



Rail signaling and train control, **built smart** for Ottawa's O-Train Line 2 and Line 4

Reliable, weather-tested performance across O-Train Line 2 and Line 4

Every light-rail system depends on a “can’t-fail” rail signaling and train control network. For Ottawa’s O-Train Line 2, that need is especially critical and challenging. Beyond withstanding Ottawa’s harsh winters and hot summers, the line features sections with just a single track, meaning trains travelling in opposite directions share the same span of rail. Precision, safety and reliability aren’t just expectations—they’re essential.

To meet those challenges, the City of Ottawa partnered with AtkinsRéalis’ TransitNEXT and Siemens Mobility, whose advanced rail signaling and train control technology now keeps the O-Train running safely and on schedule.

Rising to the challenge

Operated by OC Transpo, Ottawa’s train network has grown rapidly since its 2001 debut as an 8-kilometre pilot line. It now spans more than 35 kilometres across 27 stations, with another 27 kilometres under construction.

The newest expansion—the Line 2 Extension—extends the O-Train an additional 7 kilometres south to Limebank and adds Line 4, a 4-kilometre branch connecting from Line 2 directly to Ottawa Macdonald-Cartier International Airport.

The project came with its own challenges. Line 2 is built on a re-used single-track freight corridor with sidings and double-track sections where trains can pass each other. A single delay can cascade across the system, threatening the 12-minute headway—the interval between trains.

OC Transpo needs Line 2 to maintain a 12-minute headway to ensure frequent, reliable service and minimize passenger wait times. Achieving that level of performance is typically possible only on a double-track system, making it an exceptional benchmark for a single-track line.

Add Ottawa’s deep-freeze winters—where temperatures can drop to -40°C —and the demands on signaling and controls become extraordinary. Getting it right required both smart technology and a smarter partnership. For this task, OC Transpo relied on TransitNEXT as the overall contractor responsible for delivering the extension and improvements across Line 2, and Siemens Mobility for the rail signaling and train control solution.

"We're really proud to have achieved that 12-minute headway on a single track, when so many people thought it wasn't possible."

Cesar Palencia, Deputy Project Director, TransitNEXT

Adding intelligence to O-Train

Siemens Mobility delivered an integrated rail signaling and train control system tailored to OC Transpo's operational and environmental needs. The solution combines three tightly coordinated subsystems that maintain safety, precision, and punctuality—even at -40 °C. The new system was used on the new extension and to modernize the original span of Line 2.

- **Trainguard MT Zub Automatic Train Protection (ATP)** Provides continuous train protection with speed limits, speed recommendations, signal compliance, minimizing human error and ensuring safe operation under all conditions.
- **Trackguard Westrace Mk II Interlocking System** Manages trackside safety by precisely controlling switches and signals to prevent conflicting movements and using the Clearguard ACM250 axle-counting system to detect train position and divide the line into virtual "blocks."
- **Controlguide OCS Automatic Train Supervision (ATS)** Serves as the system's central intelligence. It supervises all interlockings, provides operators with an overview of train positions, and can automatically set routes based on timetables and define dynamic stopping times for trains in stations to manage delays; all without requiring interference from dispatchers or controllers.

The rail signaling and train control system are integrated onto the trains with features designed to simplify operation, including clear digital displays and audio and visual signals for speed changes and alarms assisting the train driver or operator.

"We proved during design and performance testing that our system can orchestrate complex single-track operations with ambitious headways and a margin of error of just two or three seconds," said Frank Boxler, Lead Engineer, Siemens Mobility. "And, when there is a delay it may be easy to catch-up and return to schedule."

A partnership built on trust

Execution demanded close collaboration between Siemens Mobility and TransitNEXT. Together, the teams developed a new hybrid signaling standard—one that gives operators more control than a traditional PTC system while dramatically simplifying operations. Siemens Mobility and TransitNEXT worked hand-in-hand with OC Transpo and Transport Canada to define and certify this innovative approach while adhering to CENELEC SIL 4 safety levels.

"The key to our success was both companies focused on a common goal," said Cesar Palencia, the Deputy Project Director for TransitNEXT. "We shared the mentality that we will work on this together and overcome whatever challenges we met. We faced extreme pressure and had the right people around the table who were committed to the project's success."

Maintenance was addressed early. By involving TransitNEXT's maintenance personnel throughout design and testing, Siemens Mobility ensured a smooth transition and deep operational knowledge once the system went live. The proven robustness of the Siemens Mobility equipment also simplifies maintenance needs.

"The level of transparency from Siemens Mobility really built trust," according to Palencia. "Typically, with a rail signaling and train controls contractor, it's like dealing with a black box. But with Siemens Mobility, we felt like they were more of a partner than a contractor."

Delivering when it matters most

Together, Siemens Mobility and TransitNEXT created a seamless control environment that delivers exceptional safety and reliability, while maintaining the target 12-minute headway.

"We're really proud to have achieved that 12-minute headway on a single track, when so many people thought it wasn't possible," said Palencia.

Since entering service, the Line 2 extension continues to perform with outstanding reliability—proving that Siemens Mobility's advanced signaling technology, combined with its strong partnership with TransitNEXT, truly delivers train control that's built smart for Ottawa.