Parsons Brinckerhoff

Customer Success Story

Clients:
**Washington State Department of Transportation**
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**AutoCAD® Civil 3D®**
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Using Autodesk BIM solutions, we developed design options and supporting materials that helped project agencies and the general public evaluate those alternatives and make informed decisions on the designs. BIM represents a new approach for civil engineers and delivers tremendous efficiency to our design process—allowing us to quickly develop what-if scenarios to inform design decisions.

—Mike Rigsby
Project Manager
Parsons Brinckerhoff

# Replacing Seattle's Viaduct

## Parsons Brinckerhoff uses Autodesk BIM solutions to develop and visualize designs for the Alaskan Way Viaduct.

**Approaching the south portal of the bored tunnel. Image courtesy of WSDOT/Parsons Brinckerhoff.**

**Project Summary**
For more than 50 years, the Alaskan Way Viaduct has been the main north-south highway through Seattle. In 2001, an earthquake damaged the viaduct, heightening concerns over its seismic safety. Since then, the State of Washington, King County, and the City of Seattle have been working together with the Port of Washington and the United States Federal Highway Administration to find a solution to replace the aging structure, which runs along Seattle's waterfront and carries 20 to 25 percent of its downtown traffic. The Washington State Department of Transportation (WSDOT) and engineering firm Parsons Brinckerhoff (PB) have developed numerous replacement options for the viaduct based on the use of surface and elevated roads, tunnels, and public transit strategies.

**The Challenge**
"One of our biggest challenges has been to develop a series of design alternatives that are very different from each other, yet all seismically safe and fiscally responsible replacement structures for the viaduct," explains Ron Paananen, WSDOT's program administrator for the Alaskan Way Viaduct and Seawall Replacement Program. "Replacing the viaduct opens up enormous opportunities to improve quality of life in Seattle by increasing mobility through the downtown while making the waterfront more accessible to the public. We need to clearly communicate our design proposals to the project stakeholders and the public—helping them understand and visualize how they can reclaim their waterfront."

**The Solution**
"Using Autodesk BIM solutions, we developed design options and supporting materials that helped project agencies and the general public evaluate those alternatives and make informed decisions on the designs," says Mike Rigsby, PB project manager. "BIM represents a new approach for civil engineers and delivers tremendous efficiency to our design process—allowing us to quickly develop what-if scenarios to inform design decisions." The project team used AutoCAD® Civil 3D® software, Autodesk® Revit® Architecture software, and Autodesk® Navisworks® software to integrate different data sources and create intelligent, interactive models that were used for design, visualization, construction planning, and contract packaging. PB also employed Autodesk® 3ds Max® Design software to help create model-based visualizations and simulations of the project.

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# Parsons Brinckerhoff relies on Autodesk building information modeling (BIM) solutions for infrastructure design and visualization.

**Develop Infrastructure Designs**
To develop replacement design options for the viaduct, the design team aggregated disparate data using AutoCAD Civil 3D model-based software. "This is an extremely complex project in a very dense urban area with a web of existing underground structures and utilities," says Paananen. "Integrating GIS data and using the geospatial analysis and mapping features in AutoCAD Civil 3D software were essential."

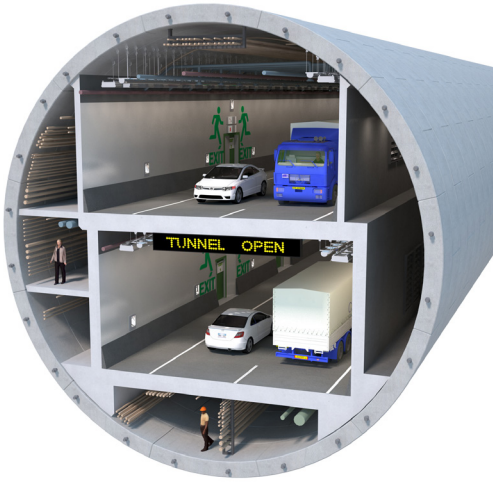
The team used AutoCAD Civil 3D to design subsurface utilities, earthwork, and other infrastructure as well as to generate direct quantities and drawings from the resulting infrastructure model. The team also used Revit Architecture to design architectural elements, such as vent structures, and 3ds Max Design for lighting design and analysis, and shadow/visibility studies. In addition, PB used Navisworks to bring all of the BIM-based design and visualization models together and perform clash detection and schedule simulations for different construction areas, details, and options.

**Evaluate Design Alternatives**
PB routinely transferred the BIM-based infrastructure models to 3ds Max Design to help enhance the design—adding surrounding city features, for example—and to create renderings and animations. These visualizations were vital for public outreach efforts and environmental studies. The visualizations and collaborative capability of Navisworks were also crucial for design reviews. "Our design teams met regularly with project stakeholders for collaborative design review sessions," says Paananen. "We updated our BIM-based models on the fly to visualize and evaluate trade-offs in real time—helping to speed up our decision-making and design time."

**Facilitate Public Outreach Programs**
In 2008, an advisory stakeholder committee of community and business representatives was appointed to review a final set of design options and provide feedback. To help the committee—as well as the general public—understand the design intent and to foster consensus, PB used 3ds Max Design to create hundreds of near-photorealistic images and more than 10 animations. "We even used traffic simulation data in 3ds Max Design software to communicate near realistic transportation behavior," says Rigsby. "These BIM-based visualizations were crucial for conveying information to the advisory committee as well as the general public."

**The Result**
In early 2009, the committee recommended that an underground bored tunnel—combined with improvements to transit and surface streets—should replace the Alaskan Way Viaduct. "Using BIM to clearly visualize the viaduct's replacement options was essential for reaching this consensus," says Paananen. "As the program moves forward, timely decisions and communication based on more accurate BIM-based designs will be extremely important for managing contract packaging and avoiding construction delays. And our visualization models will help keep the public informed and help them experience, in advance, their reclaimed waterfront."

For more information, visit **www.autodesk.com/gov** and **www.autodesk.com/bim**.




**Cross-section of the bored tunnel. Image courtesy of WSDOT/Parsons Brinckerhoff.**

**Driving through the bored tunnel. Image courtesy of WSDOT/Parsons Brinckerhoff.**

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—Ron Paananen
Program Administrator
Alaskan Way Viaduct and Seawall Replacement Program
WSDOT

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