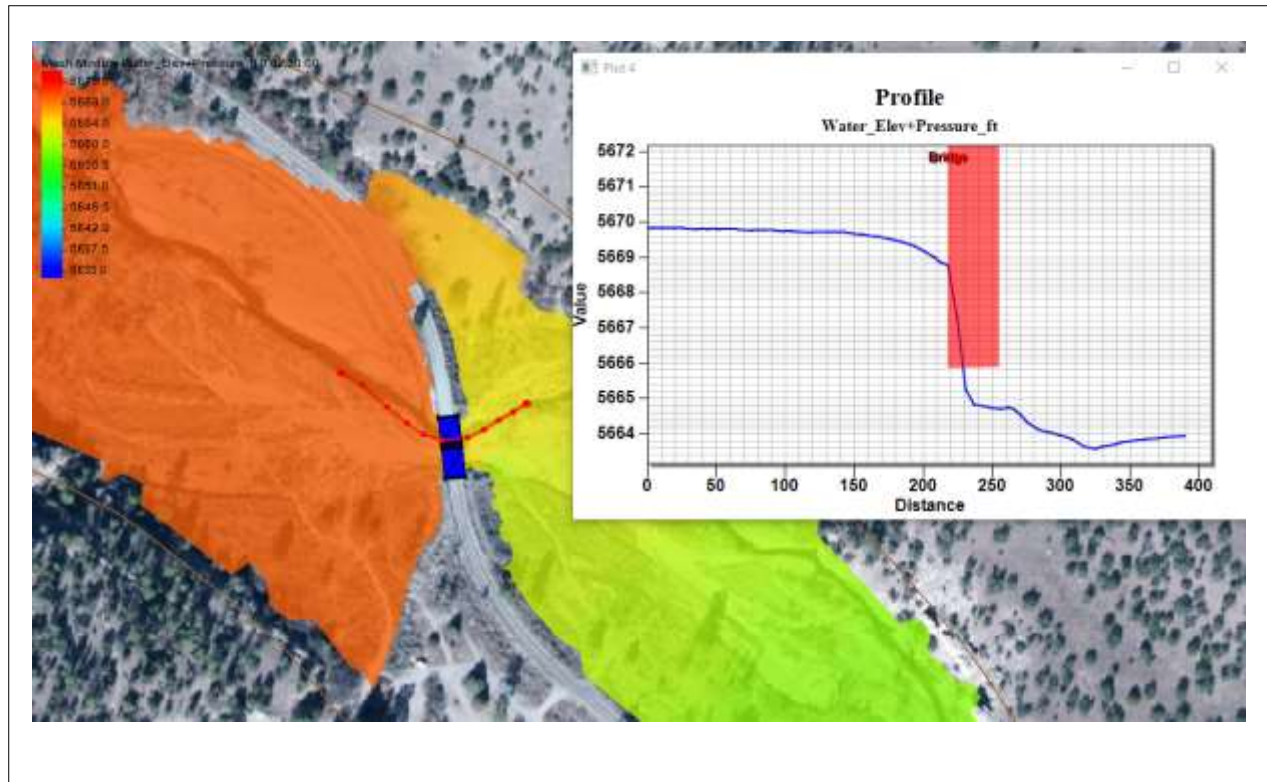*SMS 13.1 Tutorial*

Observation Data

Objectives

This tutorial first expands on using the observation coverage in SMS. It then demonstrates the use of the plot data coverage and adding a 3D bridge to a plot. Finally, the process of saving plots is demonstrated.

Prerequisites

- Observations
- SRH-2D
- 3D Bridge

Requirements

- Map Module
- Mesh Module
- SRH-2D

Time

- 20–30 minutes

1   Introduction

An important part of any computer model is the verification of results. SMS contains a suite of tools in the observation coverage to assist in the model verification and calibration processes.

This tutorial expands on the "Observations" tutorial, which should have been completed before using this tutorial. This tutorial gives additional details in using the observation coverage, including the use of a 3D bridge component. It shows how to use the plot data coverage in conjunction with the observation coverage. Finally, it demonstrates how plots can be saved.

An area located at the confluence of the west and middle forks of the Gila River in New Mexico is used for this tutorial. The initial model contains solutions from an SRH-2D model run. The model contains a pressure bridge structure and a modeled 3D bridge. See the "3D Bridge" tutorial for information about modeling a 3D bridge.

2   Opening the Starting Project

To open the simulation and solution data:

1.   Select *File* / **Open…** to bring up the *Open* dialog.

2.   Select "Project Files (*.sms)" from the *Files of type* drop-down.

3.   Browse to the *data files* folder for this tutorial and select "Gila_Structure.sms".

4.   Click **Open** to import the project and exit the *Open* dialog.

5.   If asked to delete existing data, click **Yes**.

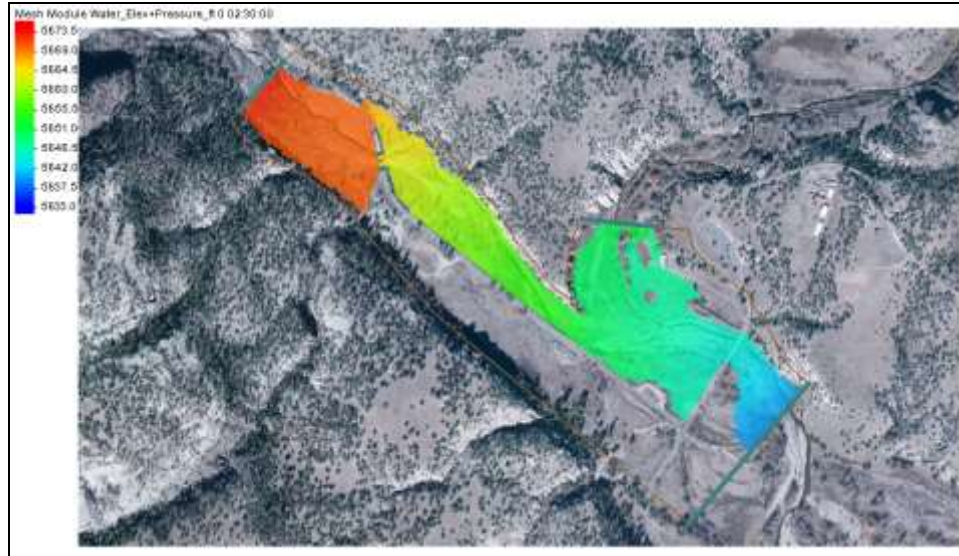The project should appear similar to Figure 1.

Figure 1   Initial project

3   Creating an Observation Profile Plot

An initial solution has already been created with this data file and was opened with the project. When the solution file is opened into SMS, various scalar and vector datasets are created.

Several display options should be changed by doing the following:

1. **Zoom** $\mathbb{Q}$ into the location shown in Figure 2.

2. Select the "⊕ Observation" coverage to make it active.

3. Using the **Select Feature Arc** $\mathcal{K}$ tool, select the observation arc that runs through the bridge area.

4. Right-click on the arc and select **Show Observation Plot...** to open the *Plot* window.

5. Make sure the "▦ Water_Elev+Pressure_ft" dataset is active and that time step "02:30:00" is selected.

The plot should appear similar to Figure 3.

6. Leave the plot window open and select the "▦ Water Elev_ft" dataset.

Notice that the plot updates to show the profile plot for the "Water_Elev_ft" dataset. Selecting other datasets and time steps will automatically update the plot window. Furthermore, the observation arc can be altered using the map tools and the plot will update automatically.

7. Before continuing, make sure the "▦ Water_Elev+Pressure_ft" dataset is active and that time step "02:30:00" is selected.
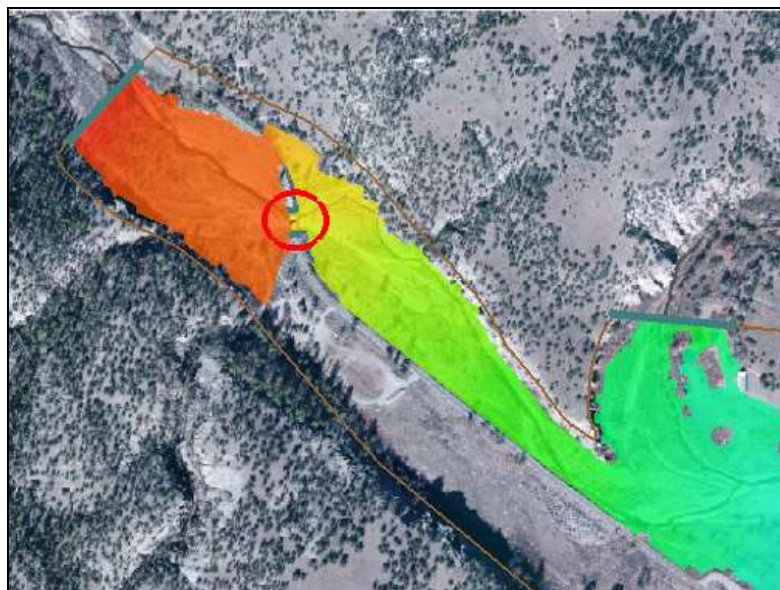
8. Leave the *Plot* window open and continue to the next section.

Figure 2   Location of the bridge
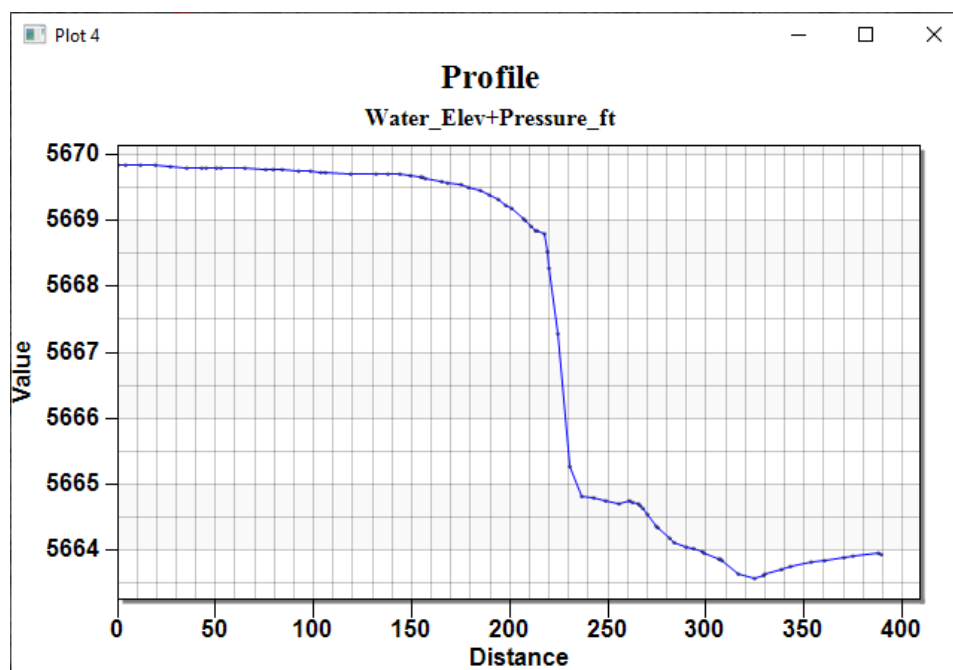
Figure 3   Profile Plot of "Water_Elev+Pressure_ft" at time step 02:30:00

4   Using the Plot Data Coverage

The location of the bridge can be difficult to see on the plot. To help see where the bridge is located on the profile plot, a Plot Data coverage can be used. Polygons created on the Plot Data coverage are assigned attributes to help show where a structure is located on a profile plot.

4.1 Creating a Plot Data Coverage

A Plot Data coverage can be created as a new coverage or created from an existing coverage. In this example, the boundary conditions coverage will be used to create the Plot Data coverage because the area for the bridge is already marked. To create a Plot Data coverage, do the following:

1. Right-click on " Structure BC" and select **Duplicate**.
2. Right-click on " Structure BC (2)" and select **Rename**.
3. Enter "Plot Data" and press *Enter* to set the new name.
4. Right-click on " Plot Data" and select *Type | General |* **Plot Data**.
5. Select the " Plot Data" to make it active.

With a Plot Data coverage available, a polygon needs to be created that intersects with the observation arc. To do this:

6. **Zoom** into the location shown in Figure 2.
7. Using the **Create Feature Arc** tool, draw an arc that connects the top node of the upstream arc to the top node of the downstream arc.
8. Repeat step 7 for the bottom nodes of the upstream and downstream arcs.
9. Select *Feature Objects |* **Build Polygons**.

With the polygon created, the polygon attributes need to be defined to let the Plot Data coverage know how to use it. To do this:

10. Using the **Select Feature Polygon** tool, double-click on the polygon to assign attributes in the *Plot Data* dialog.
11. For the *Name*, enter "Bridge".
12. Turn on *Crest Elevation* and enter "5672".
13. Turn on *Low Steel Elevation* and enter "5665".
14. Click **OK**, to close the *Plot Data* dialog.

The plot data can now be added to the profile plot.

4.2 Adding Plot Data to a Plot

Once a Plot Data coverage with one or more defined polygons has been created, the Plot Data coverage can be added to any profile plot.

To add the Plot Data to the profile plot, do the following:

1. Right-click in the *Plot* window and select **Plot Data** to open the *Data Options* dialog.
2. In the *Show Intersections* section of the dialog, turn on both check boxes in the "Plot Data" row.
3. Click **OK** to close the *Data Options* dialog.
4. Leave the *Plot* window open.

The plot should update to show where the polygon on the Plot Data coverage intersects with the profile plot (Figure 4).
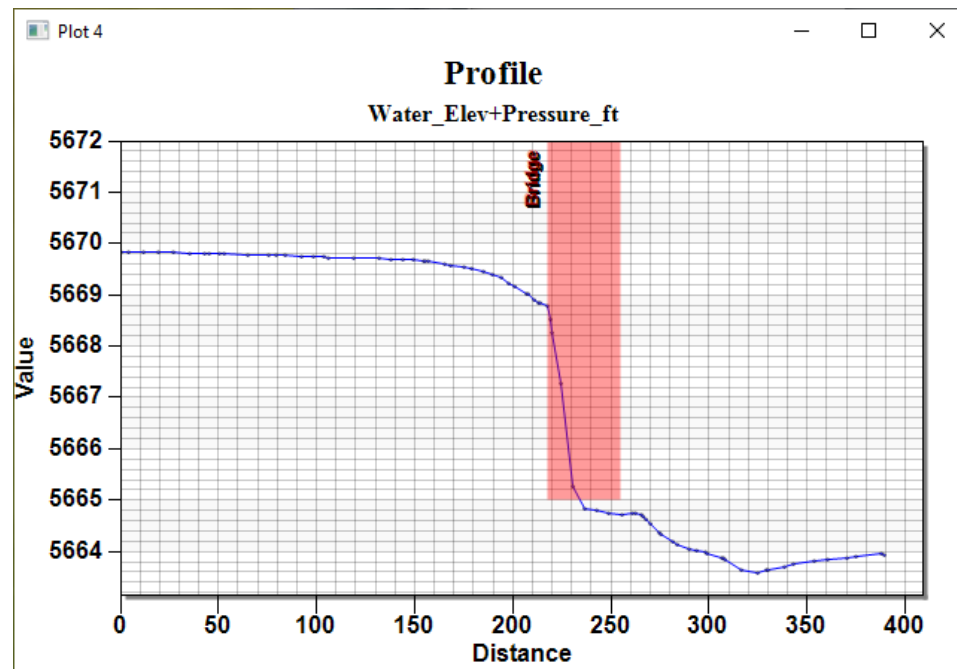

Figure 4   Profile plot using the Plot Data coverage to show the location of a bridge

5   Using a 3D Bridge Component

After creating a 3D bridge in a project, the location of bridge can be displayed in a profile plot. This is similar to using the Plot Data coverage but makes use of the 3D bridge coverage instead.

A 3D bridge was already created for this example. To see how to create a 3D bridge in SMS, see the "3D Bridge" tutorial. To view the 3D bridge, do the following:

1. In the Project Explorer, turn on the "   3D_Bridge" UGrid.
2. **Zoom**   into the location shown in Figure 2.
3. Use the **Rotate**   tool to view the 3D bridge.

To add the 3D bridge to profile plot, complete the following:

4. Right-click in the *Plot* window and select **Plot Data** to open the *Data Options* dialog.
5. In the *Show Intersections* section of the dialog, turn off both check boxes in the "Plot Data" row.
6. In the *Components* section, turn on both check boxes in the "Bridge" row.
7. Click **OK** to close the *Data Options* dialog.
8. Leave the *Plot* window open.

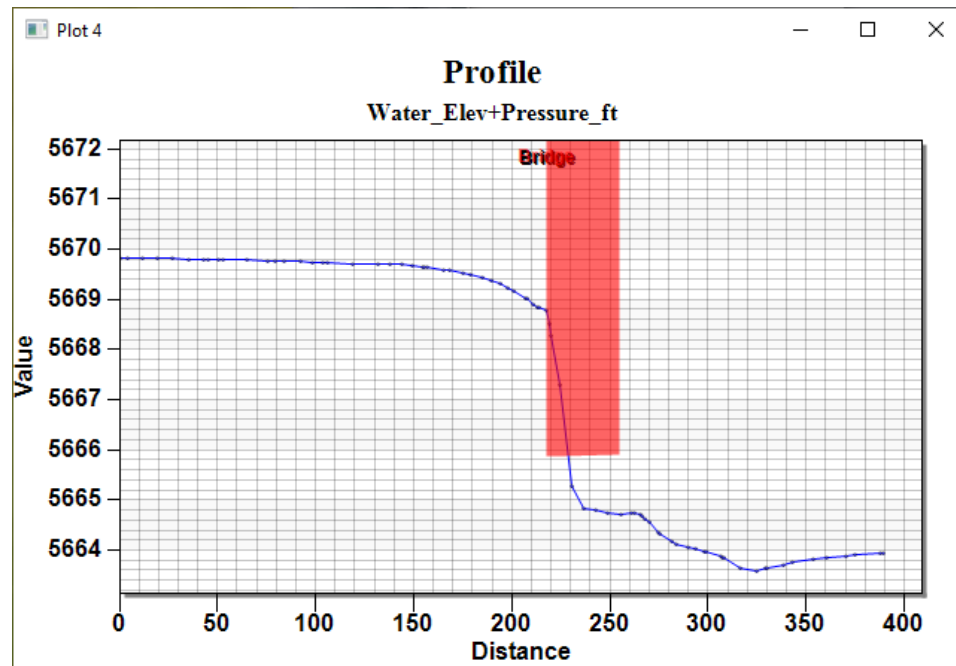The plot will update to appear as in Figure 5.

Figure 5   Profile plot showing the location of the 3D bridge component

6   Saving and Importing a Profile Plot

After creating a plot, the attributes of that plot can be saved as a file and imported into a project. If the *Plot* window is open when saving a project, a plot file will be saved with the project files. When opening a project with an accompanying plot file, the Plot window with the saved profile plot will appear when project is opened.

Plot files can also be saved separately and imported into the same project or a different project. When opened, the plot will show the selected dataset and data options that were active when the plot was saved.

6.1   Saving a Profile Plot

To save a plot file:

1. In the Project Explorer, select the "⊞ Water Elev_ft" dataset.
2. Select *File* | **Save As…** to bring up the *Save As* dialog.
3. Browse to the *data files* folder for this tutorial.
4. Select "Plot File (*.plt)" from the *Save as type* drop-down.
5. Enter "Gila_Plot.plt" in the *File name* field.
6. Click **Save** to save the plot file and close the *Save As* dialog.
7. Close the *Plot* window.

A plot file, "Gile_Plot.plt", has now been created.

6.2   Importing a Plot File

The profile plot file can be imported back into the project by doing the following:

1. Select *File* / **Open…** to bring up the *Open* dialog.
2. Select "Plot File (*.plt)" from the *Files of type* drop-down.
3. Browse to the *data files* folder for this tutorial and select "Gila_Plot.plt".
4. Click **Open** to import the plot and exit the *Open* dialog.

The previous plot will appear.

6.3   Importing a Plot File Into Another Project

A profile plot can be imported into another project if the project has certain characteristics. In general, the project needs to have a mesh the same as the project from where the plot was saved. The project also needs a dataset with the same name as the dataset that was active when the plot was saved. Finally, for a profile plot, an observation coverage with the same name is also needed.

To see how this works, import the "Gila_Plot.plt" into another project. Start by importing a different project that uses the same mesh along the Gila River.

1. Select *File* / **Open…** to bring up the *Open* dialog.
2. Select "Project Files (*.sms)" from the *Files of type* drop-down.
3. Browse to the *data files\Gila_Culvert* folder for this tutorial and select "Gila_Culvert.sms".
4. Click **Open** to import the project and exit the *Open* dialog.
5. If asked to delete existing data, click **Yes**.

The profile plot file can be imported back into the project by doing the following:

1. Select *File* / **Open…** to bring up the *Open* dialog.
2. Select "Plot File (*.plt)" from the *Files of type* drop-down.
3. Browse to the *data files* folder for this tutorial and select "Gila_Plot.plt".
4. Click **Open** to import the project and exit the *Open* dialog.

A warning will appear say that a similar water elevation dataset will be used since it could not find the same water elevation data set.

5. Click **OK** to close the warning dialog.

A Plot window will appear showing a profile plot for the observation arc that runs through the culvert structure in this project. Since the project did not contain a 3D bridge component, the component is not displayed in the plot.
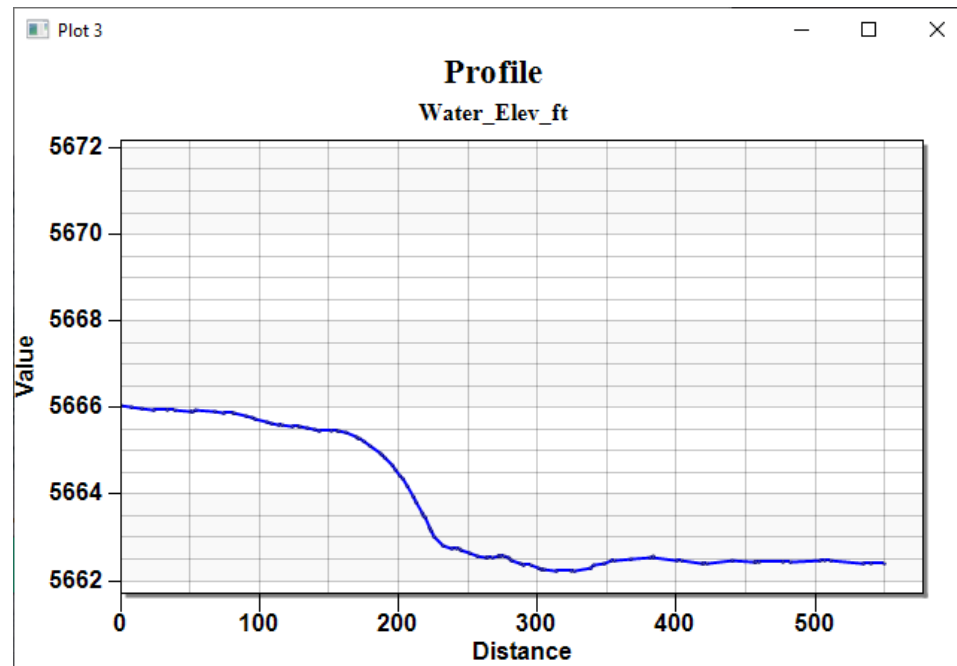
Figure 6   Profile plot of "Water_Elev_ft" in the culvert project

7   Conclusion

This concludes the "Observation Data" tutorial. Feel free to continue experimenting with the program, or exit SMS.