WSP Drives Victoria's Transformational and Sustainable Transport Initiatives with Parkdale Level Crossing Removal

Bentley's Digital Twin Technology Optimized Material Usage, Reducing Resource Hours by 15% and the Carbon Footprint by 30%

CHANGING PUBLIC TRANSPORT AND COMMUNITY CONNECTIVITY

Victoria's level crossing removal project (LXRP) aims to remove 110 level crossings across Melbourne by 2030 and is one of the most significant rail infrastructure endeavors in the state's history. The LXRP will not only eliminate commuter risks and travel delays, but it will also offer unique opportunities to modernize train stations and create open spaces and shared-use walking and cycling paths, promoting sustainable transport and improving community connectivity. Southern Program Alliance (SPA) is one of four alliances established to deliver a portion of the program, including the Parkdale level crossing removal, which focuses on enhancing safety and accessibility for motorists, pedestrians, and cyclists by providing sustainable infrastructure solutions.

The Parkdale project involved removing roads and rail level crossings, as well as constructing a viaduct and new station along the Frankston line. As an SPA partner and the project's lead design consultant, WSP committed to exploring numerous innovative and cutting-edge design solutions to create community-centric spaces that were seamlessly linked to transport access, all while minimizing environmental impact and material usage. "The removal of the level crossing will provide better access to local businesses and amenities, supporting the local economy and enhancing the community's livability. The project will also have environmental benefits by reducing emissions from idling cars and improving air quality in the local community," said Jaimin Patel, senior structural technologist at WSP. It will facilitate faster journeys along the Frankston Line and ensure safer local roads, greatly impacting area residents' daily lives, work, and travel.

SITE CONSTRAINTS, DATA MANAGEMENT, AND COORDINATION CHALLENGES

The narrow rail corridor and nearby heritage sites presented site constraints, compounded by the need to coordinate the level crossing removals with the simultaneous construction of the new Parkdale station, pedestrian crossings, car parks, and open spaces, such as playgrounds, gathering spaces, and open-air gyms. Faced with these challenges, as well as managing vast amounts of project data among a multidiscipline team, WSP sought to adopt digital solutions to streamline data and workflows to enable smart, rapid decision-making. "Working on a multidiscipline project, such as a rail project, can be challenging as it involves multiple teams with varying expertise, each working on different aspects of the project," said Patel.

Furthermore, as a community-based project of this magnitude where most of the design and structure focused on the local area and people, WSP realized that public engagement and messaging were key to avoiding negative impacts and ensuring stakeholder buy-in. WSP not only needed to digitalize and streamline design and construction works, but they also needed a visual, digital platform to accurately and seamlessly communicate design intent to the public. While WSP was aware of different software applications used for collaborative design, data management, and communication purposes, they realized that they lacked the advanced automation and processing features, connectivity, modeling accuracy, and visualization required to efficiently deliver the project. "[Our] insight into these other solutions suggested that they typically involved either labor-intensive manual processes or heavy scripting, which posed a risk," said Patel. WSP needed a versatile, dynamic, and integrated digital solution to handle design changes, streamline progress, and provide functional and clear planning and communication in a digitally visual environment.

PROJECT SUMMARY
ORGANIZATION
WSP Australia Pty. Ltd.

SOLUTION
Bridges and Tunnels

LOCATION
Melbourne, Victoria, Australia

PROJECT OBJECTIVES
- To remove dangerous level crossings and construct a viaduct and new station along Melbourne's Frankston Line.

- To improve community safety, reduce traffic congestion, and support sustainable transport connectivity.

PROJECT PLAYBOOK
iTwin®, iTwin Capture, LumenRT™, MicroStation®, OpenBridge®, OpenBuildings®, OpenRail™, OpenRoads™, ProjectWise®, ProStructures®, SYNCHRO™

FAST FACTS
- The Parkdale project is part of Victoria's program to remove level crossings across Melbourne to improve safety, travel times, and accessibility.

- The project involved removing road and rail crossings, as well as developing designs for new bridges and rail infrastructure to create community-centric spaces.

- As the lead design consultant, WSP selected Bentley technology to establish a digital twin.

ROI
- Working in a connected data environment saved approximately 300 resource hours.

- The integrated digital approach optimized data management and streamlined workflows, reducing modeling time by 60%.

- Bentley's applications helped optimize material usage and reduce the carbon footprint by 30%.

LEVERAGING INTEGRATED WEB-BASED TECHNOLOGY

WSP's digital engineering initiatives included developing a federated digital twin model for 3D coordination and clash detection, as well as utilizing gaming controllers to provide stakeholders and the public a drive-through experience of new stations, accessibility, safety, and precinct connectivity. Leveraging Bentley's open 3D and reality modeling applications along with ProjectWise, WSP established a digital twin, streamlining workflows to meet the project objectives. Using iTwin Capture Modeler to generate a reality mesh of the extensive project provided an accurate digital representation of the project site, while the advanced modeling capabilities of OpenBridge Modeler allowed WSP to create 3D models of various bridge arrangements and easily modify them to determine an optimal design solution. "The software's ability to handle design changes and streamline progress was essential in meeting the project's challenges," said Patel. The integrated digital solution managed the vast amount of project data and facilitated coordinated modeling and collaboration, ensuring that all parties were on the same page.

Working with Bentley's open modeling technology and using iTwin as a federated platform facilitated and accelerated data and model sharing. On a weekly basis, WSP synchronized the project models, creating a digital twin to ensure stakeholder access to up-to-date information and a single source of truth, enabling informed and timely decision making. The interoperability, advanced modeling features, and web-based accessibility of Bentley's software fostered community engagement, critical to successful project delivery. Using LumenRT to generate realistic animations from the 3D models in an open platform allowed the public to better understand the design intent. "The biggest help when it came to engaging with the community was setting up the digital models to allow the team to show residents how the new infrastructure would look, and that there wouldn't be any major effect on their houses or businesses," said Patel.

DIGITAL COLLABORATION AND VISUALIZATION OPTIMIZE PROJECT DELIVERY

Using Bentley's integrated digital technology, WSP accelerated project progress, ensured accuracy, and ultimately delivered a successful project. Working in a collaborative digital platform with OpenBridge Modeler minimized rework and improved efficiency by automatically capturing any subsequent changes to the alignment after setting up the initial model. "The use of OpenBridge Modeler increased the return on investment of the project by significantly reducing the time taken to create 3D models of the bridge," said Patel. Using Bentley software improved workflows and productivity, reduced modeling time by 60%, and saved 15 hours in the design delivery process.

WSP also reduced the environmental impact of the project, using the digital modeling applications to explore various design options and determine an optimal and sustainable solution that saved a significant amount of material, including concrete and steel, which has a high carbon footprint. The team achieved a 7% reduction in bridge materials by optimizing span lengths and the number of spans, as well as eliminating steel girders, reducing the project's overall carbon footprint by 30%.

Lastly, establishing a web-based digital context provided a realistic visualization of the project within its real-world context, reducing the need for physical site visits, facilitating informed decision-making, and achieving community buy-in with better public understanding of the project. WSP's collaborative digital workflows ensured timely access to accurate information, minimizing the risk of using outdated or incorrect data. The digital templates and model components created for the Parkdale project can be reused for future projects. "By choosing the right software solutions, the team was able to meet the project's challenges effectively and deliver a high-quality project," said Patel.

The Parkdale project is part of Victoria's state program to remove level crossings across Melbourne to improve safety, travel times, and accessibility.

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