



SYSTRA Designs E22 Roadway Expansion to Increase Traffic Safety and Accessibility Along Fjälkinge and Gualöv's 9-kilometer Stretch

Bentley Technology Provides Collaborative Digital Environment, Streamlining Workflows to Optimize Design and Meet Strict Deliverable Requirements

CONVERTING A COUNTY ROAD INTO A MOTORWAY

To improve traffic safety and accessibility along the 9-kilometer stretch of E22 between Fjälkinge and Gualöv in Sweden's Skane County, the Swedish Transport Administration (STA) initiated an over SEK 500 million project to transform the county road into a motorway. The project required widening the existing centrally separated two-plus-one, three-lane roadway into a 21.5-meter-wide, four-lane highway. To create well-functioning conditions for local and public transport, the conversion also involves the expansion of 10 kilometers of local roads, pedestrian, and cycle paths, as well as the addition of bus stops and a new interchange to connect traffic from the local road network.

SYSTRA was contracted by the construction company Svevia to design the main highway stretch, considering the entire landscape of the project and working together with both Svevia and the STA. "We are delivering a construction design product, which is later going to be approved by the Swedish Transport Administration," said Nicklas Persson, road designer at SYSTRA.

STRICT DESIGN DELIVERABLES, MULTIDISCIPLINE COORDINATION

STA has strict requirements of how to manage deliverables for the new highway, requiring SYSTRA to implement more complex, collaborative strategies and integrate multiple design disciplines. "We had a lot of intense collaboration parts in this project," said Persson. SYSTRA wanted to streamline modeling and the design review process. Initially on the project, the team was not aligned in how they collaborated. "Throughout the project, we found that we had multiple areas where we were commenting and talking to each other, trying to find out where we should collaborate. For example, [if] we needed

to move a ditch—move it a bit higher or lower—or if a culvert was in the wrong position," said Persson. To address these types of changes and track issues, SYSTRA needed a live, coordinated 3D model that could be accessed and updated in real time.

Given the long highway stretch, the multiple project participants, and the design and deliverables requirements, SYSTRA had to use various software options. However, they soon realized that they needed open, integrated technology to manage all the different software into one collaboration model.

ESTABLISHING A CONNECTED DIGITAL DESIGN ENVIRONMENT

SYSTRA divided the project into two phases. Already familiar with Bentley applications, they used OpenRoads for 3D roadway design and ProjectWise as the common data platform at the outset. Having used both applications internally on previous projects, their initial setup was already configured for following STA's requirements. Using OpenRoads, they were able to configure all the design objects and follow the STA's stringent requirements. "It is also important to note that using OpenRoads allows us to meet their requirements regarding digital deliverables as well," said Persson. They designed the entire main highway stretch using OpenRoads, which, as an open and interoperable platform, allowed them to connect their 3D models with other side road models. Integrating ProjectWise also played a crucial role in fulfilling the design requirements in terms of data attributes and naming conventions, keeping control of the project and standardizing and streamlining design processes.

During the second phase of the project, SYSTRA introduced iTwin to facilitate real-time collaboration and design reviews. "This was our first project in SYSTRA Sweden where we tried iTwin live in a real

PROJECT SUMMARY ORGANIZATION

SYSTRA

SOLUTION

Roads and Highways

LOCATION

Skane, Sweden

PROJECT OBJECTIVES

- ♦ To improve traffic safety and accessibility along the E22 roadway in Skane county.
- ♦ To better coordinate and streamline multidiscipline design and review processes.

PROJECT PLAYBOOK

iTwin[®], OpenRoads[™], ProjectWise[®]

FAST FACTS

- ♦ The STA is upgrading the local roadway between Fjälkinge and Gualöv to a four-lane highway, expanding the E22 motorway through Skane.
- ♦ SYSTRA is responsible for designing the 9-kilometer main stretch.
- ♦ Integrating OpenRoads, ProjectWise, and iTwin, they established a connected digital design environment.

“[We] have used other [software] and would not choose any other on the market right now over OpenRoads. In fact, the highway team wouldn’t use any other software!”

– Nicklas Persson, Roadway Designer, SYSTRA

project,” said Persson. They imported all the design models from the previous stage before the contractor joined the project to identify any areas of conflict, and then determine where road, sewage, and water disciplines needed to work closely together to address potential issues and avoid changes later during construction. “By using iTwin, we were able to keep the collaboration model up to date more often to reflect what is happening in real time,” said Persson. Together with OpenRoads and ProjectWise, iTwin provided a connected and immersive digital design environment where SYSTRA could holistically visualize and collaboratively review the project in real time.

INTEGRATED TECHNOLOGY SOLUTION REAPS BENEFITS

While exact numbers and quantifiable data in terms of ROI are not yet available, SYSTRA is confident that if they had used other software, while the turnaround time may have been similar, the overall design quality and deliverables would not have been the same. “For example, the amount of data that we have created with the quality and the amount of information in the models, [we] do not think we would have been able to create that



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much with other solutions with the time spent,” said Persson. The integrated technology solution—comprised of OpenRoads, ProjectWise, and iTwin—enabled SYSTRA to meet the STA’s strict design and digital deliverables requirements. “Without [these applications], it would have been much more difficult for us to work on this project,” said Persson.

Working in a connected digital environment made everything easier for all stakeholders involved in the project, streamlining workflows and enhancing decision-making. “We knew that when we looked at the model that it was the latest data, it was not a model from last week or the week before that. It was always up-to-date data and the time and effort that it takes to keep the model updated is effortless compared to other solutions,” said Persson. The ability to visualize the entire project and the impact of design decisions in real-time not only reaped efficiencies in terms of the design process, but it also helped optimize and recycle cut and fill masses, minimizing environmental impact. “We had more of a 50-50 mass balance in the project, and we got a lot closer and were able to save a lot of masses in the project,” said Persson.



SYSTRA is responsible for designing the 9-kilometer main stretch.