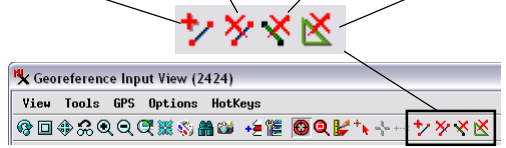# Editing Manifold Surface Triangulation

When you georeference a spatial object such as a raster cross-section using the Manifold model, the 3D control points are automatically connected to form a triangular mesh that defines the projective surface for 3D perspective display. The default triangulation covers the entire area bounded by the control points and may include triangles around the boundary of the object that are outside the area you wish to be visible in the 3D display. If the manifold object is not planar, some boundary triangles may cross the bend lines. If retained, these boundary triangles may obscure the 3D solid view of portions of the section in some view directions.

Tools for Editing a Manifold Triangulation

Define Fixed Edge | Remove Selected Fixed Edges | Remove Selected Edges | Remove Selected Triangles
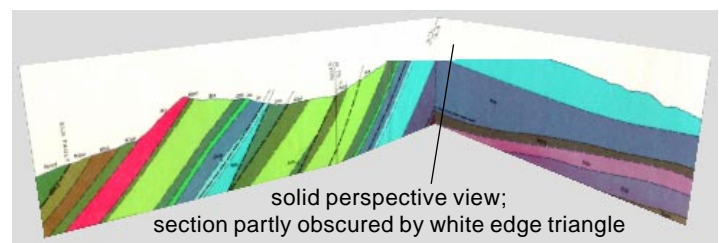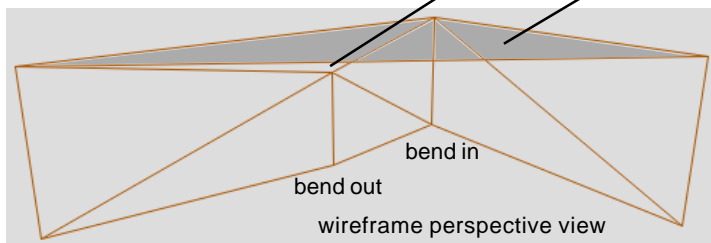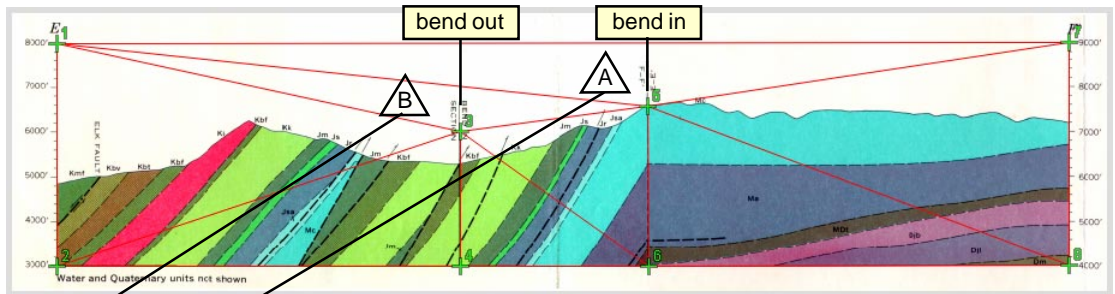

The Georeference Input View window provides several tools that allow you to edit the manifold triangulation. The icon buttons for these tools are illustrated above right. You can select and remove individual edges or triangles. Deleting a triangle makes that area of the object transparent in 3D solid view. If a boundary triangle is deleted, the outside edge of the triangle is also automatically deleted. The Control Points menu on the Georeference window includes a Restore Deleted Elements option to negate previous deletions.
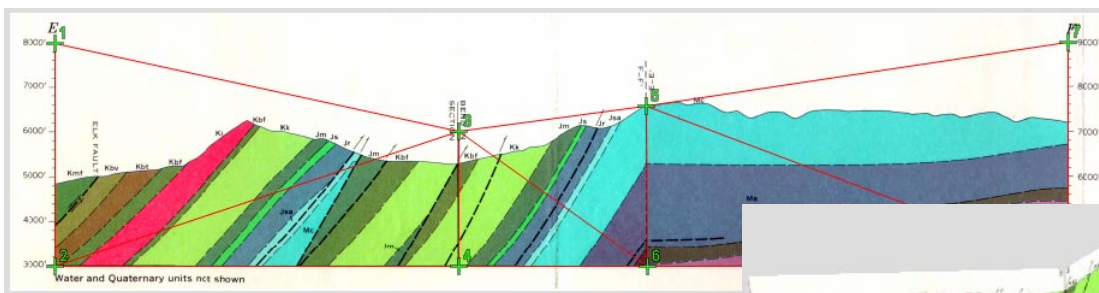
Illustrated below is a raster object showing a vertical geologic cross-section made up of three planar segments separated by vertical bending lines (defined by pairs of control points). Thin red lines in this Georeference 2D view show the default triangulation automatically created from the eight 3D control points. The triangles labeled A and B include only the white background of the scanned cross-section, and these triangles also cross the bends in the section.

bend in
bend out
wireframe perspective view

solid perspective view;
section partly obscured by white edge triangle

3D perspective views (above) of the cross-section with default manifold triangulation as viewed with a downward pitch of about 30 degrees from the horizontal. Boundary triangle A is shaded in the wireframe view (above left). When viewed from this angle in solid mode (above right), the white background rendered on this boundary triangle obscures the upper part of the cross-section. These boundary triangles can be removed using the manifold editing tools to prevent these extraneous background areas from being rendered in 3D views.

The cross-section after boundary triangles A and B were deleted using the Remove Selected Triangles tool, shown in 2D in the Georeference Input View (above) and in the 3D Reference View (right). The section is no longer obscured by extraneous boundary triangles.
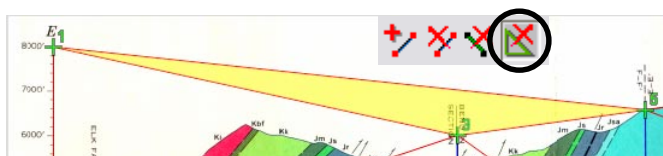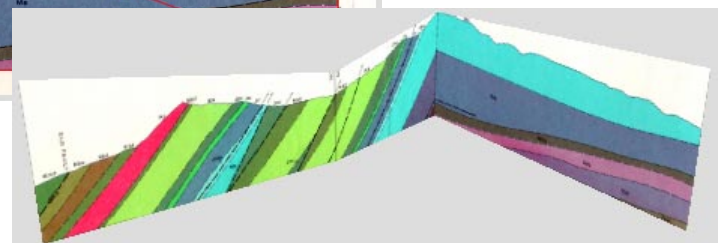

To remove a triangle or edge, turn on the Remove Selected Edges or Remove Selected Triangles tool, left-click on the desired element to highlight it (such as the yellow-highlighted triangle illustrated to the left), then right-click to delete the element.

(over)

You can also define fixed edges connecting pairs of control points. These fixed edges are retained in any subsequent change in the manifold triangulation due to the addition or deletion of other control points. For example, you may wish to define fixed edges along any bend lines in a manifold cross-section. The Define Fixed Edge tool provides a line graphic tool that you use to connect two adjacent control points. The line ends of this tool automatically snap to the closest points when you stop dragging out the line. You can define a fixed edge along an existing edge in the triangulation, or connect two points that are not directly connected in the default triangulation. The Remove Selected Fixed Edges tool can be used to remove individual fixed edges if needed. You can also remove all fixed edges using an option on the Control Points menu.

Fixed edges defined along bend lines
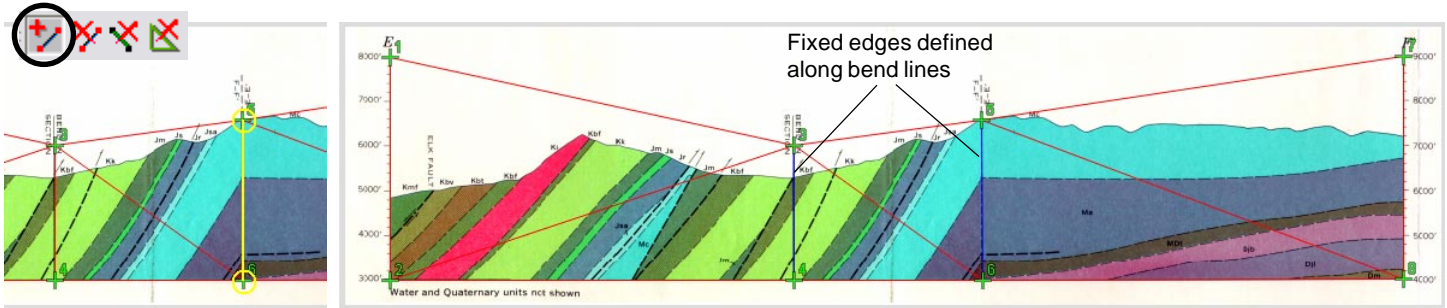
The Define Fixed Edge tool provides a line graphic (in yellow in the illustration above left) that you drag between the control points you wish to connect. Right-click to accept the line and define the fixed edge. In the illustration above right, fixed edges (shown in blue) have been defined along both bend lines in the cross-section manifold.