStation: **Applications>GEOPAK BRIDGE>Modeling**).

Note if the database is not available, Bridge will prompt to create a new one.

2. Click **OK** to proceed.

3. Select the Configuration Folder **VDOT_E. Select** for Units **Imperial**.



Bridge Configuration selection dialog

4. Click **OK**. An Information box appears informing that a Default Bridge database is created.

5. Click **OK** to proceed.

6. The Bridge tools appear. The Bridge tools appear as shown below.

Bridge Tools

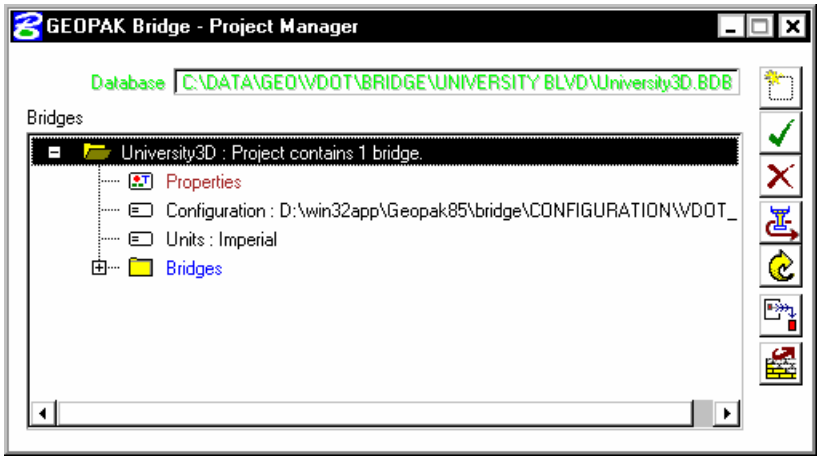
STARTING BRIDGE MODELING

CREATING A NEW BRIDGE

Create a new Bridge

TOOL	DESCRIPTION
	Project Manager

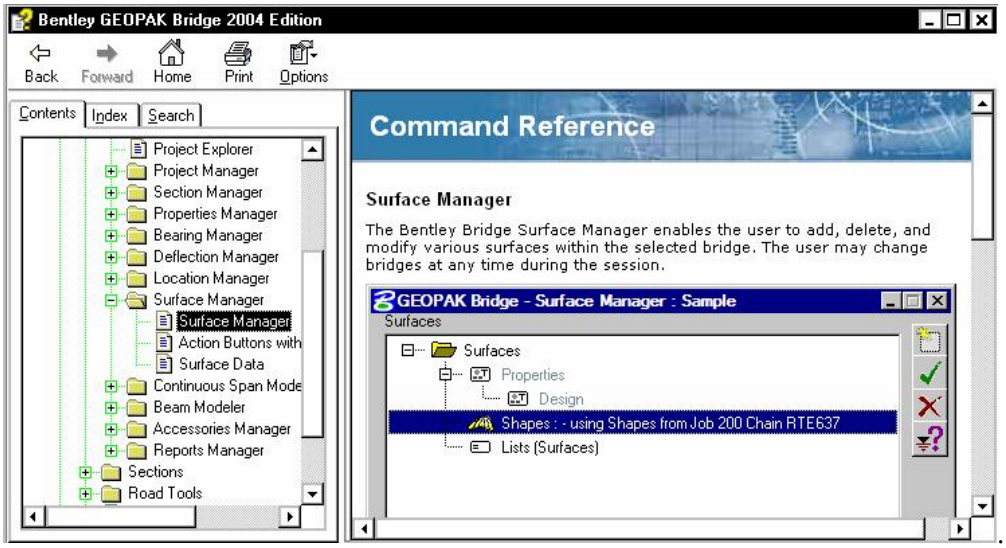
1. Select the **Project Manager** from the GEOPAK Bridge tools palette.



2. Select the **Create Bridge** tool located in the right side of the dialog.
3. The **Name and Description Editor: Bridge** dialog appears. Enter Name "**University Blvd"**.
4. Click **OK** to proceed.

CREATE A BRIDGE SURFACE

For more information refer to **CREATE A BRIDGE SURFACE** in Chapter 1 or in the On-Line Help (MicroStation: **Applications>GEOPAK>BRIDGE>Help).**



Create a Bridge Surface

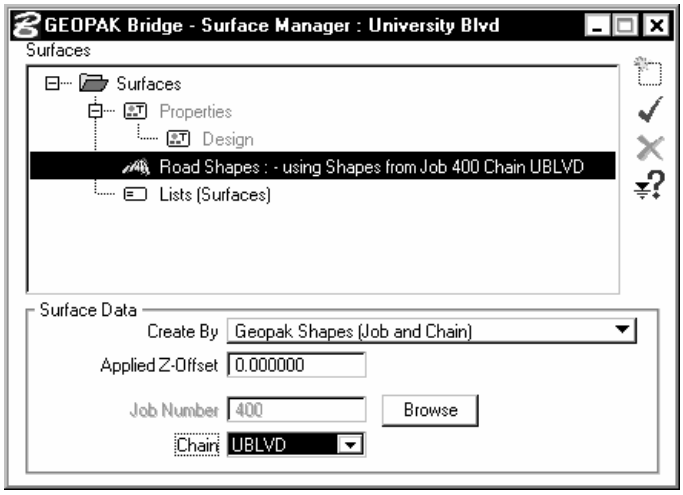
TOOL	DESCRIPTION
	Surface Manager
	Display Z Levels

1. Select the **Surface Manager** tool from the GEOAPK Bridge tools pallete.
2. Select the **Surfaces** Folder. The Surface Manager dialog expands.

Under the Surface Data group box:

3. Select **GEOPAK Shapes (Job and Chain)** from the Create By pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\UNIVERSITY BLVD**
5. Select **Job400**.
6. Select **UBLVD** from the Chain pulldown list.
7. **Right Mouse-click** anywhere within the Bridge tree list. Select **New**> **Item**.
8. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Road Shapes"**.

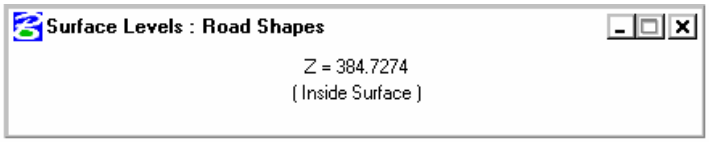
9. Click OK to proceed.



Final Surface Manager Dialog shown

10. Select the **Display Z Levels** tool, to browse elevations (Z Levels) of the selected surface.

Hint Move the cursor anywhere over the selected surface and the corresponding elevations are displayed in the Surface Levels dialog. If the point indicated is outside of the surface, Bridge will display that the point is Outside of the Surface.



11. Close the **Surface Levels** and the **Surface Manager** Dialog boxes.

CREATE/MANAGE BRIDGE LOCATION (ALIGNMENTS, PIER LINES, BEAM LAYOUTS AND GRIDS)

The Bridge Location Manager is responsible for the primary locations for all aspects of your bridge models. Alignments for the bridge deck and beams etc. are registered within the Location Manager. Pier line locations are chosen along the appropriate baseline alignment. Single span and continuous span beam layouts (their centerlines) are established with reference to the alignments and selected Pier locations. Grid patterns are developed and superimposed on beam layouts to generate deck elevations.

These locations represent the basis for the bridge layout. For maximum ease of use, they are created entirely within the X/Y plane (top view) and require no 3D modeling information or input

When the **Bridge Location Manager** tool is selected the Bridge Location Manager dialog appears.

After a Bridge is created, folders for Alignments, Pier Locations, Beam Layouts and Grid Lines appear in the Bridge Location Manager. The Bridge Location Manager displays a tree view of these folders. The Bridge Location Manager dialog expands automatically when the alignments or pier lines folder are selected.

CREATE BRIDGE ALIGNMENTS SOUTH BOUND

From information shown in the cross section for this bridge, five alignments are created to define the Left Edge, the Right Edge, and the Baseline of the Bridge, the Left Face of Curb and the Right Face of Median Curb

Create Bridge Alignment "University Blvd" (Bridge Baseline)

1. Select the Bridge Location Manager tool.
2. Select **Alignments** folder. The dialog expands.

Under the Alignment Details group box:

3. Select **Offset from GEOPAK Chain** from the Chain pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\UNIVERSITY LVD**.
5. Select **Job400.**

Under the Horizontal group box:

6. Select **UBLVD** from the Chain dropdown list.
7. Enter Offset **0.00.**
8. Under the Bridge Limits group box:

9. Select **Indicate Start Limit** tool. Indicate a Data Point just inside the beginning of the Shapes.

10. Select **Indicate Finish Limit** tool. Indicate a Data Point just inside the end of the Shapes.
11. Under the Vertical group box, select **Not used** from the Profile dropdown list.

12. Select the **Create Alignment** tool, from the right side of the dialog.
13. The **Name and Description Editor: Alignment** dialog appears. Enter Name **"University Blvd"**.
14. Click **OK** to proceed.

Set Alignment as Baseline

TOOL / OPTION	DESCRIPTION
	Set alignment as Baseline

1. Under the Alignments folder, select Alignment **University Blvd**.
2. Select the **Set alignment as Baseline** tool.

Create Additional Bridge Alignments

Create the rest of the Alignments using the information shown in the Table below. Also, use as reference, similar steps for creating alignments in chapter 1 through 3. Change items in the dialog as required prior to creating the alignment.

1. Under the Alignment Details group box, select **Offset from Baseline** from the Method pulldown list.
2. Under the Horizontal group box, change the **Offset** as indicated in table below.
3. Select the **Create Alignment** tool.
4. The **Name and Description Editor: Alignment** dialog appears.
5. Enter **Name** of Alignments are as Indicated in table below.
6. Click **OK** to proceed.
7. Repeat the same process to create the remaining alignments shown below.

Alignment Name	Create By	CHAIN/Alignment/Baseline	Offset (+ or -)
Left Edge of Deck	**Offset from Baseline**	**Default to Bridge Baseline**	**-36.6667**
Left Face of Curb	**Offset from Baseline**	**Default to Bridge Baseline**	**-35.000**
Right Edge of Deck	**Offset from Baseline**	**Default to Bridge Baseline**	**-0.0833**
Right Face of Median Curb	**Offset from Baseline**	**Default to Bridge Baseline**	**-8.00**

Create Alignment List "Face of Curbs and Baseline"

This exercise is to create an Alignment List named **Face of Curbs and Baseline**.

1. Select **List (Alignments)** icon.
2. Anywhere within the dialog box, **Right Mouse-click**. Select **New** > **Item**.
3. The **Name and Description Editor: List of Alignment** dialog appears.
4. Enter Name "**Face of Curbs and Baseline"**. Click **OK** to proceed.

Note A Folder **Lists (Alignments)** and **Face of Curbs and Baseline** icons are automatically created.

5. Select the **Face of Curbs and Baseline** icon.
6. Anywhere within the dialog box, **Right Mouse-click**. Select **Lists** > **Add All**.

Note Since all created Alignments are added to the list, alignments that do not describe a Face of Curb or the Baseline should be deleted.

7. **Expand the Tree** for this List. Click the **Plus Sign** icon.
8. Select **Left Edge of Deck** from the list.

9. Select the **Delete** tool, to remove from the list.
10. Select **Right Edge of Deck** from the list.
11. Select the **Delete** tool, to remove from the list.

CREATE PIER LINES

Create the Pier Lines using as the steps described in chapter 1 through 3. Also, use the On-Line Help MicroStation: **(Applications>GEOPAK>BRIDGE>Help)**.

Create Pier Lines

Create the Pier Lines using the information shown in the Table below.

	Abutment A	**Pier 1**	**Pier 2**	**Abutment B**
Location Method	Station and Skew Angle	Station and Skew Angle	Station and Skew Angle	Station and Skew Angle
Station	37+28.50	38+ 58.50	40+34.50	42+03.500
Skew	0.0	0.0	0.0	0.0
Bearing Line Data Back	No Bearing	Fixed	Fixed	Expansion
Bearing Back Offset	0.0	0.0	0.0	1.25
Bearing Line Data Ahead	Expansion	No Bearing	No Bearing	No Bearing
Bearing Ahead Offset	1.25	0.0	0.0	0.0
Pier Line Name	Abutment A	Pier 1	Pier 2	Abutment B
Pier Description	Face of Backwall	-	-	Face of Backwall

1. Select the **Pier Lines** folder.

Under the Pier Line Location Data group box:

2. Select the **Station and Skew Angle** from the Location Method pulldown list.
3. Change **Station** value.

Under the Bearing Line Data group box:

4. Change the **Offset** Back and Ahead.
5. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.
6. **The Name and Description Editor: Pier Line** dialog appears. Enter **Pier** Name.
7. Click **OK** to continue.
8. Repeat steps above to create the additional pier lines.

CREATE GIRDER LAYOUTS AND GIRDER LINES FOR “GIRDERS SPAN A THROUGH C”

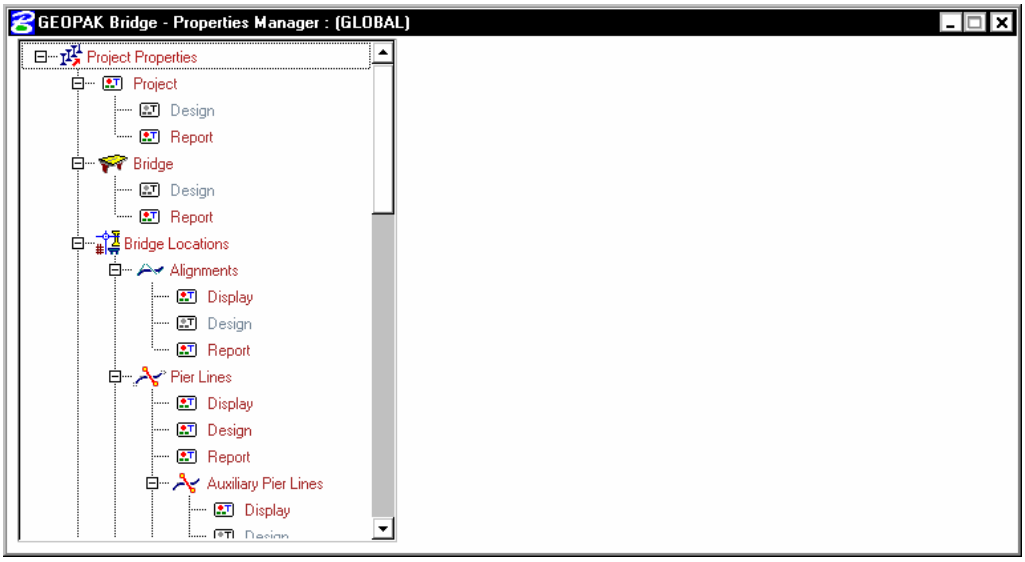
The Girders are parallel to the baseline and are continuous.

MODIFY THE DEFAULT REGULAR BEAM LINES NAMING PATTERN

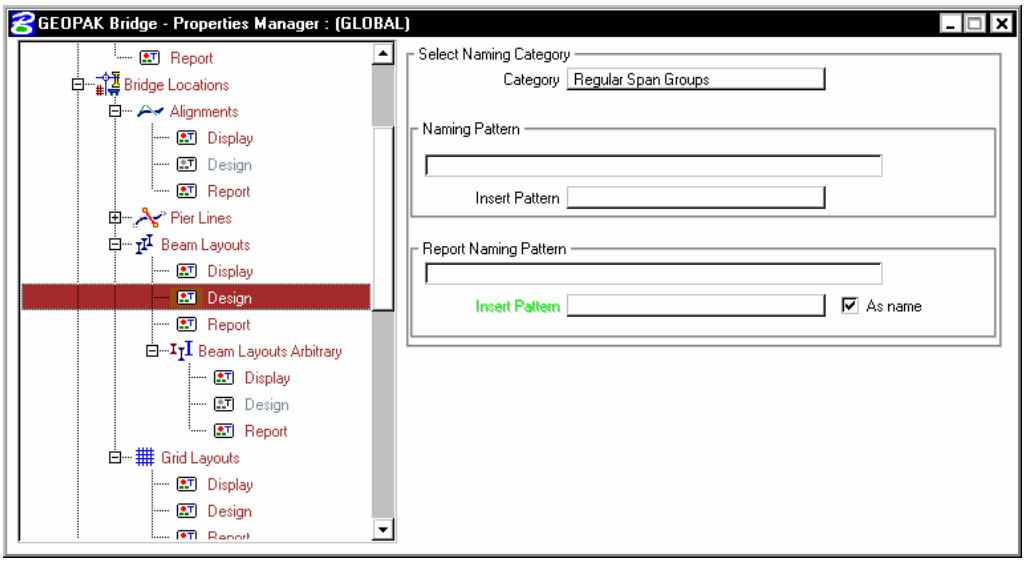
The default naming pattern is Beam {@}. In this exercise you need to change the pattern from Beam {@} to Girder {@}. You need to select the Properties Manager tool to make this modification.

Change Pattern from Beam {@} to Girder {@}

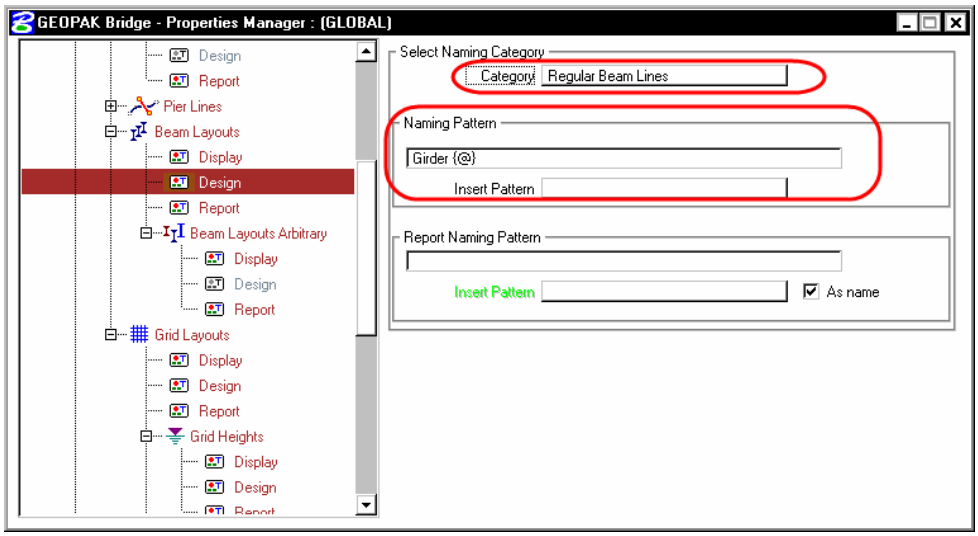
1. Select the **Properties Manager** from the GEOPAK Bridge tools palette. The GEOPAK Bridge-Properties Manager: [GLOBAL] appears.



2. Under the Bridge Locations icon, select the **Beam Layouts** icon > **Design** icon.



3. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.



4. Under the Naming Pattern group box, Change from **Beam** {@} to **Girder** {@}.
5. **Close** the Properties Manager dialog box.

CREATE GIRDER LAYOUTS FOR “GIRDERS SPAN A THROUGH C”

Create Beam Layout for “Beams Span A through C”

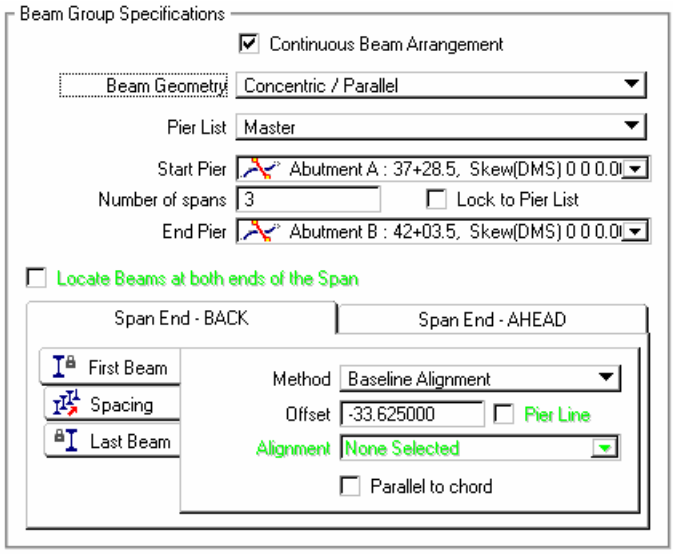
1. Select the **Beam Layouts** folder.
2. Select the **Create Beam Line** tool.
3. The **Name and Description Editor: Beam Layout Group** dialog appears.
4. Enter Name “**Girders Span A through C”**.
5. Click **OK** to continue.

CREATE GIRDER LINES FOR “GIRDERS SPANS A THROUGH C”

Define the First Beam

1. Select beam layout **Girders Span a through c**. The dialog expands.

Under the Beam Group Specifications group box:



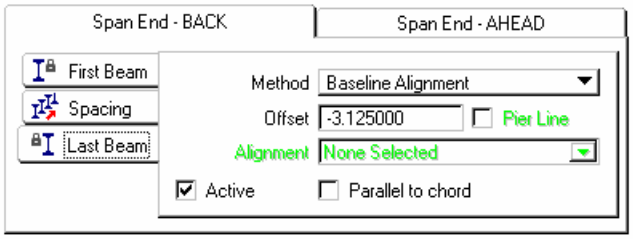
2. Enable the **Continuous Beam Arrangement** option.
3. Select **Concentric/Parallel** from the Beam Geometry pulldown list.
4. Select **Abutment A** from the Start Pier pull down.
5. Select **Abutment B** from the End Pier pull down.
6. Click **First Beam** tab to define the First Beam.
7. Select **Baseline Alignment** from the Method pulldown list.

Note In this example it is not REQUIRED to enable the Parallel to Chord option because the Baseline is already a straight line. Therefore all the beams will be placed parallel to the baseline.

8. Change Offset to **-33.6250** ft.

Define the Last Beam

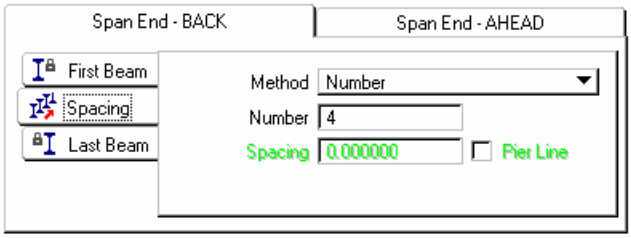
Under the Beam Group Specifications group box:



1. Click **Last Beam** tab to define the Last Beam.
2. Enable the **Active** option to define the Last Beam.
3. Select **Baseline Alignment** from the Method pulldown list.
4. Change the **Offset** to **-3.125** ft.

Define the Beam Spacing

Under the Beam Group Specifications group box:



1. Click the **Spacing** tab to define the Beam Spacing.
2. Select **Number** from the Method pulldown list.
3. Enter **4** in the Number field.
4. Select the **Modify Beam Line** tool to update the information.

CREATE GRID LAYOUTS AND GRID LINES FOR CALCULATING ELEVATIONS

Two Grid layout Groups need to be created - one for the Girders and the other for the Faces of Curbs and Baseline.

CREATE GRID LAYOUTS AND GRID LINES FOR GIRDERS

One Grid layout Group is created in this exercise. The Second span needs to be modified since the number of Grid lines is different from the exterior spans.

The pictures depicted below were extracted from existing plans. Girder Elevations A through D are for the Southbound Bridge and Girder Elevations E through I are for the Northbound Bridge.

SPAN A

Point	10	11	12	13	14	15	16	17	18	19	20
Girder A	380.23	380.33	380.41	380.47	380.53	380.56	380.58	380.59	380.58	380.56	380.52
Girder B	380.44	380.54	380.62	380.69	380.74	380.77	380.80	380.80	380.80	380.77	380.73
Girder C	380.65	380.75	380.83	380.90	380.95	380.99	381.01	381.02	381.01	380.98	380.95
Girder D	380.87	380.96	381.04	381.11	381.16	381.20	381.22	381.23	381.22	381.20	381.16
Girder E	380.88	380.96	381.04	381.11	381.16	381.19	381.22	381.22	381.21	381.19	381.15
Girder F	380.72	380.78	380.83	380.89	380.95	380.98	381.00	381.01	381.00	380.98	380.94
Girder G	380.57	380.59	380.62	380.68	380.73	380.77	380.79	380.80	380.79	380.77	380.73
Girder H	380.41	380.41	380.40	380.47	380.52	380.56	380.58	380.59	380.58	380.56	380.52
Girder I	380.25	380.22	380.19	380.26	380.31	380.35	380.37	380.38	380.37	380.34	380.31

SPAN B

TOP OF SLAB ELEVATIONS ALONG ℄ GIRDER

20	21	22	23	24	25	26	27	28	29	30
380.52	380.45	380.34	380.21	380.05	379.87	379.65	379.41	379.14	378.84	378.52
380.73	380.66	380.56	380.43	380.27	380.08	379.87	379.62	379.35	379.05	378.73
380.95	380.87	380.77	380.64	380.48	380.29	380.08	379.83	379.56	379.27	378.94
381.16	381.08	380.98	380.85	380.69	380.50	380.29	380.05	379.78	379.48	379.15
381.15	381.08	380.98	380.84	380.69	380.50	380.28	380.04	379.77	379.47	379.15
380.94	380.87	380.76	380.63	380.47	380.29	380.07	379.83	379.56	379.26	378.94
380.73	380.66	380.55	380.42	380.26	380.08	379.86	379.62	379.35	379.05	378.72
380.52	380.44	380.34	380.21	380.05	379.86	379.65	379.41	379.14	378.84	378.51
380.31	380.23	380.13	380.00	379.84	379.65	379.44	379.19	378.92	378.63	378.30

SPAN C

30	31	32	33	34	35	36	37	38	39	40
378.52	378.18	377.82	377.43	377.02	376.59	376.12	375.64	375.12	374.59	374.02
378.73	378.39	378.03	377.65	377.23	376.80	376.34	375.85	375.34	374.80	374.24
378.94	378.60	378.24	377.86	377.45	377.01	376.55	376.06	375.55	375.01	374.45
379.15	378.82	378.46	378.07	377.66	377.22	376.76	376.27	375.76	375.22	374.66
379.15	378.81	378.45	378.06	377.65	377.22	376.75	376.27	375.75	375.22	374.65
378.94	378.60	378.24	377.85	377.44	377.00	376.54	376.06	375.54	375.01	374.44
378.72	378.39	378.03	377.64	377.23	376.79	376.33	375.84	375.33	374.79	374.23
378.51	378.18	377.82	377.43	377.02	376.58	376.12	375.63	375.12	374.58	374.02
378.30	377.97	377.60	377.22	376.81	376.37	375.91	375.42	374.91	374.37	373.81

CREATE GRID LAYOUT FOR “GIRDERS SPAN A THROUGH C”

Create Grid Layout for “Girders Span A thru C”

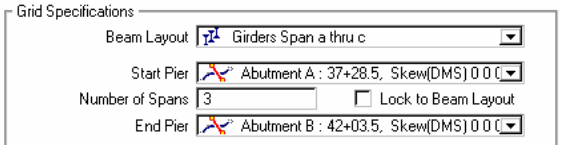
1. Select the **Grid Layouts** folder.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name **Girders Span A through C**.
5. Click **OK** to proceed.

CREATE GRID LINES FOR “GIRDERS SPAN A THROUGH C”

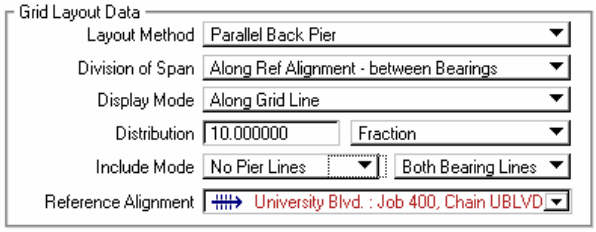
Create Grid Lines for “Girders Span A thru C”

1. **Select** the Grid Layout **Girders Span a thru c** icon. The dialog expands.
2. Under the Grid Specifications group box, select **Girders Span a through c** icon from the Beam Layout pulldown list

Note Notice that under the Grid Specifications the Start Pier, Number of Spans and End Pier are automatically selected.



Under the Grid Layout Data group box:



3. Select **Parallel Back Pier** from the Layout Method pulldown list.
4. Select **Along Ref Alignment-between Bearings** from the Division of Span pulldown list.
5. Select **Along Grid Line** from the Display Mode pulldown list.
6. Enter Distribution **10** and select **Fraction** from the pulldown.
7. Select **No Pier Lines** from the Pier Mode pulldown list.
8. Select **Both Bearing Lines** from the Bearing Mode pulldown list.
9. Select **University Blvd** from the Reference Alignment pulldown.

Under the Grid Specifications group box:

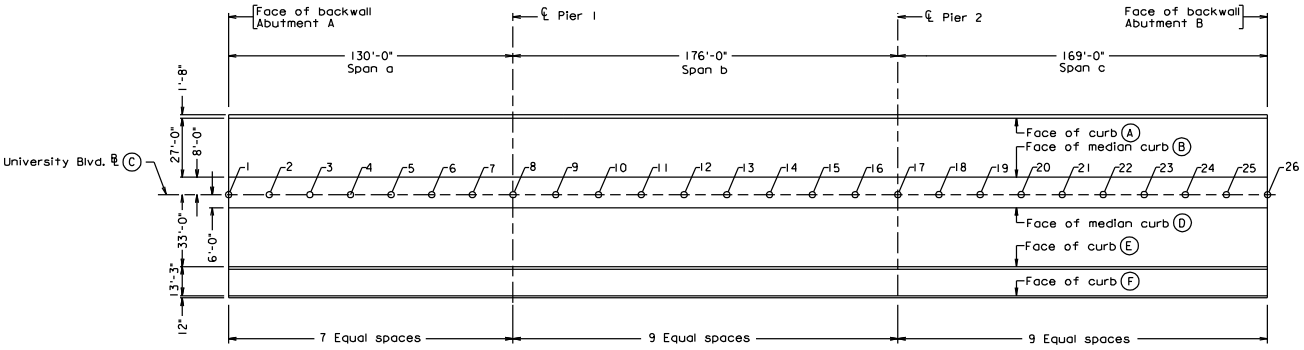
10. Select **None Selected** from the Alignments pull down list.
11. Select **Road Shapes** from the Elevation Surface pulldown list.
12. Select **None Selected** from the Clearances Surface pull down list.

13. Select the **Modify Grid** tool to update the changes.

CREATE GRID LAYOUTS AND GRID LINES FOR “FACE OF CURBS AND BASELINE”

One Grid layout Group is created in this exercise with 9 divisions per span. The first span needs to be modified since the number of divisions is equal to 7.

The pictures depicted below were extracted from existing plans.



DECK SLAB ELEVATIONS
Scale: 1" = 30'

Location \ Point	1	2	3	4	5	6	7	8
A	380.19	380.33	380.43	380.51	380.55	380.56	380.54	380.49
B	380.75	380.89	381.00	381.07	381.11	381.13	381.11	381.06
C	380.92	381.06	381.16	381.24	381.28	381.29	381.27	381.22
D	380.83	380.94	381.04	381.11	381.15	381.17	381.15	381.10
E	380.42	380.42	380.47	380.55	380.59	380.60	380.59	380.54
F	380.22	380.16	380.20	380.27	380.32	380.33	380.31	380.26

DECK SLAB ELEVATIONS

Location \ Point	8	9	10	11	12	13	14	15	16	17
A	380.49	380.41	380.29	380.13	379.95	379.72	379.47	379.17	378.85	378.49
B	381.06	380.97	380.85	380.70	380.51	380.29	380.03	379.74	379.41	379.05
C	381.22	381.14	381.02	380.86	380.68	380.45	380.20	379.90	379.58	379.22
D	381.10	381.01	380.89	380.74	380.55	380.33	380.07	379.78	379.45	379.09
E	380.54	380.45	380.33	380.18	379.99	379.76	379.51	379.22	378.89	378.53
F	380.26	380.17	380.05	379.90	379.71	379.49	379.23	378.94	378.61	378.25

DECK SLAB ELEVATIONS

8	9	10	11	12	13	14	15	16	17
380.49	380.41	380.29	380.13	379.95	379.72	379.47	379.17	378.85	378.49
381.06	380.97	380.85	380.70	380.51	380.29	380.03	379.74	379.41	379.05
381.22	381.14	381.02	380.86	380.68	380.45	380.20	379.90	379.58	379.22
381.10	381.01	380.89	380.74	380.55	380.33	380.07	379.78	379.45	379.09
380.54	380.45	380.33	380.18	379.99	379.76	379.51	379.22	378.89	378.53
380.26	380.17	380.05	379.90	379.71	379.49	379.23	378.94	378.61	378.25

Create Grid Layout for “Face of Curbs and Baseline”

1. Select the grid **Beams Span A thru C** icon.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name **Face of Curbs and Baseline**.
5. Click **OK** to proceed.

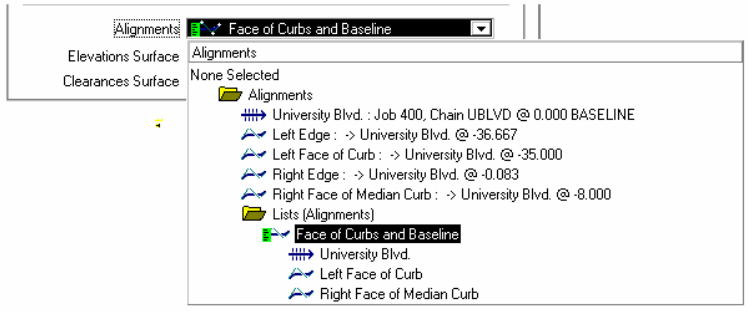
Create Grid Lines for “Face of Curbs and Baseline”

The grid layout **Face of Rails and Baseline** icon is automatically highlighted and the dialog remains expanded. Few changes are required here.

1. Under the Grid Specifications group box, select **None Selected** from the Beam Layout pulldown list.

Under the Grid Layout Data group box:

2. Select **Along Ref Alignment Between Piers** from the Division of Span pulldown list.
3. Enter Distribution **9**.
4. Select **Both Pier Lines** from the Pier pulldown list.
5. Select **No Bearing Lines** from the Bearing pulldown list.
6. Select **Face of Curbs and Baseline** icon from the Alignments pulldown list.



7. Select the **Modify Grid** tool to update the changes.

MODIFY A GRID LAYOUT WITHIN A SPAN

Modify Interior Grid Layout in Span A from Abutment A to Pier 1

This exercise is to modify the second span Grid distribution by using the **Use local Grid specifications at this span** option.

1. Select **Face of Curbs and Baseline** icon.

2. **Expand the Tree** for this Grid. Click the **Plus Sign** icon.
3. Select the first span **[Abutment A -> Pier 1]** icon.
4. Under the Grid Specifications group box, enable the **Use local Grid specifications at this span** option.
5. Change Distribution to **7**.

6. Select the **Modify Grid** tool to update the changes.

CREATE REPORTS

For more information refer to REPORTS in Chapter 1 or in the On-Line Help MicroStation: **(Applications>GEOPAK>BRIDGE>Help)**

REPORTS MANAGER

The Report Manager is used to manage the output of Text, CSV and XML files. It is also used to manage the updating, deleting, re-sequencing and displaying of reports.

PROCEDURE

Reports are created by using both the **Properties Manager** and the **Reports Manager** options.

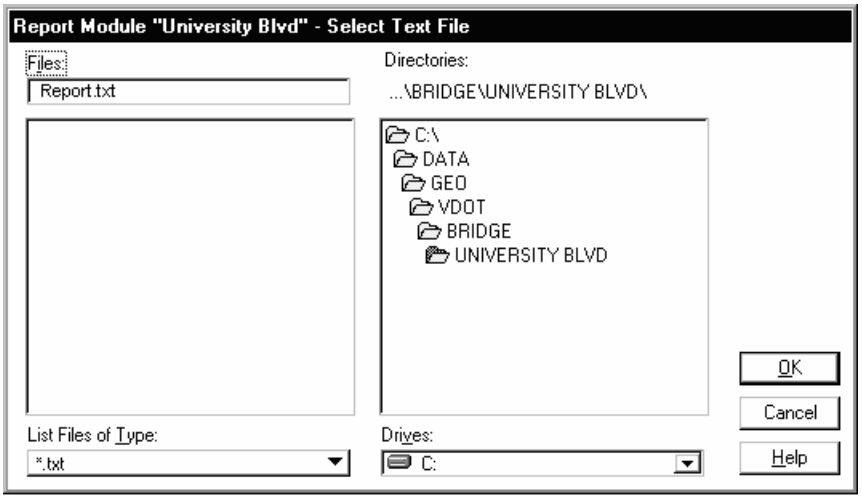
1. The Reports Manager is where output files are managed.
2. The Properties Manager tool is where reports are activated and where Report Templates are selected.

Create a Report Set

1. Select the **Reports Manager** tool from the GEOPAK Bridge tools palette.

2. Select the **Create Reports Set** tool.
3. The Name and Description Editor: Bridge Component dialog appears. Enter Name "**University Blvd**".
4. Click **OK** to proceed.
5. Select the **University Blvd** icon. The dialog expands.
6. Under the Report Output Modes group box, enable the **Text File** option.

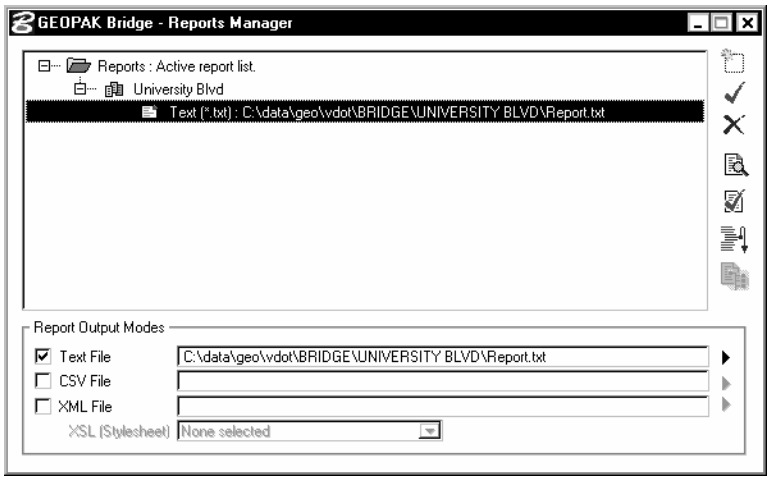
7. Select the **Select Text File** tool. The default directory appears. Under Files enter **"Report"**.



8. Click **OK** to continue.

9. Select the **Modify Reports Set** tool to update the changes.
10. Expand the **University Blvd** tree. Select the Text icon as shown below:

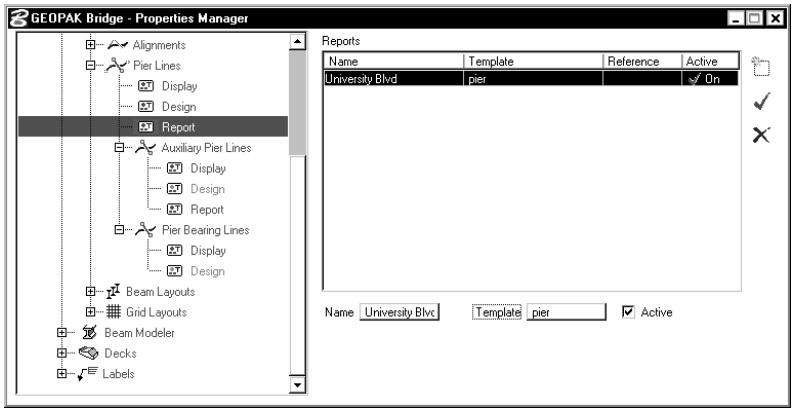
Warning **DO NOT CLOSE THE REPORTS MANAGER DIALOG**. We need to proceed with the Properties Manager to enable the reports properties.



ACTIVATE REPORTS IN THE BRIDGE PROPERTIES

Activate Pier Lines Report

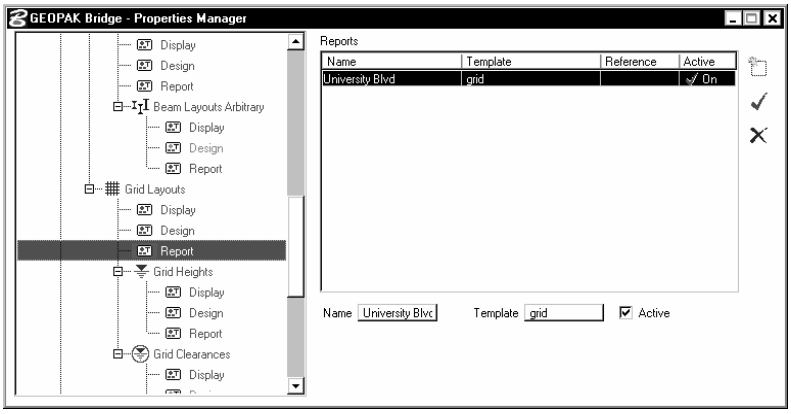
1. Select the **Properties Manager** tool.
2. Locate the **Pier Lines** icon in the tree. Under the **Pier Lines** icon select the **Reports** icon.



3. Under the Reports window, select **University Blvd** from the Name pulldown list.
4. Select **Modify Report** tool from the right side of the dialog.

Activate Grid Layouts Report

1. Under the **Grid Layouts** icon select the **Reports** icon.

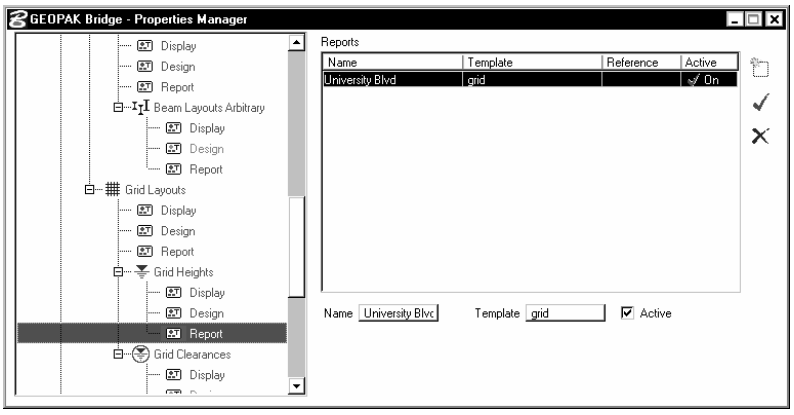


Global Bridge Properties dialog shown

2. Under the Reports window, select **University Blvd** from the Name pulldown list.
3. Select **Modify Report** tool.

Activate Grid Heights Report

1. Under the **Grids Heights** icon, select the **Report** icon.
2. Select **University Blvd** from the Name pulldown list.
3. Select **Modify Report** tool.



Report activated for Grid Heights shown

4. **Close** the Bridge Properties dialog.

.

UPDATE REPORT

When reports are activated in the Bridge Properties dialog, the Report Manager can process the report. You can display the report by selecting the Display Report tool.

Update Report

1. Proceed to locate the Reports Manager dialog.
2. Select the **Update Report** tool. Wait for processing.

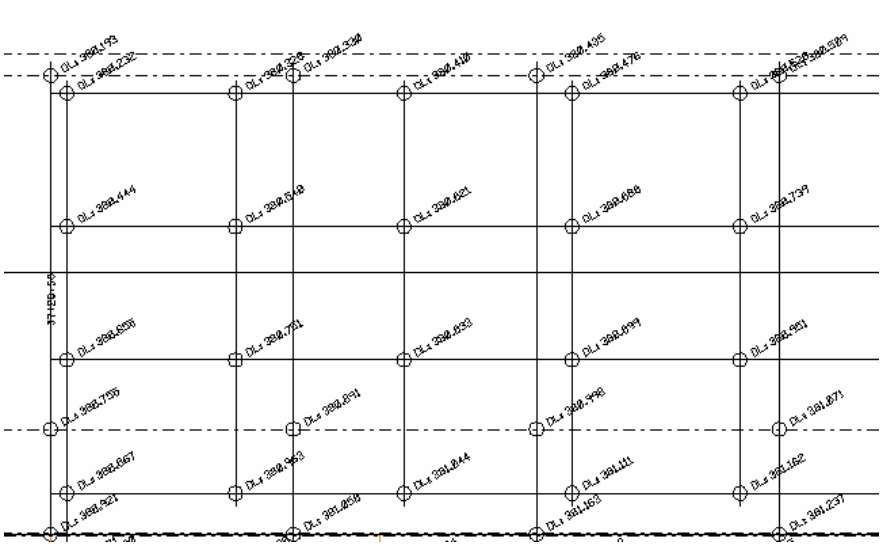
Note The report is displayed automatically when the report generation is completed.

The Grid report is partially shown below.

Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Grid No.1	(Located at Bearing)					
Girder A	100560.754	50306.768	380.232	37+29.75	-33.625	380.932
Girder B	100560.754	50296.601	380.444	37+29.75	-23.458	380.932
Girder C	100560.754	50286.435	380.655	37+29.75	-13.292	380.932
Girder D	100560.754	50276.268	380.867	37+29.75	-3.125	380.932
Grid No.2						
Girder A	100573.629	50306.768	380.328	37+42.63	-33.625	381.028
Girder B	100573.629	50296.601	380.540	37+42.63	-23.458	381.028
Girder C	100573.629	50286.435	380.751	37+42.63	-13.292	381.028
Girder D	100573.629	50276.268	380.963	37+42.63	-3.125	381.028

Name	X Coord	Y Coord	Z	Station	Offset	PGL Elevation
Grid No.1	(Located at Bearing)					
Left Face of Curb	100560.754	50308.143	380.204	37+29.75	-35.000	380.932
Right Face of Median	100560.754	50281.143	380.765	37+29.75	-8.000	380.932
University Blvd.	100560.754	50273.143	380.932	37+29.75	0.000	380.932
Grid No.2						
Left Face of Curb	100578.076	50308.143	380.330	37+47.07	-35.000	381.058
Right Face of Median	100578.076	50281.143	380.891	37+47.07	-8.000	381.058
University Blvd.	100578.076	50273.143	381.058	37+47.07	0.000	381.058

The design file should appear as shown below.

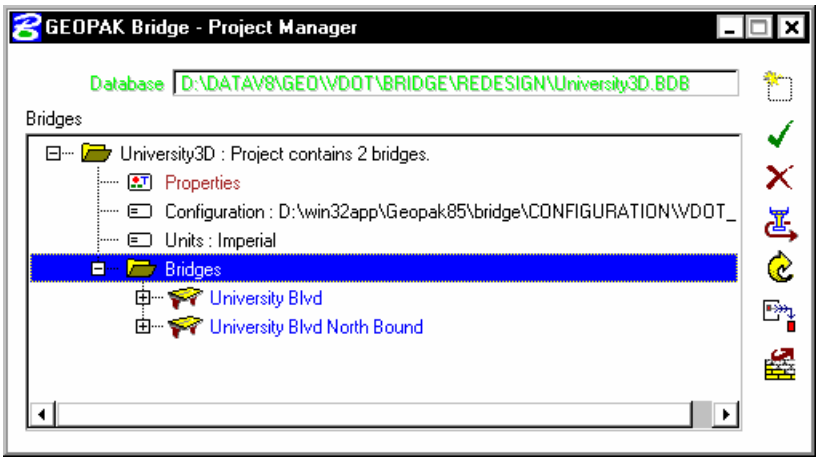


Partial Un-Rotated Plan view of Bridge shown

CREATE THE NORTH BOUND BRIDGE

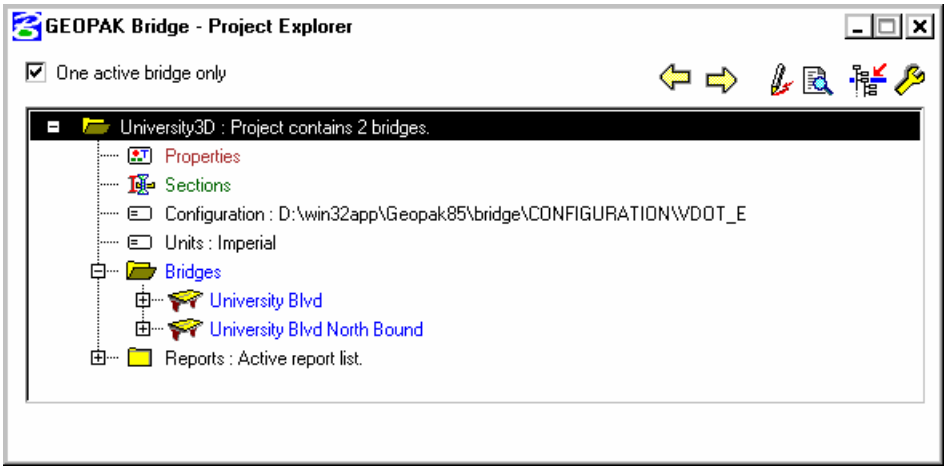
Create a new Bridge "University Blvd North Bound"

1. Select the **Project Manager** from the GEOPAK Bridge tools palette.



2. Select the **Create Bridge** tool located in the right side of the dialog.
3. The Name and Description Editor: Bridge dialog appears. Enter Name "**University Blvd North Bound**".
4. Click **OK** to proceed.

5. Select the **Project Explorer** tool. The GEOPAK Bridge-Project Explorer appears. Select the **One active bridge only** option.



Note This option allows you to switch between Bridges synchronizing all dialog boxes to the selected Bridge.

6. **Right Mouse-Click** anywhere within the Bridge Tree list. Select **Bridge** > **University Blvd North Bound**.
7. Close the **Project Manager** and the **Project Explorer** dialog boxes.

Create a Bridge Surface

1. Select the **Surface Manager** tool from the GEOAPK Bridge tools pallete.
2. Select the **Surfaces** Folder. The Surface Manager dialog expands.

Under the Surface Data group box:

3. Select **GEOPAK Shapes (Job and Chain)** from the Create By pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\UNIVERSITY BLVD**
5. Select **Job400**.
6. Select **UBLVD** from the Chain pulldown list.
7. **Right Mouse-click** anywhere within the Bridge tree list. Select **New**> **Item**.
8. The **Name and Description Editor: Surface** dialog appears. Enter Name "**Road Shapes"**.
9. Click **OK** to proceed.

10. Select the **Display Z Levels** tool, to browse elevations (Z Levels) of the selected surface.
11. Close the **Surface Levels** and the **Surface Manager** Dialog boxes

CREATE BRIDGE ALIGNMENTS NORTH BOUND

From information shown in the cross section for this bridge, six alignments are created to define the Left Edge, the Right Edge, and the Baseline of the Bridge, the Right Face of Curb, Outside Face of Curb and the Left Face of Median Curb.

Create Bridge Alignment "University Blvd North Bound" (Bridge Baseline)

1. Select the Bridge Location Manager tool.
2. Select **Alignments** folder. The dialog expands.

Under the Alignment Details group box:

3. Select **Offset from GEOPAK Chain** from the Chain pulldown list.
4. Click **Browse** and select directory **C:\DATA\GEO\VDOT\BRIDGE\UNIVERSITY LVD**.
5. Select **Job400.**

Under the Horizontal group box:

6. Select **UBLVD** from the Chain dropdown list.
7. Enter Offset **0.00.**

Under the Bridge Limits group box:

8. Select **Indicate Start Limit** tool. Indicate a Data Point just inside the beginning of the Shapes.

9. Select **Indicate Finish Limit** tool. Indicate a Data Point just inside the end of the Shapes.
10. Under the Vertical group box, select **Not used** from the Profile dropdown list.

11. Select the **Create Alignment** tool, from the right side of the dialog.
12. The Name and Description Editor: Alignment dialog appears. Enter Name "**University Blvd North Bound**".
13. Click **OK** to proceed.

Set Alignment as Baseline

TOOL / OPTION	DESCRIPTION
	Set alignment as Baseline

1. Under the Alignments folder, select Alignment **University Blvd North Bound**.
2. Select the **Set alignment as Baseline** tool.

Create Additional Bridge Alignments

Create the rest of the Alignments using the information shown in the Table below. Change items in the dialog as required prior to creating the alignment.

1. Under the Alignment Details group box, select **Offset from Baseline** from the Method pulldown list.
2. Under the Horizontal group box, change the **Offset** as indicated in table below.
3. Select the **Create Alignment** tool.
4. The **Name and Description Editor: Alignment** dialog appears.
5. Enter **Name** of Alignments are as Indicated in table below.
6. Click **OK** to proceed.
7. Repeat the same process to create the remaining alignments shown below.

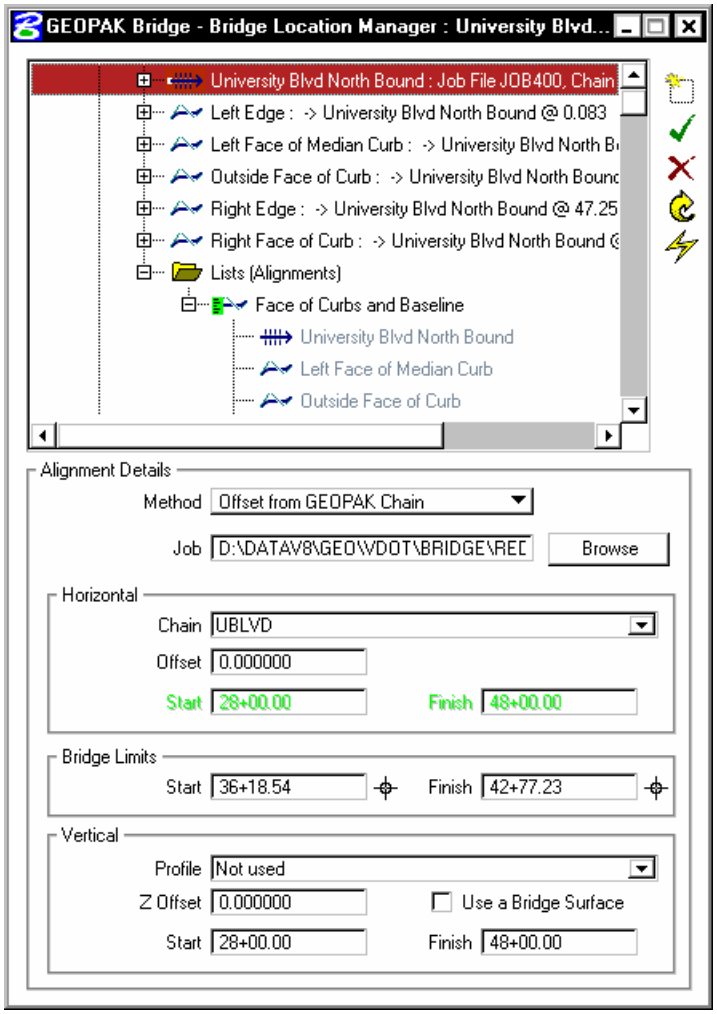
Create By	Offset (+ or -)	Alignment Name
Offset from Baseline	**.0833**	**Left Edge of Deck**
Offset from Baseline	**6.0**	**Left Face of Median Curb**
Offset from Baseline	**33.0**	**Right Face of Curb**
Offset from Baseline	**47.25**	**Right Edge of Deck**
Offset from Baseline	**46.25**	**Outside Face of Curb**

Create Alignment List "Face of Curbs and Baseline"

This exercise is to create an Alignment List named **Face of Curbs and Baseline**.

1. Select **List (Alignments)** icon.
2. Anywhere within the dialog box, **Right Mouse-click**. Select **New** > **Item**.
3. The **Name and Description Editor: List of Alignment** dialog appears.
4. Enter Name "**Face of Curbs and Baseline"**. Click **OK** to proceed.
5. Select the **Face of Curbs and Baseline** icon.
6. **Right Mouse-click** anywhere within the dialog box,. Select **Lists** > **Add All**.
7. **Expand the Tree** for this List. Click the **Plus Sign** icon.
8. Select **Left Edge of Deck** from the list.

9. Select the **Delete** tool, to remove from the list.
10. Select **Right Edge of Deck** from the list.
11. Select the **Delete** tool, to remove from the list.



Bridge Location Manager- Showing Created Alignments

CREATE PIER LINES

Create Pier Lines

1. Select the **Pier Lines** folder.

Create the Pier Lines using the information shown in the Table below.

	Abutment A	**Pier 1**	**Pier 2**	**Abutment B**
Location Method	Station and Skew Angle	Station and Skew Angle	Station and Skew Angle	Station and Skew Angle
Station	37+28.50	38+ 58.50	40+34.50	42+03.500
Skew	0.0	0.0	0.0	0.0
Bearing Line Data Back	No Bearing	Fixed	Fixed	Expansion
Bearing Back Offset	0.0	0.0	0.0	1.25
Bearing Line Data Ahead	Expansion	No Bearing	No Bearing	No Bearing
Bearing Ahead Offset	1.25	0.0	0.0	0.0
Pier Line Name	Abutment A	Pier 1	Pier 2	Abutment B
Pier Description	Face of Backwall	-	-	Face of Backwall

Under the Pier Line Location Data group box:

2. Select the **Station and Skew Angle** from the Location Method pulldown list.

3. Change **Station** value.

Under the Bearing Line Data group box:

4. Change the **Offset** Back and Ahead.

5. **Right mouse-click** anywhere within the Bridge tree list. Select **New** > **Item**.

6. **The Name and Description Editor: Pier Line** dialog appears. Enter **Pier** Name.

7. Click **OK** to continue.

Repeat steps above to create the additional pier lines.

CREATE GIRDER LAYOUTS AND GIRDER LINES FOR “GIRDERS SPAN A THROUGH C”

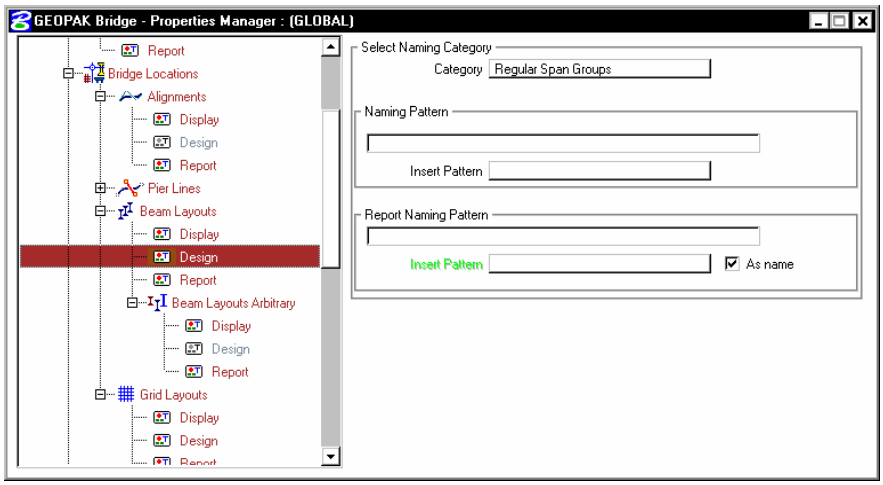
The Girders are parallel to the baseline and are continuous.

MODIFY THE DEFAULT REGULAR BEAM LINES NAMING PATTERN

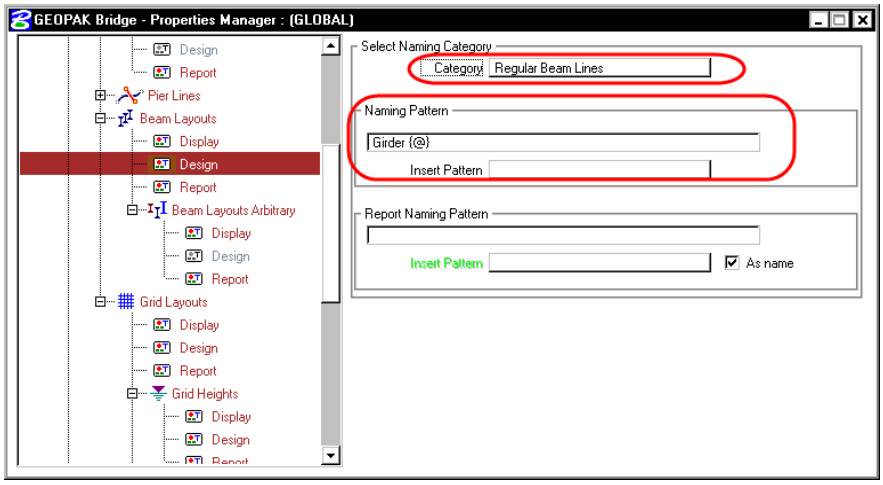
The default naming pattern is **Beam {@}**. In this exercise you need to change the pattern from **Beam {@} to Girder {@}**.

Change Pattern from Beam {@} to Girder {@}

1. Select the **Properties Manager** from the GEOPAK Bridge tools palette. The GEOPAK Bridge-Properties Manager: [GLOBAL] appears.
2. Under the Bridge Locations icon, select the **Beam Layouts>Design** icon.



3. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.



4. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.
5. Under the Naming Pattern group box, Change from **Beam** {@} to **Girder** {@}.
6. **Close** the Properties Manager dialog box.

CREATE GIRDER LAYOUTS FOR “GIRDERS SPAN A THROUGH C”

Create Beam Layout for “Beams Span A through C”

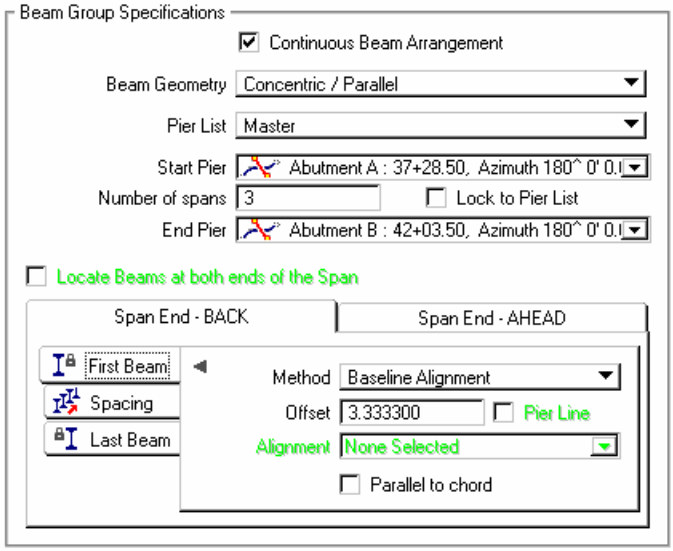
1. Select the **Beam Layouts** folder.
2. Select the **Create Beam Line** tool.
3. The **Name and Description Editor: Beam Layout Group** dialog appears.
4. Enter Name “**Girders, Span A through C”**.
5. Click **OK** to continue.

CREATE GIRDER LINES FOR “GIRDERS SPANS A THROUGH C”

Define the First Beam

1. Select beam layout **Girders Span a through c**. The dialog expands.

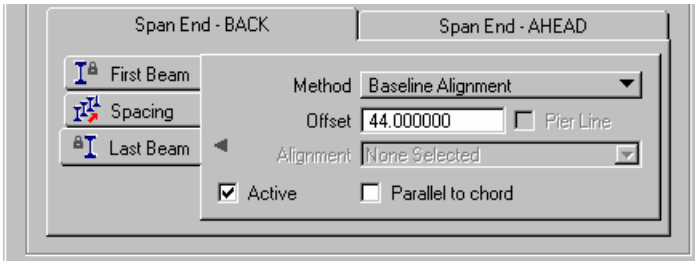
Under the Beam Group Specifications group box:



2. Enable the **Continuous Beam Arrangement** option.
3. Select **Concentric/Parallel** from the Beam Geometry pulldown list.
4. Select **Abutment A** from the Start Pier pull down.
5. Select **Abutment B** from the End Pier pull down.
6. Click **First Beam** tab to define the First Beam.
7. Select **Baseline Alignment** from the Method pulldown list.
8. Change Offset to **3.3333** ft.

Define the Last Beam

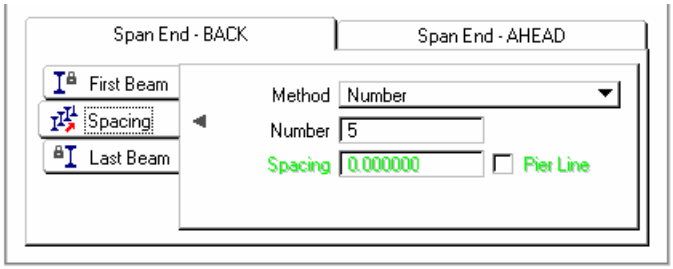
Under the Beam Group Specifications group box:



1. Click **Last Beam** tab to define the Last Beam.
2. Enable the **Active** option to define the Last Beam.
3. Select **Baseline Alignment** from the Method pulldown list.
4. Change the **Offset** to **44.0 ft**.

Define the Beam Spacing

Under the Beam Group Specifications group box:



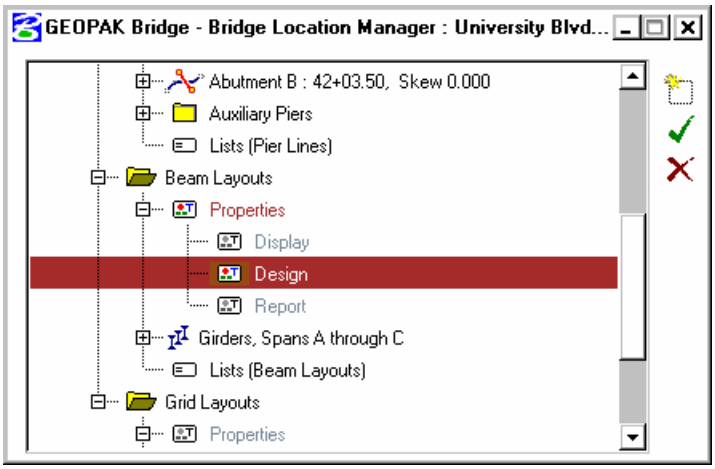
1. Click the **Spacing** tab to define the Beam Spacing.
2. Select **Number** from the Method pulldown list.
3. Enter **5** in the Number field.
4. Select the **Modify Beam Line** tool to update the information.

RENAME THE NORTH BOUND GIRDER LINES

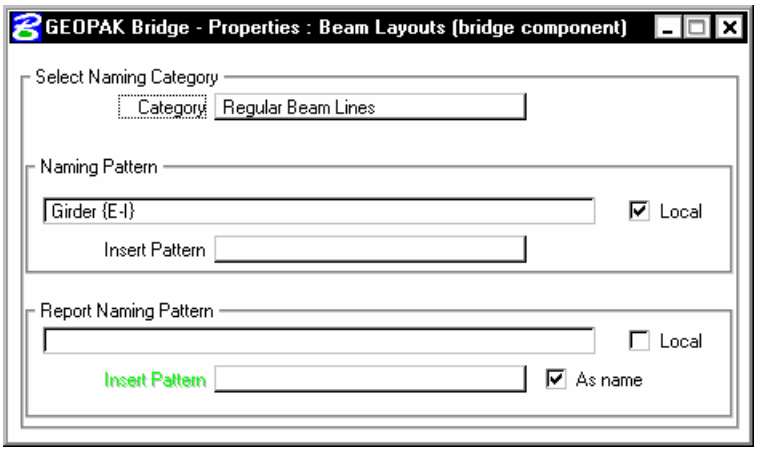
Rename the Girder Lines from A-C to E- I

Under the Beam Layouts folder:

1. Select the **Design** icon.



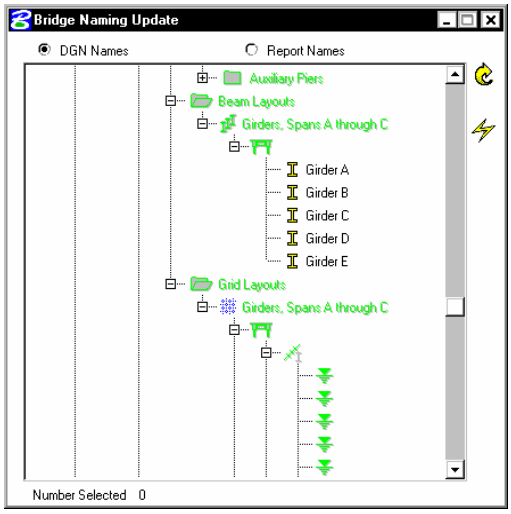
2. **Double Click** on the Design icon. The GEOPAK Bridge properties dialog appears.
3. Under the Select Naming Category group box, select **Regular Beam Lines** from the Category pulldown list.
4. Under the Naming Pattern group box, change **Girder {@}** to **Girder {E-I}.**



5. Close the **GEOPAK Bridge Properties** dialog. The Bridge Naming tools appears.

6. Select the **Update Naming Sequence** tool. The Bridge Naming Update dialog appears.

7. Select **Raname all groups** tool from the right side of the dialog.



Note Notice that the Girder Lines are renamed accordingly.

8. **Close** the Bridge Naming Update dialog box.

CREATE GRID LAYOUT FOR “GIRDERS SPAN A THROUGH C”

Create Grid Layout for “Girders Span A thru C”

1. Select the **Grid Layouts** folder.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name **Girders Span A through C**.
5. Click **OK** to proceed.

CREATE GRID LINES FOR “GIRDERS SPAN A THROUGH C”

Create Grid Lines for “Girders Span A thru C”

1. **Select** the Grid Layout **Girders Span a thru c** icon. The dialog expands.

Under the Grid Specifications group box:

2. Select **Girders Span a through c** icon from the Beam Layout pulldown list

Under the Grid Layout Data group box:

3. Select **Parallel Back Pier** from the Layout Method pulldown list.
4. Select **Along Ref Alignment-between Bearings** from the Division of Span pulldown list.
5. Select **Along Grid Line** from the Display Mode pulldown list.
6. Enter Distribution **10** and select **Fraction** from the pulldown.
7. Select **No Pier Lines** from the Pier Mode pulldown list.
8. Select **Both Bearing Lines** from the Bearing Mode pulldown list.
9. Select **University Blvd North Bound** from the Reference Alignment pulldown.

Under the Grid Specifications group box:

10. Select **None Selected** from the Alignments pull down list.
11. Select **Road Shapes** from the Elevation Surface pulldown list.
12. Select **None Selected** from the Clearances Surface pull down list.
13. Select the **Modify Grid** tool to update the changes.

CREATE GRID LAYOUTS AND GRID LINES FOR “FACE OF CURBS AND BASELINE”

Create Grid Layout for “Face of Curbs and Baseline”

1. Select the grid **Girders Span A thru C** icon.
2. Select the **Create Grid** tool.
3. **Name and Description Editor: Grid Group** dialog appears.
4. Enter name **Face of Curbs and Baseline**.
5. Click **OK** to proceed.

Create Grid Lines for “Face of Curbs and Baseline”

The grid layout **Face of Rails and Baseline** icon is automatically highlighted and the dialog remains expanded. Few changes are required here.

1. Under the Grid Specifications group box, select **None Selected** from the Beam Layout pulldown list.

Under the Grid Layout Data group box:

2. Select **Along Ref Alignment Between Piers** from the Division of Span pulldown list.
3. Enter Distribution **9**.
4. Select **Both Pier Lines** from the Pier pulldown list.
5. Select **No Bearing Lines** from the Bearing pulldown list.
6. Select **Face of Curbs and Baseline** icon from the Alignments pulldown list.
7. Select the **Modify Grid** tool to update the changes.

MODIFY A GRID LAYOUT WITHIN A SPAN TO CHANGE THE DISTRIBUTION

Modify Interior Grid Layout in Span A from Abutment A to Pier 1

This exercise is to modify the second span Grid distribution by using the **Use local Grid specifications at this span** option.

1. Select **Face of Curbs and Baseline** icon.
2. **Expand the Tree** for this Grid. Click the **Plus Sign** icon.
3. Select the first span **[Abutment A -> Pier 1]** icon.
4. Under the Grid Specifications group box, enable the **Use local Grid specifications at this span** option.
5. Change Distribution to **7**.
6. Select the **Modify Grid** tool to update the changes.

UPDATE REPORTS

When reports are activated in the Bridge Properties dialog, the Report Manager can process the report. You can display the report by selecting the Display Report tool.

Update Report

3. Proceed to locate the Reports Manager dialog.
4. Select the **Update Report** tool. Wait for processing.

The report is displayed automatically when the report generation is completed