AECOM Enhances US-Canada Border Crossing with Michigan Interstate-75 Interchange Improvements

Digital Software Solutions Reduce Multidiscipline Design Time by 12%

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CASE STUDY

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EXPANDING THE MICHIGAN I-75 INTERCHANGE

The Windsor-Detroit gateway is the busiest commercial land border crossing between Canada and the United States. The daily transport of products and people benefits the economies of both countries, specifically within the state of Michigan and the province of Ontario. To improve the effective and efficient movement of people and goods in the area, Bridging North America was contracted through a public-private partnership arrangement by Windsor-Detroit Bridge Authority (WDBA) to design and construct a CAD$ 5.7 billion project, which included components of a new border transportation system.

AECOM is responsible for the design of the project, which features the Gordie Howe International Bridge, the longest cable-stayed bridge in North America, new Canadian and U.S. Ports of Entry, and the expansion of the Michigan Interchange on I-75.

The interchange project alone includes widening nearly two miles of freeway connected to the U.S. Port of Entry, local road improvements, and the construction of four road bridges, five pedestrian bridges, and 12 ramps. In addition, an intricate enclosed drainage system needed to link to the existing stormwater system. Creating such a highly complex interchange design within a 1.8-mile stretch was a formidable undertaking.

MANAGING A GLOBALLY DISPERSED DESIGN TEAM AND STAKEHOLDER INPUT

The project team was dispersed across 10 AECOM offices and six subcontractor offices with more than 150 geographically distributed personnel needing to work collaboratively and in sync. The design would need to be refined over the course of the project based on input from several community stakeholder groups who voted on various design options, such as a design contest for art imprints on the flyover and pedestrian bridges. The AECOM design team had to ensure that final design information was easily conveyed to construction teams and that design changes provided from the field team were implemented in real time to address issues that cropped up during construction.

To meet these goals, design data had to seamlessly blend into one federated model that was accessible to all dispersed team members, the client, and community partners with the ability to be updated immediately. AECOM used a connected data environment that facilitated collaboration and could easily handle the immense data file sizes required on this type of project. Without seamless project collaboration and real-time access to design changes delivery would be much more difficult.

SUPPORTING WORLDWIDE COLLABORATION WITH A FEDERATED MODEL

AECOM determined that Bentley applications would provide the capabilities they needed for this project. Using ProjectWise, they established digital workflows, enabling all team members to easily circulate and push design changes to all collaboration teams. Facilitating global collaboration through a connected data environment guaranteed all dispersed team members were working on the latest iteration of the interchange design.

Up-to-the-minute model revisions allowed the U.S. Port of Entry and the I-75 design teams to coordinate their plans. The use of design authoring software also allowed the specialty design teams – such as environmental, drainage, structural, roadway, and geo-technical services – to work simultaneously. Additionally, construction teams could review and edit the model from the field as construction issues emerged on site, avoiding rework.

PROJECT SUMMARY

ORGANIZATION

AECOM

SOLUTION

Roads and Highways

LOCATION

Detroit, Michigan, United States

PROJECT OBJECTIVES

- To enable collaboration among globally dispersed design teams across 16 offices.
- To facilitate concurrent design work among all team members to guarantee they are working on the latest design iteration.

PROJECT PLAYBOOK

MicroStation®, OpenRoads Designer, ProjectWise® 365

FAST FACTS

- Expanding the Michigan Interchange on I-75 is part of a larger infrastructure project to improve border crossing between the U.S. and Canada.
- A primary component of the project is the Gordie Howe International Bridge, which will be the longest cable-stayed bridge in North America.
- The I-75 Interchange design includes four new road bridges, five new pedestrian bridges, four interchange ramps, and local road improvements.

ROI

- Using digital delivery workflows to establish a connected data environment reduced design time by 12%.
- Creating a paperless project supported by digital workflows lowered the project's carbon footprint by 5%.
- Switching to a completely virtual work environment using cloud technology had no negative effect on the project's timetable.

"At AECOM, we're harnessing the power of digital technology and innovation to accelerate project delivery, solve social and environmental challenges, and drive effective asset management."

-Peter Byrne, Vice President, Alternative Delivery, AECOM

"By going digital, we could collaborate across offices, creating robust workflows that were capable of handling various file types that were instantly accessible anywhere and anytime," said Peter Byrne, AECOM's vice president of alternative delivery.

By using client-specified Bentley road design software, AECOM's design teams integrated end-to-end building information modeling (BIM) capabilities for roadway, terrain, utility, and sewer network design and analysis. They also incorporated environmental, water, and geotechnical datasets into the plan. AECOM then designed alternative alignments and drainage schematics of the I-75 interchange to determine the optimal proposal.

One component of the I-75 Michigan Exchange expansion project is the Gordie Howe International Bridge, which will be the longest cable-stayed bridge in North America. Image courtesy of AECOM.

Working within MicroStation, AECOM processed the vast datasets required for this large-scale project. The I-75 design team developed and submitted more than 3,000 plan sheets within eight different plan packages. Bentley's interoperable software ensured that all BIM technology used on the project was seamlessly incorporated with ProjectWise. Despite the huge amount of data, all files were integrated into an accessible, federated 3D model. Throughout the process, the client, owner, 150 I-75 design team members, multiple construction teams, and more than 1,500 members of the U.S. Port of Entry team knew that they were accessing the latest design iteration whenever they opened the model.

HITTING THE DEADLINE WITH DIGITAL TECHNOLOGY ADVANCEMENTS

Using Bentley applications, AECOM delivered a high-quality model that met all the client's specifications. Digital workflows reduced design time by 12% and the overall carbon footprint by 5%. The open modeling platform allowed various file types and sizes to be instantly accessible, speeding design and decision-making.

When COVID-19 restrictions moved design team members from their offices to telework, personnel could contribute to the project without interruption since they were already working within ProjectWise's cloud environment. All members of the I-75 design team continued to collaborate with each other and with the larger Gordie Howe International Bridge project team.

"The teams were already used to collaborating in the cloud and to using digital workflows for approvals and updates, so nothing in the process changed except where the cloud was accessed," Byrne said. "AECOM attributes part of this successful pivot to the overall Gordie Howe International Bridge project's digital workflows and technology use."

Working within the connected data environment helped AECOM to meet their deadline. All final stage design drawings were ready for review and approval for Michigan Department of Transportation and Bridging North America on schedule. Consequently, Windsor-Detroit Bridge Authority (WDBA) won the 2021 International Association of Business Communicators Ovation Award of Merit for Excellence for COVID-19 Response & Recovery Management and Communications.

Once complete, the new I-75 interchange will simplify the approach to the border crossing and increase access to the highway, lessening traffic congestion. A streamlined approach to both ports of entry and the new bridge will boost the transit of freight, people, and services to both Canada and the United States.

Creating a paperless project supported by digital workflows lowered the project's carbon footprint by 5%. Image courtesy of AECOM.