Bridge object force and stress diagrams

This page is devoted to **frequently asked questions** (FAQ) related to bridge modeler basic concepts.

On this page:

Obtaining bridge force and stress diagrams

Question: How are bridge force and stress diagrams obtained?

Answer:

CSI software uses section cuts defined by groups to obtain bridge force and stress diagrams. These section cuts are automatically formed through parametric definition of the bridge model. Section cuts may be viewed through Display > Show Tables > Model Definition > Bridge Data > Bridge Object Data > Table: Bridge Section Cuts 01 - General *and* Table: Bridge Section Cuts 02 - Groups. Within these tables, the coordinate system for bridge section cuts are as follows:

- The local 1 axis of a bridge object is longitudinal to its layout line. When oriented up-station, this axis is orthogonal to the bridge section cut.
- The local 2 axis is normal to the local 1 axis, oriented in the vertical plane.
- The local 3 axis is normal to both the local 1 and 2 axes, oriented in the horizontal plane. Following the right-hand rule, when the local 1 axis is up-station, the local 3 axis points toward the right edge of the deck.

Any objects added manually are not automatically added to the section cuts. These objects may resist loading, and their contribution to performance may not be displayed in force and moment diagrams.

Bridge response after manual modification

Question: Are bridge-object force and stress diagrams still correct upon manual modification, deletion, or division of certain bridge-deck elements?

Answer: The bridge force and stress diagrams available through the Bridge Object Response Display menu are based on section cuts that utilize only the objects created by the bridge modeler. Any frame, shell, or solid object manually modified, removed, or added will not be accounted for in section cuts and response diagrams.

Stress calculation

Stresses reported on the "Bridge Object Response Display" form are calculated from forces acting on individual bridge deck section components using beam stress formula which is based on the assumption that plane section remains plane. For example, the top center stress in the slab is calculated from the slab axial force P and moments M3 and M2 as **stress = P/A + M3/W33 + M2/W22**, where A is the slab area and W22 and W33 are the section moduli of the slab. Similar procedure is used for the calculation of the stresses in the beam.