

Bridge Elevation Calculation ("ELEV")

Description: ELEV (meaning "Elevations") computes elevations at any station and offset for a set of vertical curves and cross-sections. The user first creates a vertical curve file containing profile grade and cross-sectional data, then elevations are computed by referring to that file. Up to 10 vertical curves are allowed at a time. The user has the option of entering points to be computed from the keyboard or from a file. Another program included with this package, "DECKELEV", uses the vertical curve file to compute bridge deck elevations at ten foot intervals.

Theory: (Refer to input data for nomenclature.)

$$\text{Curvature, } k = (g1\% - g2\%) / (2 * L * 100)$$

For a point on a vertical curve, the profile grade elevation is given by,
 $PG \text{ El} = PVC \text{ El} + g1\% * X / 100 - k * X^2$

The user must describe the cross-section in the following terms:

Number of cross-section stations (≥ 0)

Number of points per cross-section (≥ 0)

A "cross-section station" is shown in the input data sheet. Each point has an offset with respect to the stationing line ("-" is to the left of stationing line, "+" is to the right), and an elevation relative to the profile grade line.

If there is only one cross-section station, the cross-section of the roadway is taken to be constant thruout. If there is more than one cross-section station, the slopes will vary linearly by connecting the points between the stations. If no cross-section stations are entered, only the profile grade elevation is computed.

The user will be able to compute elevations on some very complex alignments by "slicing" the alignment into numerous cross-sections. Such situations typically arise where a curved or tapered ramp blends into a straight or curved mainline roadway.