Tool Descriptions – Design\_Tools

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**HEC-RAS\_merger.xlsm**

1. Purpose

This spreadsheet takes in a 2 dimension surface and injects a designed cross section into it.

1. Usage

Open the “Typical Cross Sections Tab”. The sheet is broken up into groups of three columns, each representing a designed cross section. Under STA and EL, enter in the station and elevation of the designed cross section. The cross section should have an odd number of points. You can enter up to 11 cross sections.

Open the “10+00” tab. Mark the cross section you want to inject with an “x” in cells F2:F12. Paste The stationing and elevations of the existing surface into the appropriate cells in Columns L and M. Cells I3 and J3 are used to specify the station and elevation of the middle of the injected cross section. Set these, then press the “Add XS” Button. A blue XS will appear on the first chart and Columns O and P will fill. If the chart is not scaled properly, click the chart and then press the “Set Axes” button.

There are several ways to decide on how to tie out the cross section. The most common is to set the tieout parameters (J15:J18) and then hit the “Generate Tieouts” button. With these parameters you can specify the left and right floodplain widths and tieout slopes. You can also use the six small button around cell J8 to extend or trim the edge of the XS to the current ground surface, specify the elevation of the edge of the cross section, or match the elevation of one side of the cross section to the other. Once you are satisfied with your tieouts, hit the “Merge XS” button. If the “Trim” button is used, the FPW and Tieout Ratio for the side will be set to TRIM. If you want a flat tieout ratio enter “Flat”. You MUST hit “Generate Tieouts” before “Merge XS”. “Generate Tieouts” will fill columns R and S and “Merge XS” will fill Columns U and V.

The result will show in the second chart. If you do not like the result, hit the “Clear” button to start over. You can also save your result and restore it with the “Save Existing XS” and “Restore from Save” buttons. You can also use the “Delete Point” button to remove unwanted points from the new surface. The “Next Point” and “Previous Point” buttons can be used to traverse the surface. If you like the result, hit the “Confirm Merged” button. This will clear the working columns and replace the values in columns L and M with the new surface you have created.

The “Visvalingam” button can be used to remove points from the *existing* surface such that only n (cell I43) points remain. The result will be displayed on the first chart. These points are removed in order of least to most visual change. If you want to do this, do this before injecting a cross section. If you like the result hit the “Confirm Visv.” button. Reject it with the “Reject Visv.” button.

You can alter more than one surface in a single workbook. Simply make a copy of the worksheet. This is best done before any macros are run for the reasons noted below.

1. Notes

Some macros in the worksheet are destructive, i.e., they delete cells and alter ranges. Always keep a clean, unaltered copy of the worksheet somewhere and use a fresh copy for new projects.

**xs\_design.xlsm**

1. Purpose

The worksheet is meant to facilitate rapid design of cross sections. Bank slopes, max depth, bottom width, terrace slope, channel roughness and water surface slope are used to generate channel geometry and give key info on expected channel hydraulics.

1. Usage

Enter values into cells B1:B8. Expected hydraulic parameters are given in cells B9:B21. Optionally desired hydraulic values can be entered into cells J14:J17 to compare desired values to expected values.

1. Notes

The XS tab can be copied to allow multiple designs in one workbook.