# *RoadWorks*

3-D Roadway Design Software
for Landscape Architects

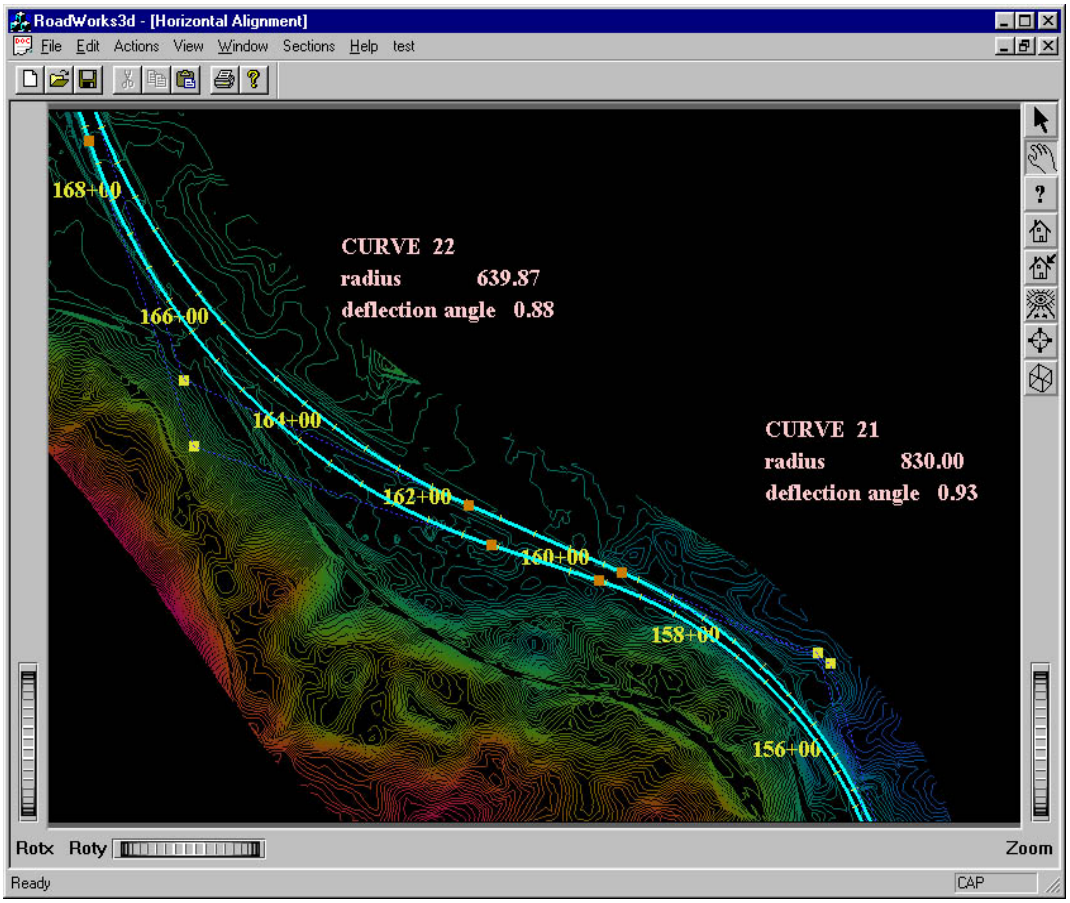


*Screenshot showing **RoadWorks** 3-D model of four-lane divided highway with cut and fill slopes and retaining walls tying the road to existing grade. The user can quickly create a 3-D model of the road and place it into a landscape model. The user can then assess the design visually from any angle, create presentation graphics, superimpose the roadway on a photograph of the existing terrain for before-and-after simulations, and produce a video of a drive along the road.*

## *RoadWorks* and Roadway Design

Landscape architecture and planning firms are increasingly interested in highway design because it is an important aspect of design on the land, and because there are very large design budgets in highway projects. *RoadWorks* provides a way for these firms to take the design lead in highway projects.

Roadway design is now mostly done by civil engineering firms. Landscape architecture design firms such as Jones & Jones in Seattle have shown there are aesthetic, ecological, social, and cost benefits to having landscape architects and planners as design leads for highway projects. *RoadWorks* has played a key role in enabling Jones & Jones to influence the placement and alignment of highways in their projects.

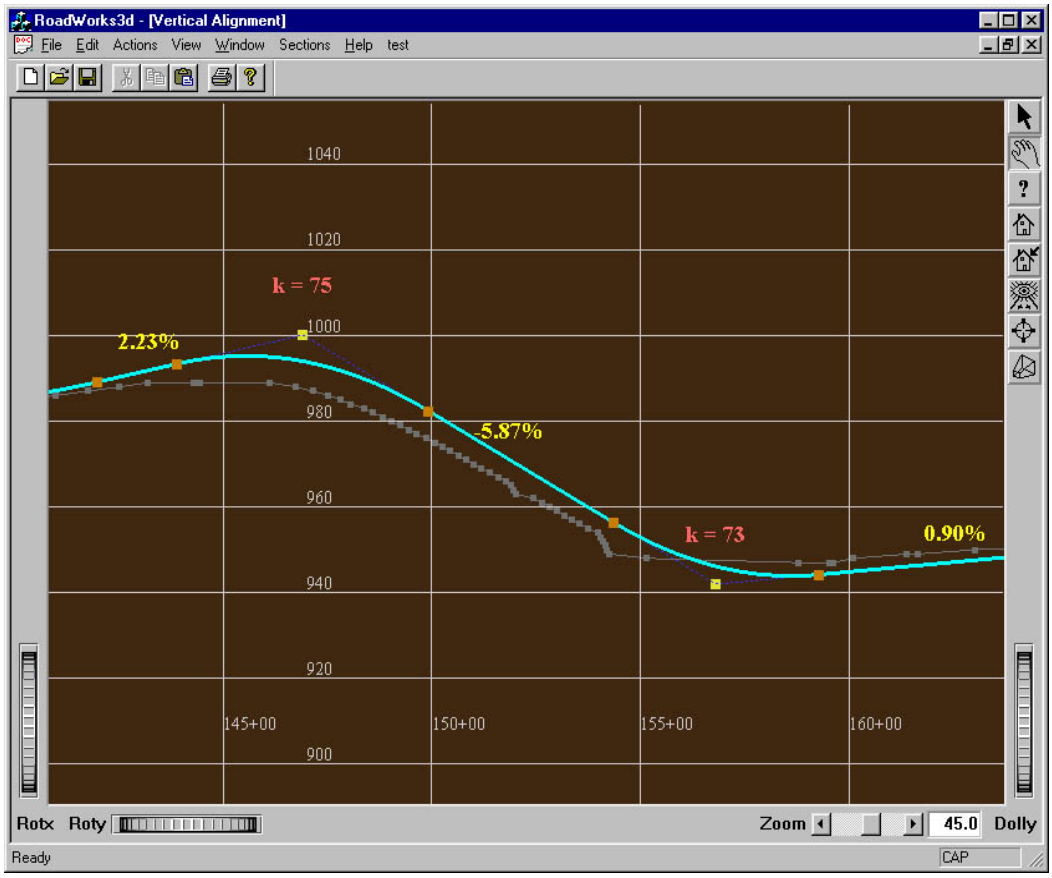



*Screenshot showing **RoadWorks**' horizontal alignment editor. The curve editing tool is pre-programmed to keep the alignment within design criteria set by highway agencies for maximum degree of curve. The topographic contours are color-coded by elevation to assist in visualization of the landscape; aerial photos can also be added to the view. The curves can be of either circular or spiral type. Spiral curves, because of their complexity are avoided by roadway engineers but are useful in sensitive landscapes because of their gentle transitions from tangent to curve.*

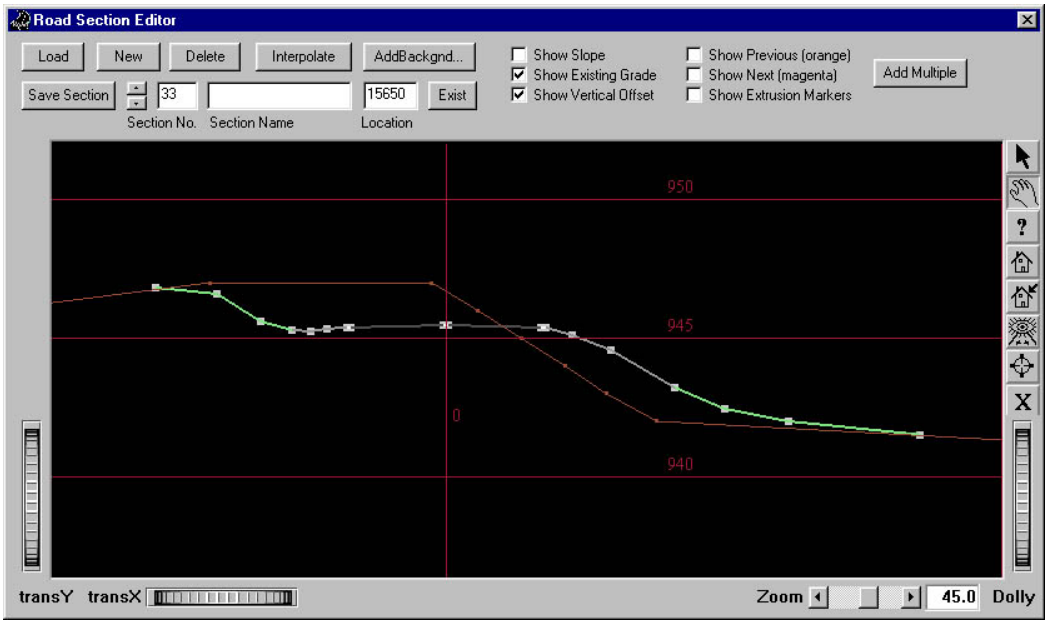
## Description of *RoadWorks*

*RoadWorks* is a 3-D interactive application that encapsulates the mathematics and engineering standards of roadway design, and allows the user to focus on practical and aesthetic issues while manipulating a centerline alignment using the mouse as a drawing tool. Shown below are screen shots of *RoadWorks*' user interface for manipulating road geometry, and 3-D output.

I developed *RoadWorks* so "lay engineers" such as landscape architects and planners could design viable alignments based on visual and landscape criteria. Civil engineers can also use RoadWorks as an easy to use preliminary design tool, before committing a design to high-end civil engineering software applications that are more difficult and cumbersome to use. The user can create 3-D models of the road design in the landscape, take a ride along the road, make changes quickly, and export road geometry files to standard civil engineering software applications.




*Screen shot of vertical alignment view showing proposed vertical alignment with slope and K-values. Profile of existing grade along the horizontal alignment is shown in grey. Design parameters such as k-value, slope and visibility distances are pre-programmed into the alignment editor and alert the user when overstepped.*




*Screen shot of section editor showing proposed roadway cross-section including cut and fill slopes tying road to existing grade. Existing grade is shown in brown. Once horizontal and vertical alignments and cross-sections have been input, a 3-D model of the road can be created.*

*RoadWorks* is currently a stand-alone desktop application. Its 3-D graphics are based on OpenGL, and uses Open Inventor, a 3-D object-oriented graphics library developed by Silicon Graphics. Its functionality consists of two main parts:

- a user-friendly and intuitive interface for laying out and manipulating road alignment geometry, and creating 3-D graphic models of the road in the landscape.

- facilities for importing CAD, aerial photos, and 3-D terrain model information over which the roadway design takes place.

**History of *RoadWorks***

I am a landscape architect with 15 years experience and have developed 3-D design software for 8 years. During that time I worked with Jones & Jones Architects and Landscape Architects on highway design projects. I developed *RoadWorks* as a tool to enable us to design and communicate roadway alignments more effectively. The function and user interface of *RoadWorks* has been developed and refined while using it on visually and ecologically sensitive highway projects including Paris Pike, twelve miles of new highway in rural Kentucky, and US 93, 50 miles of new highway in western Montana. Both of these projects won awards for the beauty and sensitivity of their design and for their ground-breaking collaboration between landscape architects and highway engineers.

http://www.djc.com/special/landscape98/10037856.htm

http://www.asla.org/meetings/awards/awds01/ushighway.html