Bentley
Advancing Infrastructure

CASE STUDY

Mott MacDonald and HDR Digitally Connect All Contributors to Gigantic Mass Transit Line in Toronto

Bentley Applications Provide Rapid, Secure Data Access and Visibility into the Construction Process

TRANSFORMING CITY TRANSPORTATION

The Ontario Line is an ambitious, CAD 10.9 billion new subway line in Toronto that will radically transform public transit across the city. Consisting of 15.6 kilometers of new railway infrastructure and 15 new stations, the subway line extends from Exhibition Place in the southwest of the city, through the heart of the downtown area, and up to the Flemingdon Park and Science Centre neighborhoods in the northeast. When complete, the Ontario Line will cut travel time across the city from 70 minutes to 30 minutes and significantly reduce congestion in the wider Toronto transit network by eliminating 28,000 car trips per day.

Thanks to the massive scale of the project, design and construction responsibilities are being split among an array of contractors, with main civil works to be delivered across five different teams. Despite the staggering scope, the project owner wanted every part of the development of the Ontario Line to be visible to all contributors as well as key stakeholders, in part to illustrate the impact of construction. Mott MacDonald and HDR are serving as a combined technical advisor for the project and needed to connect all contributors and improve project visibility. "Given the number of interfaces between each of these different contracts, coordinating and integrating the different designs by sharing trusted and reliable data in an efficient way represents a significant challenge," said Matthew Lane, senior principal design consultant at Mott MacDonald.

ENSURING SAFETY AND COMPLIANCE

Addressing the challenge of effective information sharing meant ensuring there are clear information requirements in place for the key delivery contracts to follow. "Exchange information and asset information requirements (EIR and AIR) had to be developed in collaboration with the Metrolinx team to define how information should be developed and shared in a controlled manner, following the requirements of ISO 19650," said Lane.

Though establishing a common data environment was critical to the project's success, the platform had to be robust enough to manage data flowing between the various teams in an efficient and secure manner, all while supporting ISO 19650-compliant workflows. At the same time, Mott MacDonald and HDR wanted to establish a digital twin strategy to provide a vision for how the utility of project data could be maximized and to provide Metrolinx with a high value digital asset alongside the physical railway. The two companies needed a flexible, interoperable suite of solutions to meet expectations.

GOING DIGITAL FOR BETTER WORKFLOWS

Mott MacDonald and HDR quickly determined Bentley applications could help them achieve everything they wanted to accomplish on this project. They first used ProjectWise to establish a connected data environment useable by all contributors, then they customized it to fit all project needs. "Bespoke folder structures, environments, and workflows were developed to support the different key collaboration processes on the project," said Lane. "A workflow was established to ensure only authorized team members could approve the final set of comments before returning to the originating project company."

Next, to grant the project community better insight into the evolving design, they used the iTwin Platform to provide quick, web-based access to the latest shared and published models pushed

PROJECT SUMMARY

ORGANIZATION
Mott MacDonald and HDR

SOLUTION
Enterprise Engineering

LOCATION
Toronto, Ontario, Canada

PROJECT OBJECTIVES
- To improve data sharing between numerous development teams and stakeholders.
- To improve visibility into the construction process.

PROJECT PLAYBOOK
Bentley LumenRT™, iTwin®, ProjectWise®, SYNCHRO™

FAST FACTS

- The CAD 10.9 billion Ontario Line will add 15.6 kilometers of railway line in Toronto and transform the city's public transit.
- Mott MacDonald and HDR are serving as a combined technical advisor for the project and needed to connect all contributors and improve project visibility.
- Their solution had to be robust enough to manage data flowing between the various teams in an efficient and secure manner, all while supporting ISO 19650-compliant workflows.

ROI

- To date, over 19,000 deliverables have been reviewed, with quick reviews and automatic identification of any data errors.
- The unified approach greatly reduced the effort of manually reporting progress, saving 15 hours per week and enabling reports to be accessed 25% faster.
- Mott MacDonald and HDR estimate SYNCHRO has made constructability 60% more efficient.

"Bentley products and services are fundamental to our delivery of the Ontario Line—tools such as ProjectWise, iTwin and SYNCHRO are providing unparalleled access to, control over, and insight into data shared by our project team."

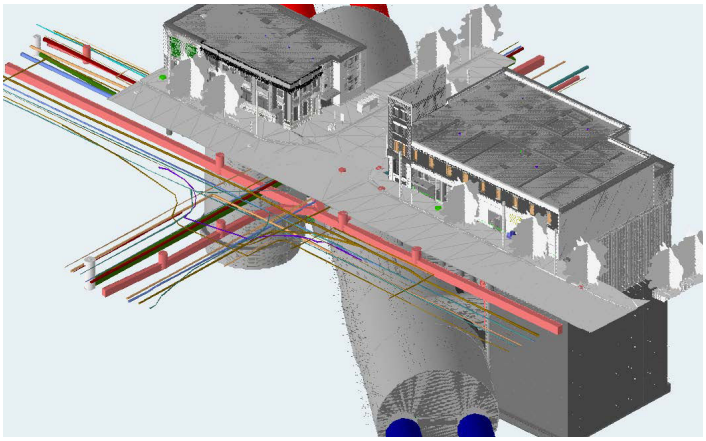
– Cameron Schaefer, Transportation Digital Delivery & Data Acquisition Director, HDR

into ProjectWise by design teams. Lastly, SYNCHRO was used to support 4D modeling, with Bentley LumenRT providing visualization.

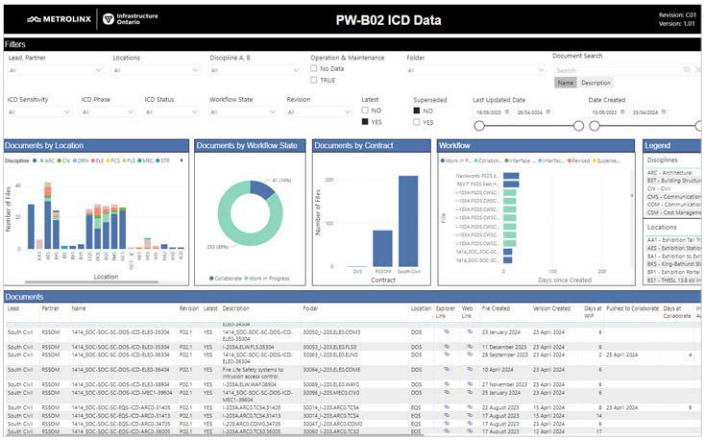
QUICKER ACCESS FOR IMPROVED VISIBILITY

Adopting ProjectWise allowed the project to exert tight control over who has access to what information and when, all while establishing ISO 19650-compliant collaborative environment where only information authorized by the relevant authoring-party could be advanced to a "shared" state. "This reduced the risk of information being shared by unauthorized individuals and reduced the risk of shared data being used for inappropriate purposes," said Lane. "These tools were utilized in supporting communication across the IPT community and with key third-party stakeholders across six major areas of critical interface points." To date, over 19,000 deliverables have been reviewed, with quick reviews and automatic identification of any data errors. The unified approach greatly reduced the effort of manually reporting progress, saving 15 hours per week and enabling reports to be accessed 25% faster.

Visualizing the construction process in advance has improved constructability reviews and provided a consistent approach for interfacing with stakeholders. "The use of 4D modeling with SYNCHRO has enabled better understanding of key interfaces and identifying constructability issues," said Lane. Mott MacDonald and HDR estimate SYNCHRO has made constructability 60% more efficient. The complex Ontario Line project is well under way and is on track for completion by 2031.



To date, over 19,000 deliverables have been reviewed, with quick reviews and automatic identification of any data errors.



The unified approach greatly reduced the effort of manually reporting progress, saving 15 hours per week and enabling reports to be accessed 25% faster.