

## COMPANY

**David Evans and Associates**

## LOCATION

**Portland, Oregon**

## SOFTWARE

**Autodesk® InfraWorks**

# Seeing the design through the trees

## InfraWorks helps David Evans and Associates communicate a trailhead relocation design to project stakeholders

The use of InfraWorks was a huge benefit on this project. It gave our client and all the project stakeholders photorealistic views of the project in the context of the surrounding area. And it enabled us to actually stand in the middle of a forest but still see the design through the trees.

—Daniel Iliyn P.E.  
Civil Engineer, Roads & Highways  
David Evans and Associates, Inc.



Image courtesy of David Evans and Associates

### Project Summary

The Mirror Lake Trail is an easy day hike located in the Mount Hood National Forest in Oregon. Due to its proximity to the Portland metropolitan area and its views of Mount Hood, the trail is extremely popular and the small parking area at the trailhead is often overcrowded. The parking area is located on the shoulder of a sharp curve of a busy surface highway (US 26). On crowded days, parking spills over to the other shoulder or even to the parking lot of a ski area about a mile down the road. These conditions can result in a dangerous situation for drivers as well as hikers who are walking from their parked cars to the trailhead.

To address this situation, a partnership of agencies including the US Forest Service (USFS), the Western Federal Lands Highway Division (WFLHD), and the Oregon Department of Transportation (ODOT) have undertaken a project to relocate the trailhead to a safer location and create a new parking area that is off the highway. This \$4.5 million project includes a new 50-space parking area with restrooms, a

trail connection from the new parking area to the existing trail, a pedestrian bridge where the trail connection cross over a creek, and updates to US 26 such as turning lanes, intersection improvements, and an Intelligent Transportation System (ITS) Sign. The new parking area will be adjacent to the existing parking lot of the ski area with a shared entrance, so the project also includes updating the existing ski area entrance and expanding the existing parking lot.

Oregon-based David Evans and Associates (DEA) provided engineering design services for the project. DEA has used Autodesk software for many years, including Autodesk® InfraWorks® for preliminary design and project visualization.

### The Challenge

The site of the new trailhead and parking lot—near the highway, ski area, and the town's wastewater treatment facility—was chosen, in part, to avoid a riparian buffer zone of a nearby creek. But the resulting location means the parking lot will be within visual distance of US 26.

# Providing a whole new level of context for sites

That stretch of US 26 is classified as a National Scenic Byway, so the design must adhere to strict guidelines that minimize its visual impact.

DEA's primary client on this project was the WFLHD. But given the location of the new parking lot (on Forest Service land) and its proximity to the scenic highway, the ski area, local utilities, and the treatment plant, there were a lot of very interested project stakeholders. "Most project review meetings involved several people from each of these different agencies," explains DEA civil engineer Daniel Iliyn. "And of course, each group was particularly interested in the impact on their land or their structures or their road."

In addition, many of the review meetings included visits to the site itself, which is currently just forest. "Without having a survey crew stake out important reference points like the edges of the parking lot wall, it was almost impossible for anyone to get their bearings," says Iliyn. "But this would have taken approximately 20 hours of survey staking work for each site visit...over 100 hours in total."

## The Solution

DEA used InfraWorks to merge existing conditions and project design data of the parking lot and trail head, generating a 3D model of the area in the context of its surroundings. This model displayed the project design overlaid on a terrain model with aerial images and environmental data of the surrounding area, including the forest, the creek and its riparian buffer zone, the



Image courtesy David Evans and Associates

nearby highway, the ski area parking lot, and the treatment plant. DEA used this model in review meetings with the client and other project stakeholders, enabling them to easily visualize and understand the various design alternatives. And during site visits with the stakeholders, DEA used augmented reality and the InfraWorks iPad mobile app to physically locate the real-world bounds of the project model in the forest, without any surveying effort.

### Model-based visualization

During the course of this project, DEA held close to a dozen design review meetings, with 10 to 20 people from different agencies at each meeting. DEA typically used the live InfraWorks model as the main basis for its presentation, enabling the different agencies to see the project from any angle in a realistic environment. "Some of the people with technical backgrounds were used to looking at standard 2D plans and strip maps, but many were not," says Iliyn. "For those people in particular, InfraWorks was invaluable for presenting the designs in an easy-to-understand format."

Plus, DEA's ability to interactively move and manipulate the model helped them visually display and explain various aspects of the design that were of interest to the different agencies.

### Augmented reality

As the design progressed and the final location was selected, many of the review meetings would begin or end with a visit to the trailhead site.

"We tried to help them visualize the design on the site using strip maps and even with some survey flags, but it wasn't enough," says Iliyn. "After several of these site visits, we decided to use the InfraWorks mobile app."

Using an iPad and the InfraWorks mobile app, DEA walked through the site with the various project stakeholders. "We brought 2D exhibits just in case, but when we started using the mobile app, it became our sole frame of reference," says Iliyn.

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As the team toured the site and pointed the iPad in a different direction, the view of the project model updated automatically. "The InfraWorks mobile app provided a whole new level of context for our site visits," says Iliyn. "I had 15 or 20 people huddled around me and the iPad in the middle of the forest...everyone was blown away by it."

For example, one of the issues with the final site was its proximity to the scenic highway and the design's visual buffer. "With the InfraWorks model and the mobile app, we could stand in the 'parking lot' and see how the berms and plantings minimized the visual impact from the scenic highway." The InfraWorks model was also the basis of the renderings created by DEA for its official visual resource report for ODOT and the USFS.

## The Result

"The use of InfraWorks was a huge benefit on this project," says Iliyn. "It gave our client, and all the project stakeholders photorealistic views of the project in the context of the surrounding area. And it enabled us to actually stand in the middle of a forest but still see the design through the trees."

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