## Exercise 13-2

This is a group exercise to demonstrate how stream cross sections can be plotted from both a digital terrain model (DTM) and the field surveyed survey chains. A previous exercise demonstrated how survey points are used to create a chain and a profile. This exercise plots the chains to indicate the location of the cross sections, creates cross sections at those locations from the DTM, and adds the surveyed profiles so a comparison can be made between the DTM and the field-surveyed data. A later exercise demonstrates how a report can be generated from this geometric information for import into HEC-RAS.

1. Open the MicroStation file:
   **t:\br-proj\a_geopak\d2\j2p0300\data\pattern_shape_j2p0300.dgn**.

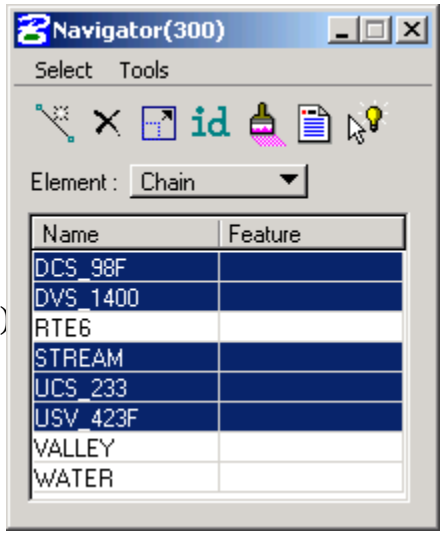
   If it has not already been done, attach the following files as references:
   **t:\br-proj\a_geopak\d2\j2p0300\data\plan_j2p0300.dgn**.
   **t:\br-proj\a_geopak\d2\j2p0300\data\topo_j2p0300.dgn**.

2. Open the project **t:\br-proj\a_geopak\d2\j2p0300\project\j2p0300.prj** and enter it as **userc**.

3. Copy the J2P0300 working alignment to **Stream** and enter that working alignment.

4. **Enter Coordinate Geometry** (COGO). Set Visualization to and use the Permanent and use the COGO Navigator to **visualize the following chains**, which are highlighted in the figure to the right. To do this, set Element to Chain, highlight the desire elements, and click on the paintbrush (Visualize Element) icon.

   **DCS_98F** (Typical Channel Section 98' Downstream)
   **DVS_1400** (Narrow Valley Section 1400' Downstream)
   **STREAM** (The Streambed)
   **UCS_223** (Typical Channel Section 233' Upstream)
   **USV_423F** (Narrow Valley Section 423' Upstream)

   Close the navigator and COGO.

   The section of the RTE6 chain that corresponds to the Existing Channel section will be plotted later.

5. To make it easier to complete the rest of this exercise, turn off the display for the reference files.

6. A close inspection of the plots of the chains shows that lines are not straight, which means that locations surveyed weave back and forth. In fact, the upstream channel section actually doubles back in two placed near where it crosses the stream. Engineering judgment is needed to determine whether the chains and profiles should be used as submitted or recreated by eliminated some of the points. To do this, the chain and profile need to be restored using only the desired points. Exercise 5-4 gives information on how to store a chain and a profile from a set of points.

   For this exercise we will use the chains and profiles used as submitted with the Bridge Survey Report for the project. Great care must be used before modifying the survey information provided. If you question the data, the best option is to direct them to the District Contact, who can verify the information with the surveyor.

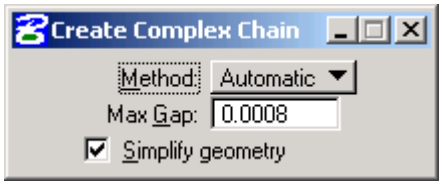
7. The pattern lines that are used to indicate the location of cross-sections need to be a single line or a line string running from the left to the right side of the alignment that connects the cross-sections together. For this case, the alignment chain is STREAM, which is the streambed as surveyed.

   Set the active MicroStation symbology to the following:

| | |
|---|---|
| **Lv Names** | **Geopak-Pattern line 2** |
| **Color** | **0** |
| **Line Style** | **0** |
| **Weight** | **1** |

   The lines visualized using COGO are just a series of lines. Use the MicroStation Create Complex Chain to covert the lines in to line strings. It is the highlighted tool in the Main MicroStation toolbox shown to the right.

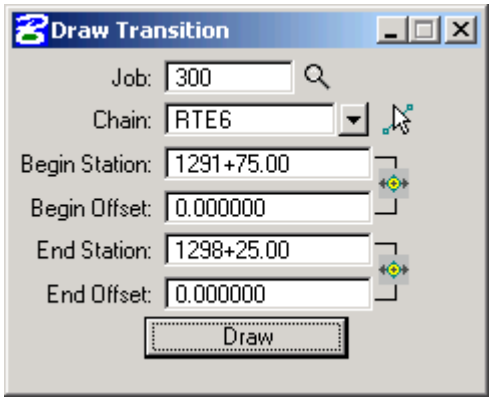
   In the **Create Complex Chain** tool, set the Method to **Automatic** and toggle on **Simplify geometry**, as shown below.




   With this tool active click on the left end of each of the section chain lines and data point twice to accept.

8.


Since only a portion of the RTE6 chain needs to be plotted, use Draw Transition to plot the portion needed. It is the third icon in the raised tool pallet in the Road toolbox shown to the left. The expanded tool pallet is shown above an to the right:



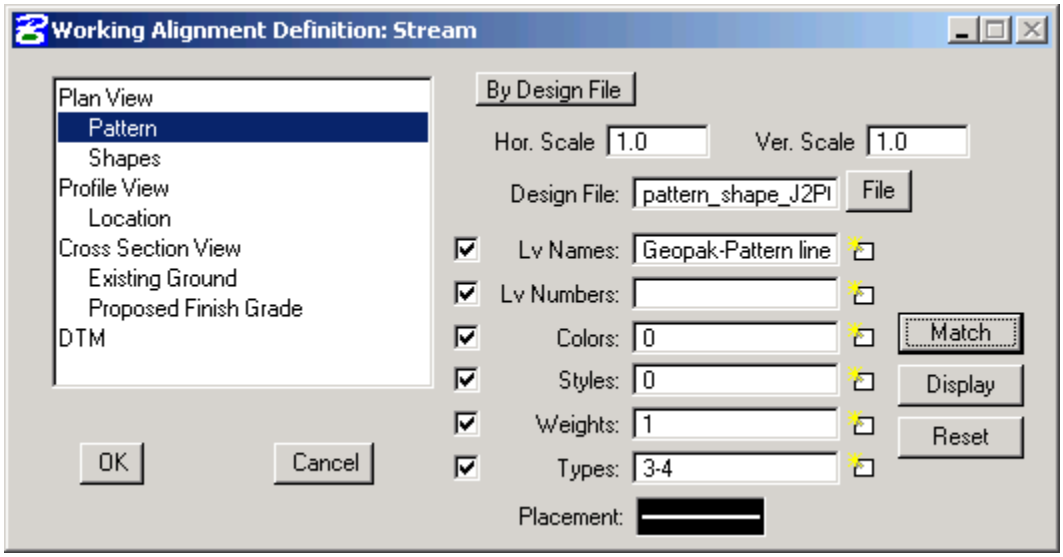

The existing channel section is plotted from RTE6 **Station 1291+75.00 to 12+98.25**. Use the same range when drawing the chain with a **beginning and ending offset of zero**, which indicates the location of the existing channel section in the drawing.

Set up the Draw Transition tool as shown to the right and click **Draw**.

9. Enter the Working Alignment Definition for **Stream** and change the following:

| Section | Item | Value |
|---|---|---|
| **Plan View** | **Chain:** | **STREAM** |
| **Pattern** | **Design File:** | **pattern_shape_j2p0300.dgn** |
| | **Lv Names** | **Geopak-Pattern line 2** |
| | **Weights** | **1** |
| | **Colors** | **0** |

The easiest way to set Pattern search symbology is to use the Match feature. To use it, click on the **Reset** button to clear the symbology settings, click on the **Match** button, **data point on one of the pattern lines** (the line is highlighted), and **data point again to accept** the line. The completed dialog of the Pattern section is shown below.

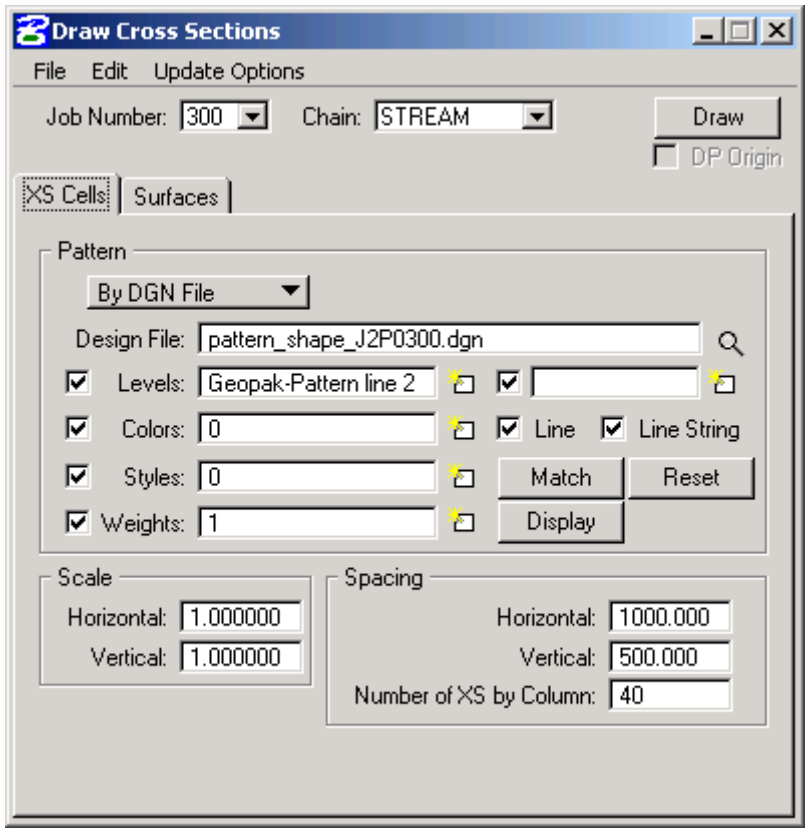


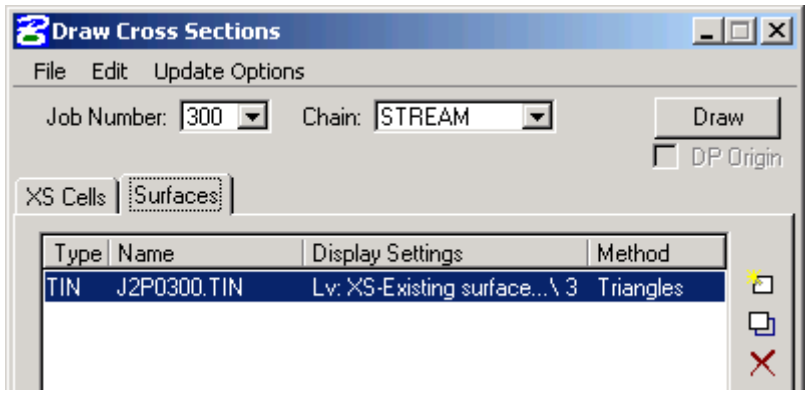

Make sure you get **line types 3-4**. Click **OK** to accept the changes.

10. Save changes to the current MicroStation file and open the following drawing:
**t:\br-proj\a_geopak\d2\j2p0300\data\xs_stream_j2p0300.dgn**.

11. Choose **Existing Ground Cross Sections** from the **Project Manager** dialog.

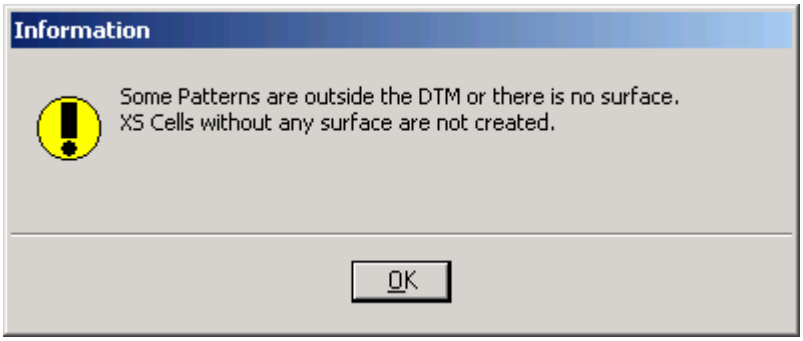
Copy the **MoDOT** run to **Stream** and enter that run. Set the **XS Cells tab** as shown below and have the **J2P0300.TIN** as the only one listed under the **Surfaces tab**.




Select **Draw** to generate the sections. **Save** the MicroStation file. Exit the run and save settings

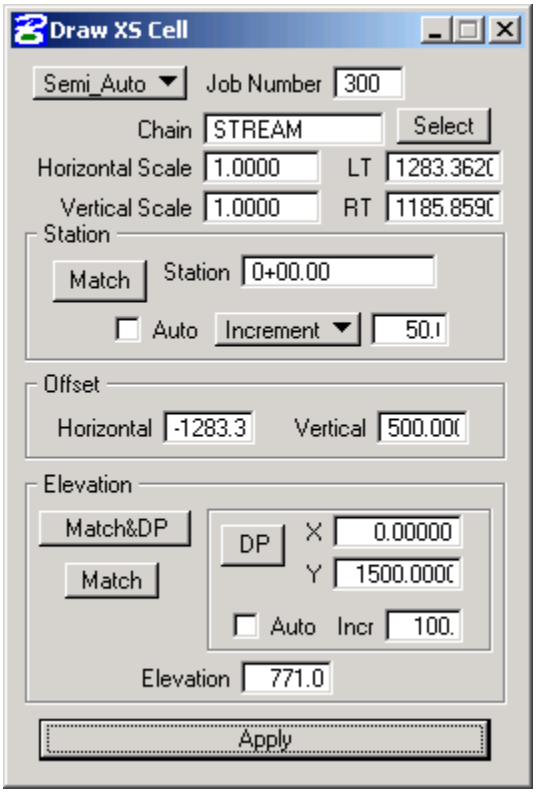
12. When you click on Draw you should have gotten the following dialog:




This dialog appears because the downstream narrow valley section is outside of the TIN model. Before plotting this profile, a cell needs to be drawn to for that pattern line.

Open the Draw Cross Section Cells tool. It is fifth (5th) icon from the right in the Cross Section tool pallet, which is shown below. The Cross Section tool are located in the lower left hand corner of the Road tools.

Enter the following settings in the Draw XS Cell tool, as shown to the right:




Top Section

| | | | |
|---|---|---|---|
| Method | **Semi_Auto** | | |
| Job Number | **300** | | |
| Chain | **STREAM** | | |
| Horizontal Scale | **1.00** | LT | **1283.362** |
| Vertical Scale | **1.00** | RT | **1185.859** |

Station Section

| | |
|---|---|
| Station | **0+00.00** |
| Auto | **Off** |

Offset Section

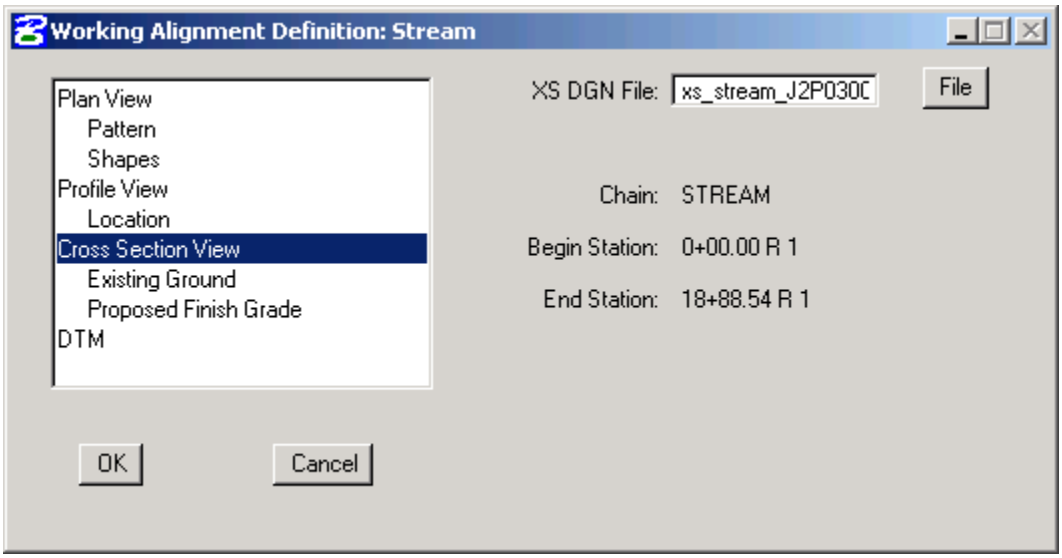
| | |
|---|---|
| Offset Horizontal | **-1283.362** |
| Offset Vertical | **500** |

Elevation Section (DP is left end of top cell)

| | |
|---|---|
| DP X | **0.00** |
| DP Y | **1500** |
| Auto | **Off** |
| Elevation | **771** |

Click **Apply** to draw the cell.

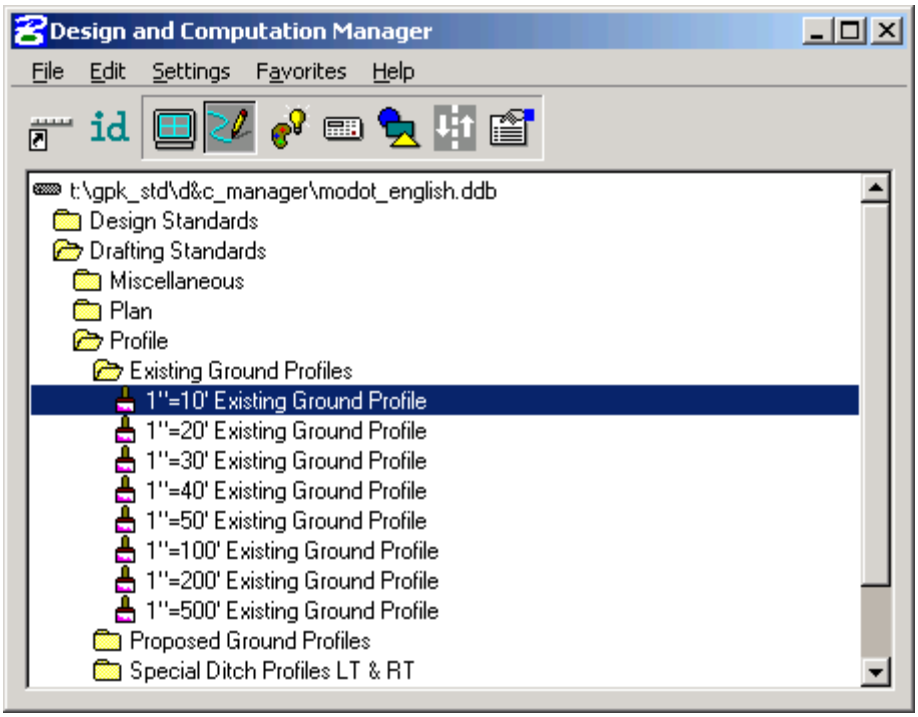
13. Set **xs_stream_j2p0300.dgn** as the **XS DGN** in the Cross Section View section of the Water **Working Alignment Definition** as shown below.




14. The final step is to draw the survey profiles for each of the sections.

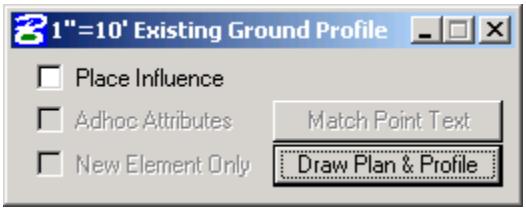
Open **D & C Manager** and navigate to the following item:

**Drafting Standard \ Profile \ 1”=10’ Existing Ground Profile** as shown below.



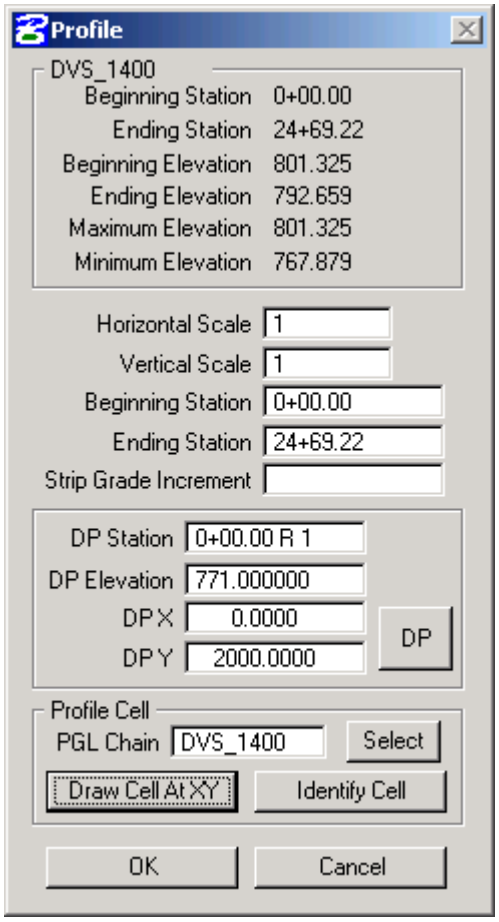
(Step 14 continued)

Click on **Draw Plan & Profile** in the operations box shown below.




This will bring up the following dialog. Since only the line and no text is being plotted the setting of the label scale does not matter.

Since the sections will be plotted from top to bottom, select the profile **DVS_1400**. Set up the Profile dialog as shown below.



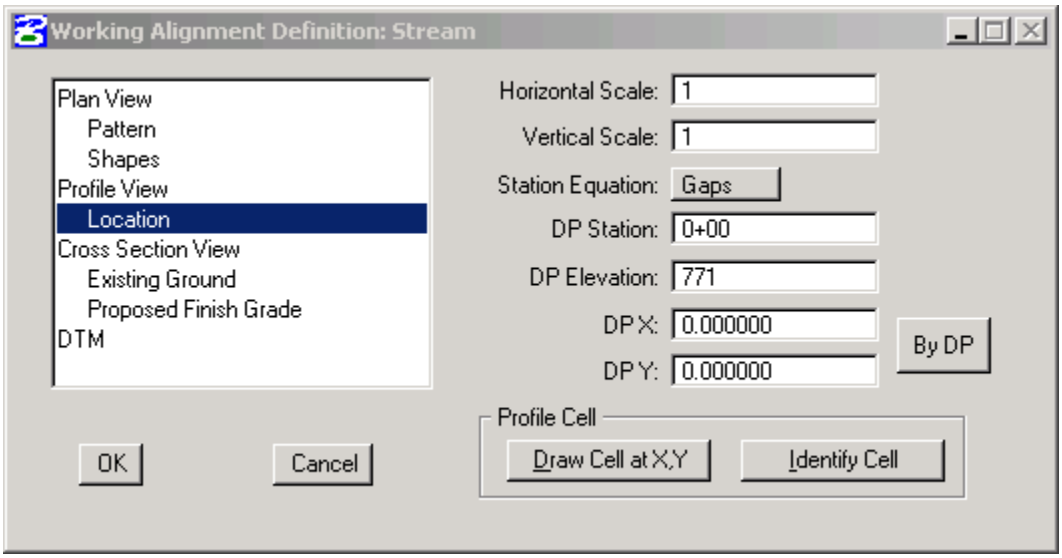

The **DP** point is the left edge of the top most cross section cell (Station 0+00).

Click on **Draw Cell At XY** to place a profile cell.

Click on **OK** to draw the profile.

(Step 14 continued)

To make the placement of the rest of the profiles easier, open the Working Alignment Definition dialog and go to the Profile View / Location section. Set it up as shown below

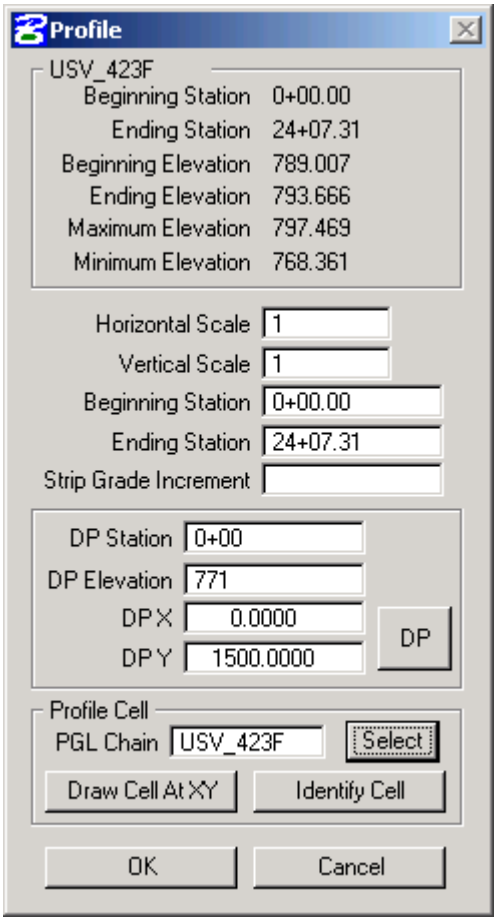


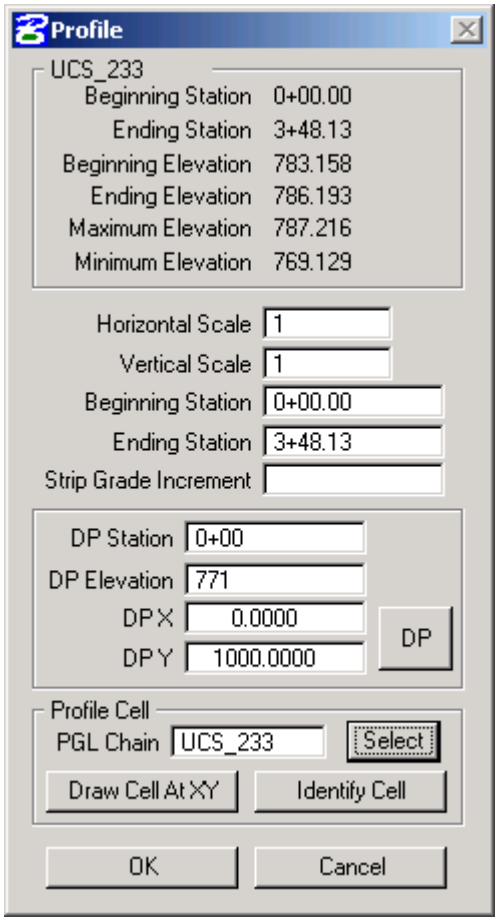

Click **OK** to save the changes.

(Step 14 continued)

The second from the top XS cell (Station 18+88.54) is for the upstream narrow valley section.

Select the profile **USV_423F**. Set up the Profile dialog as shown below on the left.




Click on **Draw Cell At XY** to place a profile cell.

Click on **OK** to draw the profile.

Repeat the process for the third XS cell (Station 16+68.42), which is for the upstream channel section.

Select the profile **UCS_233**. Set up the Profile dialog as shown above and on the right.

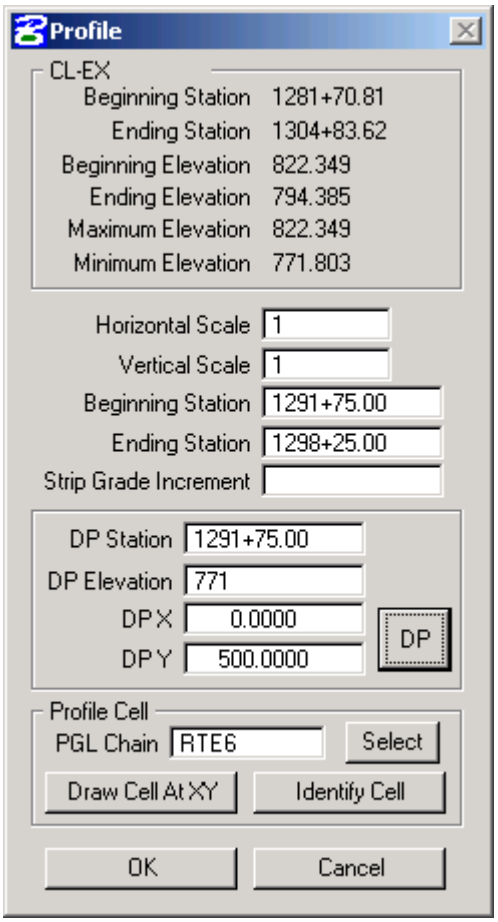
Click on **Draw Cell At XY** to place a profile cell.

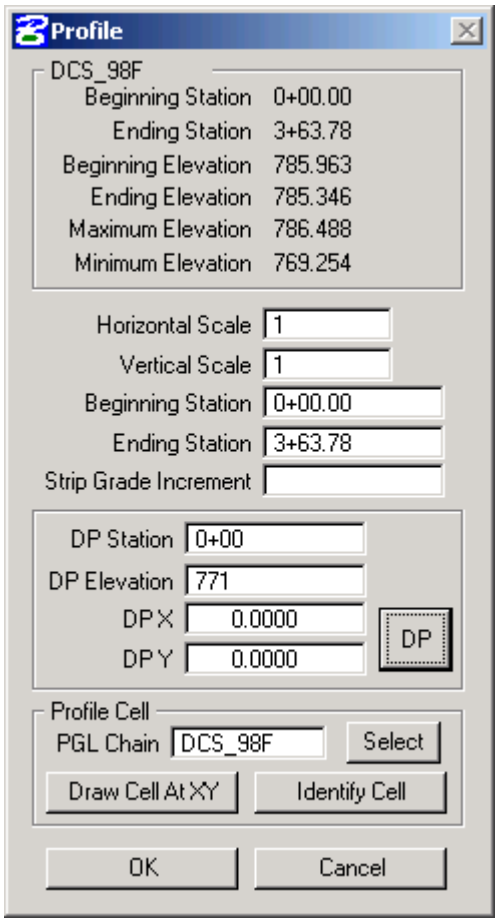
Click on **OK** to draw the profile.

(Step 14 continued)

The forth XS cell (Station 14+36.88) is for the existing channel section.

Select the profile **CL-EX**. Since the pattern line was not created for the whole profile, limit the plot of profile to **Stations 1291+75 to 1298+25** set the rest of the Profile dialog as shown below on the left.




Click on **Draw Cell At XY** to place a profile cell.

Click on **OK** to draw the profile.

Repeat the process for the bottom XS cell (Station 13+41.50), which is for the downstream channel section.

Select the profile **DCS_98F**. Set up the Profile dialog as shown above and on the right.

Click on **Draw Cell At XY** to place a profile cell.

Click on **OK** to draw the profile.

Close D&C Manager and **save** the changes to the MicroStation drawing.