May 2013

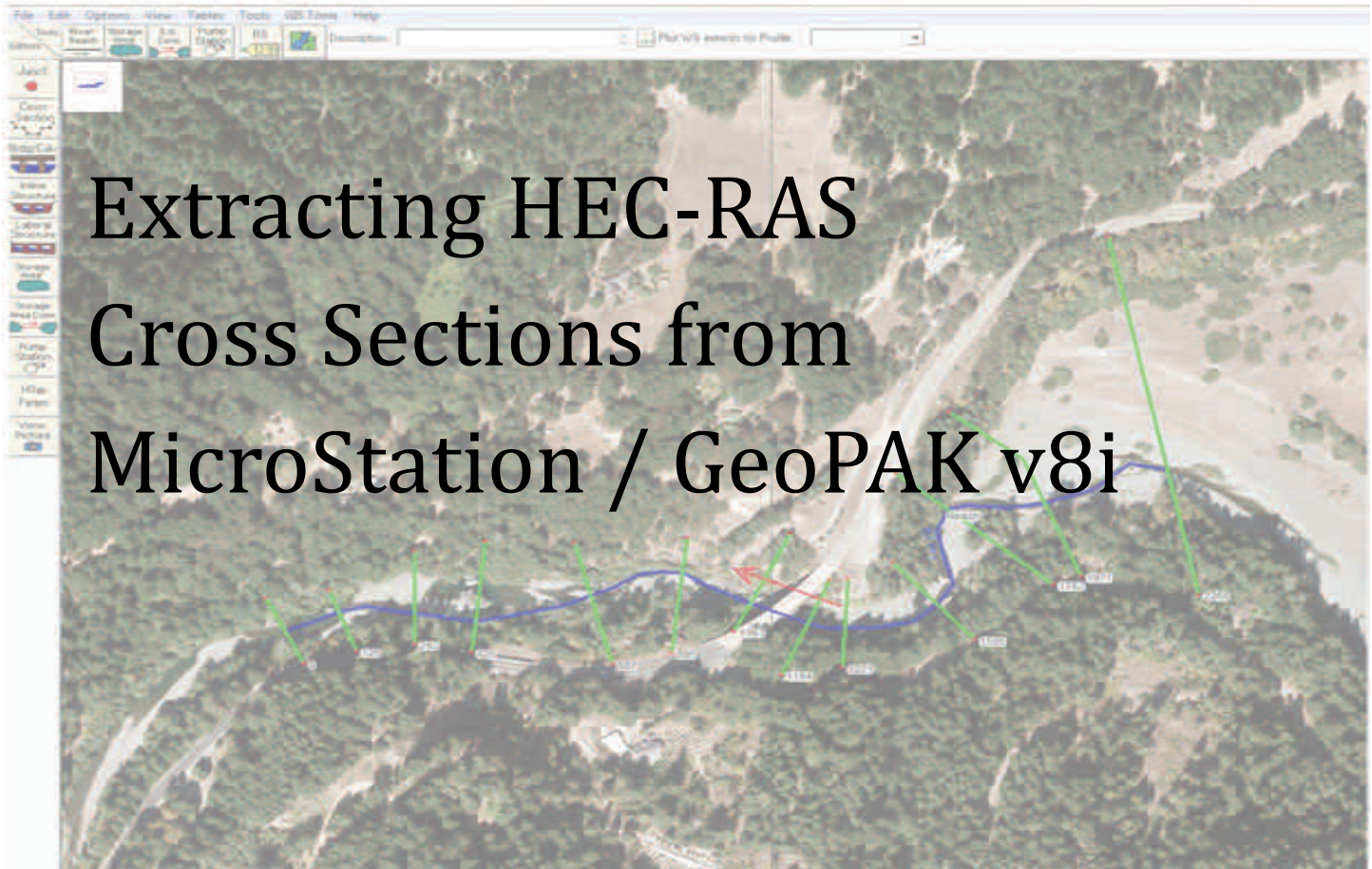# Extracting HEC-RAS Cross Sections from MicroStation / GeoPAK v8i

Please forward any questions or comments on this material to:

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Required Information

- MicroStation v8i .dgn file setup for your project units/coordinates. The file must be a 2D rather than 3D file (Cross sections will not export from a 3D .dgn file)

- MicroStation .tin file—DTM file used to generate contours in MicroStation

Additional helpful information:

- Background image (geo-rectified)

- Project planimetric data (key features including waters edge, road alignment, etc.)

- Contours generated from the *.tin* file

Creating HEC-RAS geometry in MicroStation

Step 1. Open your project .dgn file in MicroStation

Step 2. Set User Preferences in GeoPAK. Go to Menu: **Applications —> GEOPAK —> ROAD —> User Preferences**

- Set the working directory to your preference

- Clear all cells in the *COGO preferences*
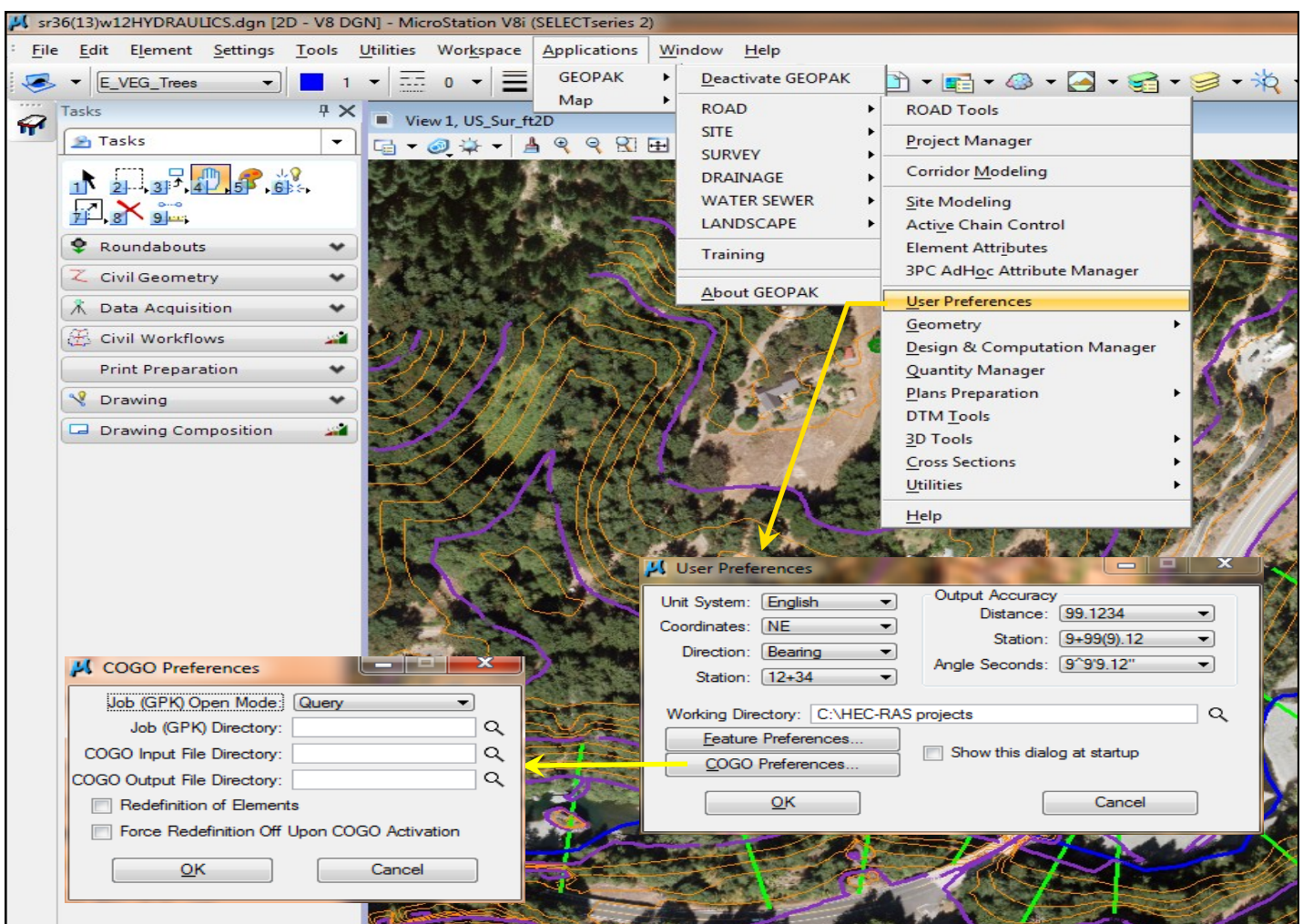
Creating HEC-RAS geometry in MicroStation

Step 3. Create a new level for your line work

- Go to **Settings —> Level —> Manager —> Level —> New**. Use a name of your preference (i.e. HYDRO).

- After the level is created, right click it and set it to active

- Set desired color and line type

Step 4. Draw cross sections

- Draw each cross section in the desired locations using the *Place SmartLine* tool. IM-PORTANT—Start each section on the left side (looking downstream). Cross sections may have multiple segments to maintain perpendicular alignment to the flow

Step 5. Draw channel centerline

- Using the *Place SmartLine* tool, click points along the channel thalweg (or centerline), starting at the DOWNSTREAM end of your model limit to the upstream limit.
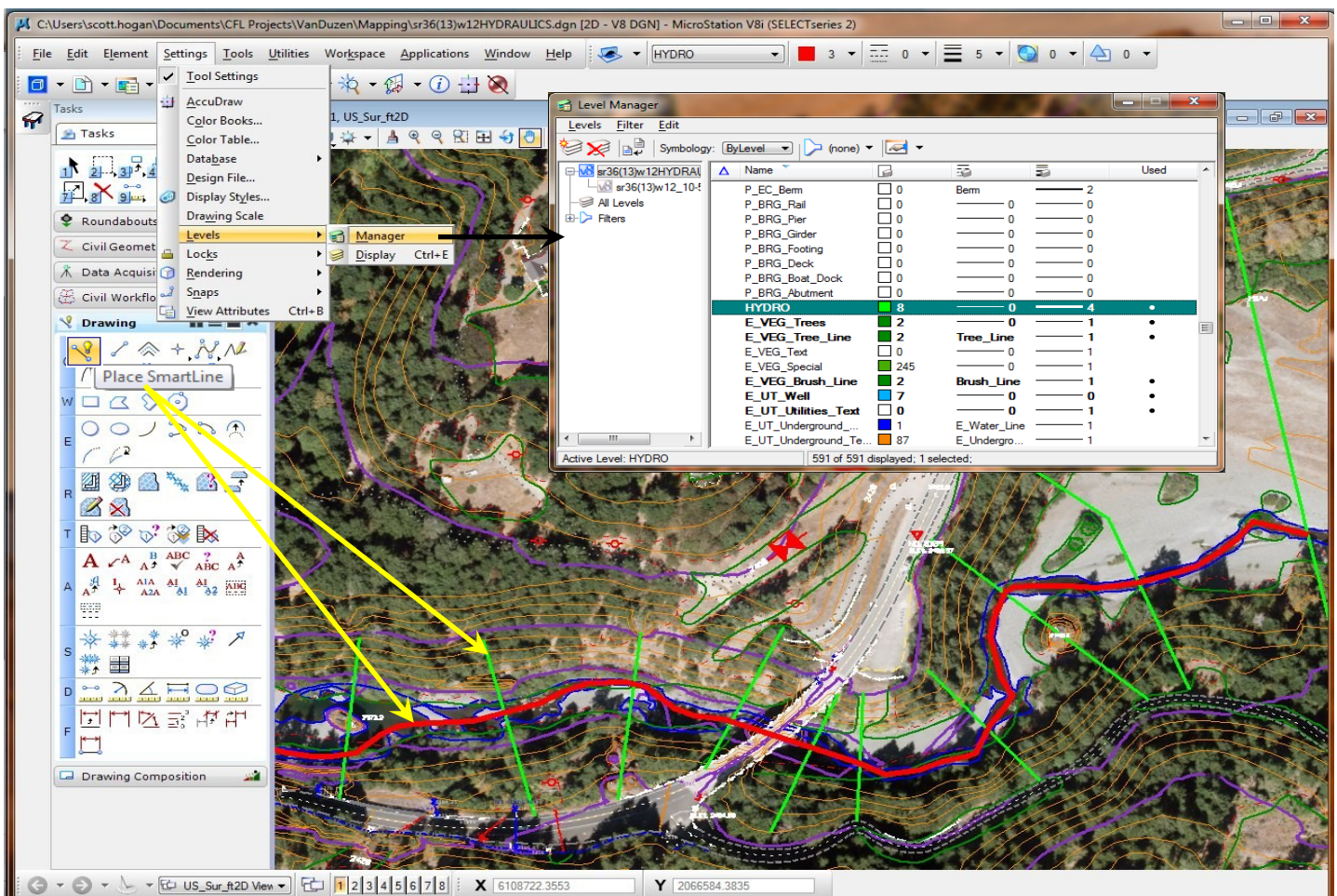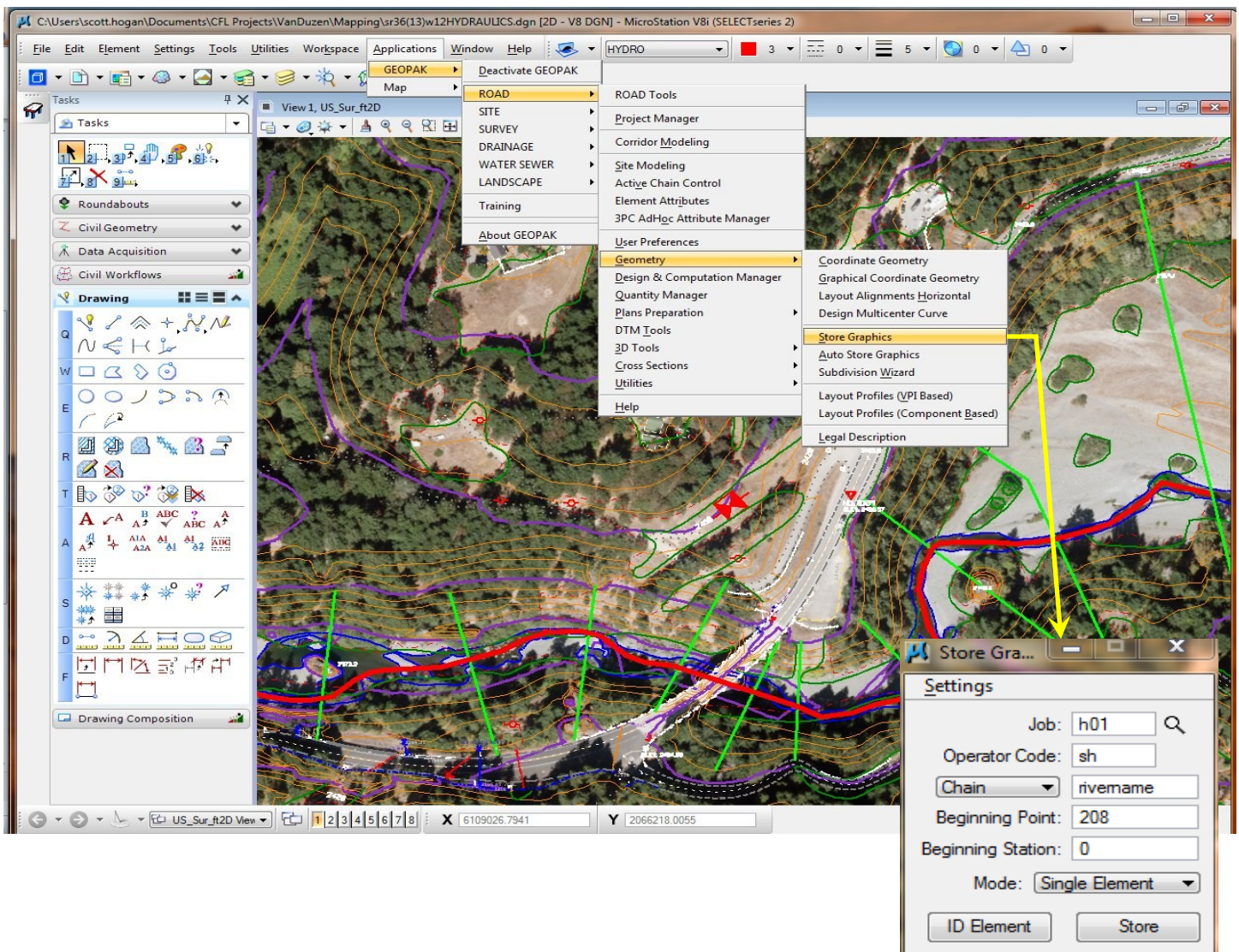
Creating HEC-RAS geometry in MicroStation

Step 6. Save the alignment

- Go to **Applications —>GEOPAK—>ROAD —> Geometry —> Store Graphics**

- In the *Store Graphics* window enter a job name (i.e.h01)

- Use your river name for the chain

- Leave the point and station as is

- Change the Mode to '*Single Element*'

- Select *ID Element,* click the Centerline to highlight it and then click again away from the center-line to accept the selection

- Select the *Store* button in the Store Graphics window. If prompted to create a project and add a new chain, select 'yes'
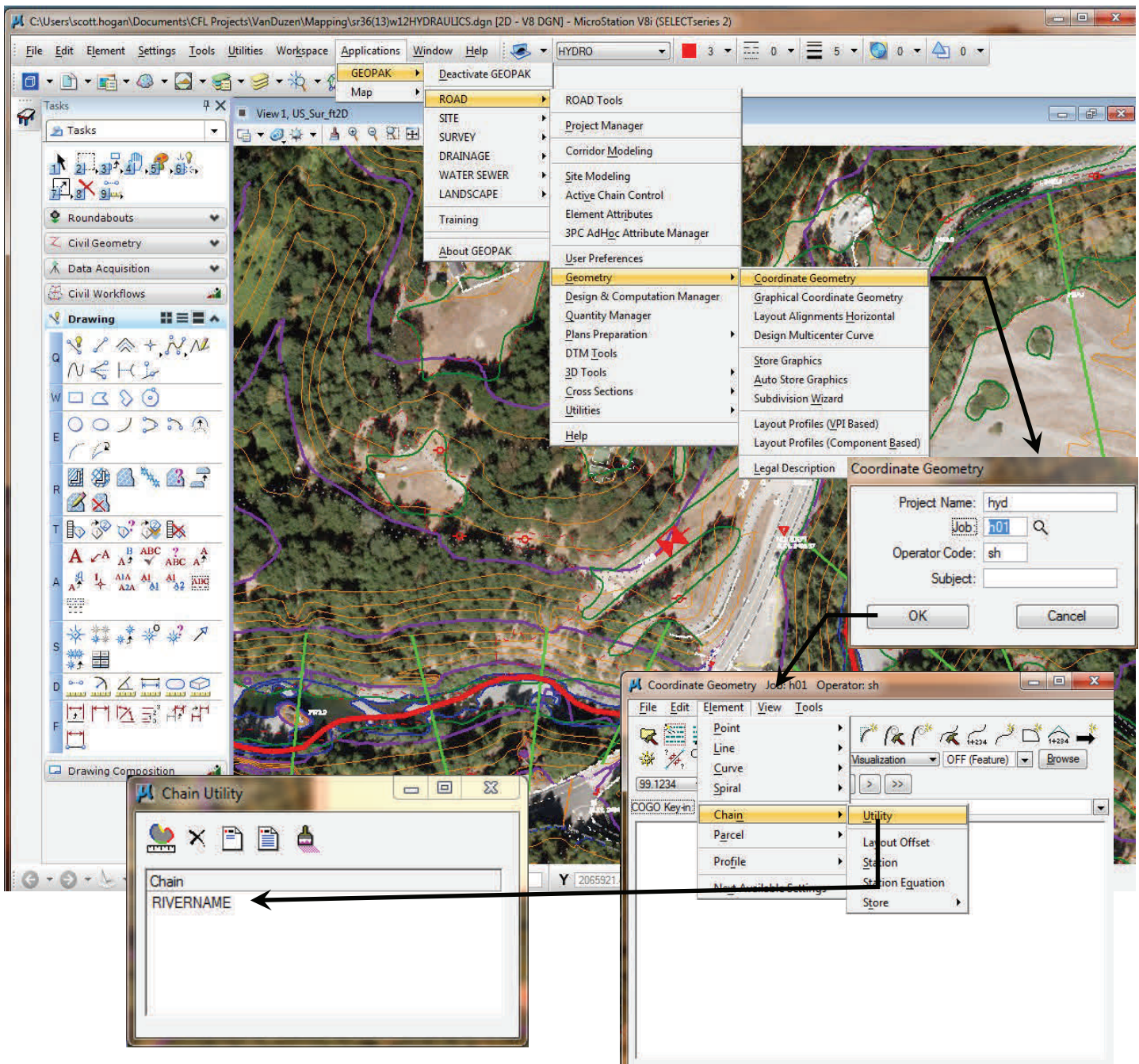
Creating HEC-RAS geometry in MicroStation

Step 7. Confirm the alignment.

- Go to **Applications—>GEOPAK —>ROAD —> Geometry —> Coordinate Geometry.**

- Enter your job number window and select *OK*.

- In the Coordinate Geometry select **Element —>Chain —> Utility.**

- Confirm that the alignment name is displayed (River name). If not, redo Step 6.

Creating HEC-RAS geometry in MicroStation

Step 8. Cut Cross Sections

- Go to **Applications—>GEOPAK—>ROAD —> Cross Sections —>Draw Cross Sections from Surfaces** to open the *Draw Cross Sections* window.

- Under the *Surfaces Tab*, browse and select the project tin file (under Details) and then click the *Add Surface* icon on the right side of the window.

- Under the *XS Cells* Tab, Change the pull down from 'By Station' to 'By DGN file'. Select the Design file (.dgn) where you want the plotted cross sections to go to (most likely the current file).

- Select all six check boxes (level, color, style, weights, line, line string).

- Select *Match* and select (and accept) one of your cross sections.

- Select *Display*, which should highlight all of your sections. If not, select each individually.

- Select *Draw* and the cross sections should be generated in the design file. Select 'Fit View' if you don't see them.
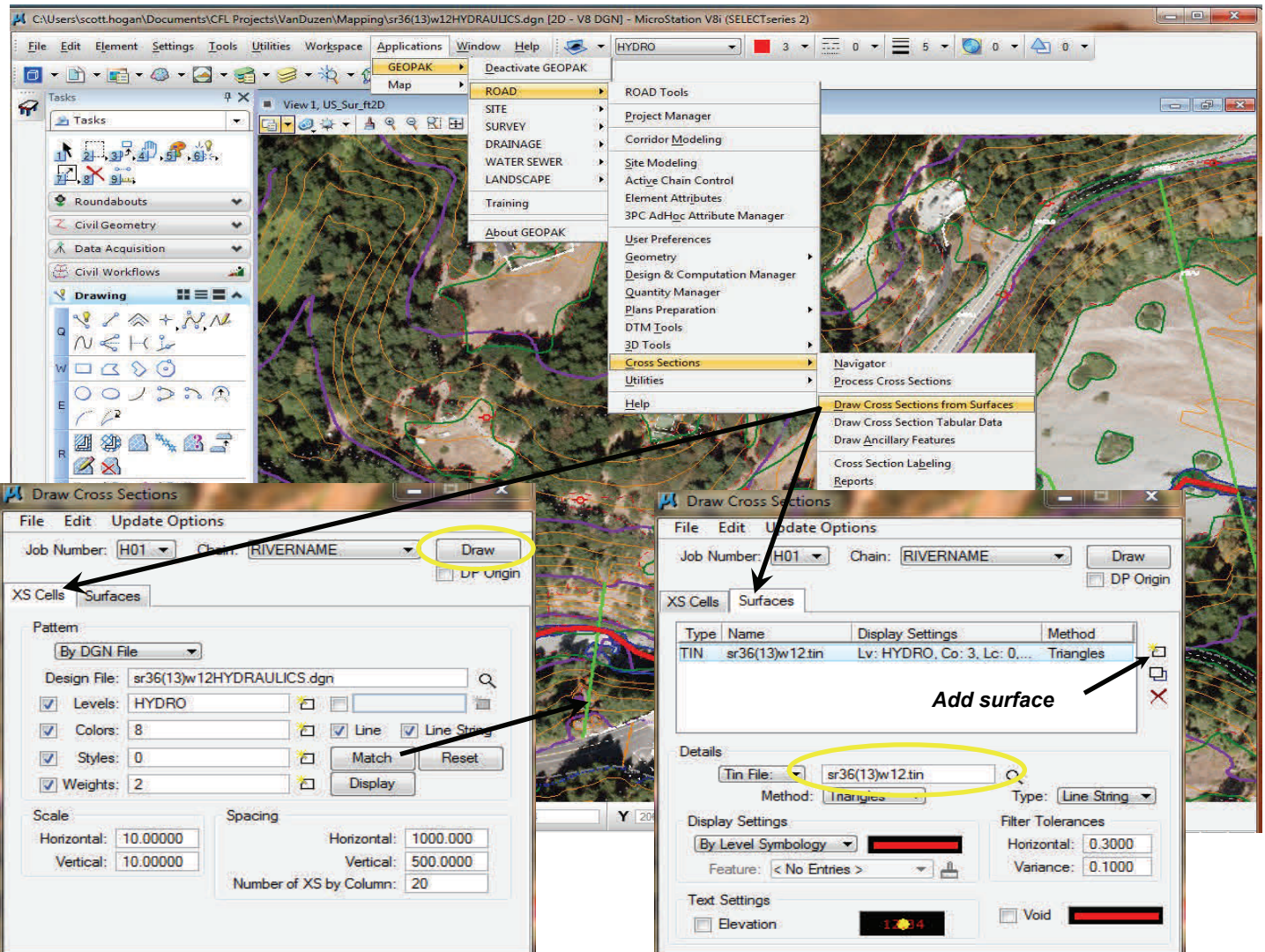
Creating HEC-RAS geometry in MicroStation

Step 9. Export HEC-RAS file

- Zoom in to the generated cross section plots

- Go to **Applications—>GEOPAK—>ROAD —> Cross Sections —> Reports**

- Select *HEC-RAS* in the pop-up window

- In the *HEC-RAS Report* window select *HEC-RAS Elements*

- In the HEC-RAS Select Elements window select all of the check boxes

- Select *Match* and click/accept one of the plotted cross sections

- Select the preferred location and name of the HEC-RAS file in the HEC-RAS Report window and make sure that the correct job number is open (i.e. h01)

- Select *Apply*— This generates a HEC-RAS GIS geometry file (.geo extension) that contains the centerline and cross section data.
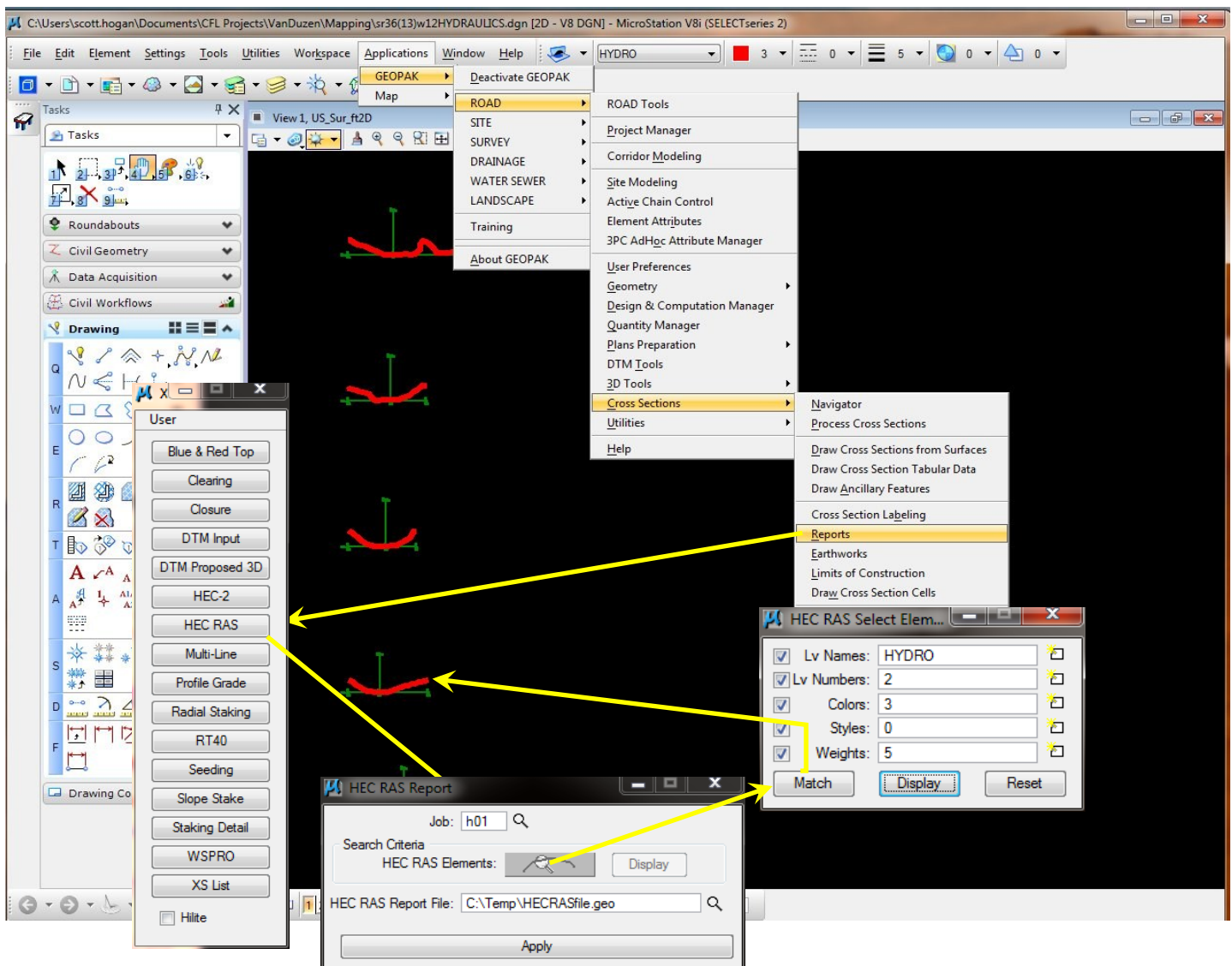
Importing geometry into HEC-RAS

Step 1. Importing the GIS geometry into HEC-RAS

- Run HEC-RAS and open your project or start a new one

- Open the Geometric Data editor and go to **File —>Import Geometric Data —> GIS Format** and go to the directory where you saved the HEC-RAS report from MicroStation. Open the .geo file.

- The next few windows allow you to set the units for your model, change the river/reach names, and adjust the stationing.
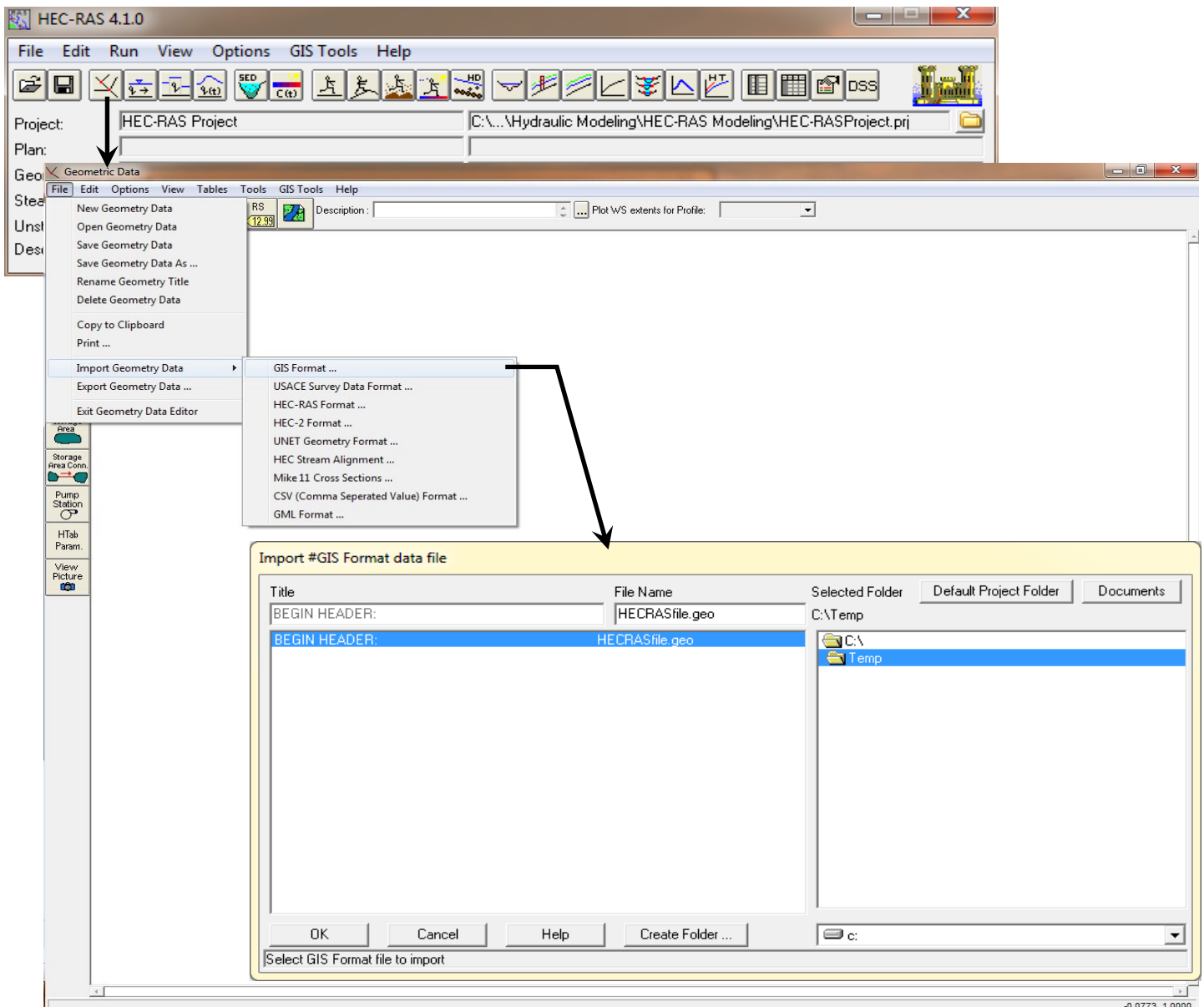
Importing geometry into HEC-RAS

- Under the *Import Geometry Data window / Intro* tab, select the appropriate units and click next

- In the *Import Geometry Data window / River Reach Stream Lines* tab you can change the river and reach names (These can also be changed later). Click next after making any changes.

- In the *Import Geometry Data window / Cross Sections and IB Nodes* tab check only the boxes that apply (Cross Sections (XS), GIS Cut Lines, and Station Elevation Data. Select the *RS* data under the *Import As* column and then select *0 decimal places* and click **Round** (optional).

- If you don't wish to import all cross sections you can de-select individual sections under the *Import Data* column

- Click **Finished-Import Data**

Importing geometry into HEC-RAS

- Please note that this procedure only imports the cross section station/elevation data, cross section location/alignment, and the centerline alignment at each cross section. All of the other cross section information needs to be added by the user (i.e. Reach Lengths, Manning's n Values, Bank Station locations, and Contraction Expansion Coefficients).

- Reach lengths can be measured in HEC-RAS by holding the CTRL button and clicking the mouse while in the Geometric Data Editor. MicroStation also has a similar tool.