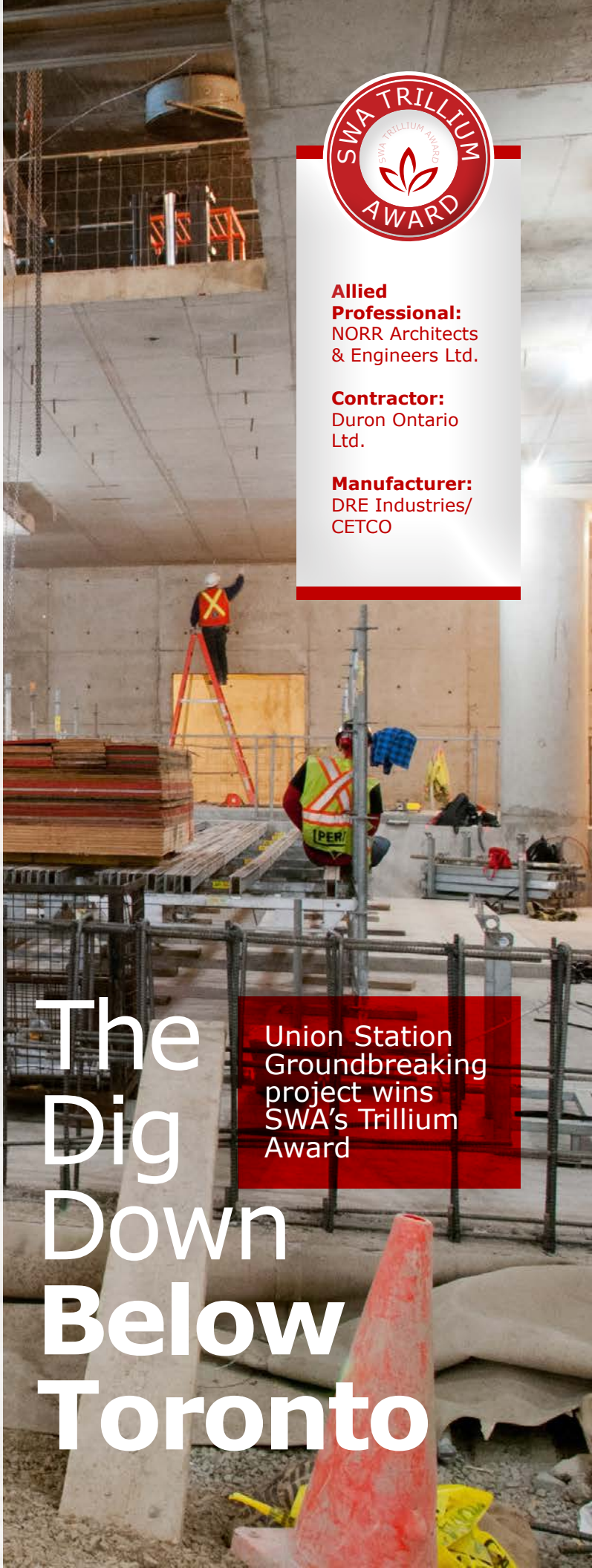
The Dig Down **Below Toronto**

Union Station Groundbreaking project wins SWA's Trillium Award



Allied Professional:
NORR Architects & Engineers Ltd.

Contractor:
Duron Ontario Ltd.

Manufacturer:
DRE Industries/ CETCO

Extensive teamwork and deep expertise made "The Dig Down Below Toronto Union Station" a solid choice for SWA's first Trillium Award. The landmark project saw NORR Limited unite a team of industry-leading contractors and waterproofing professionals to revitalize Canada's busiest transportation hub.

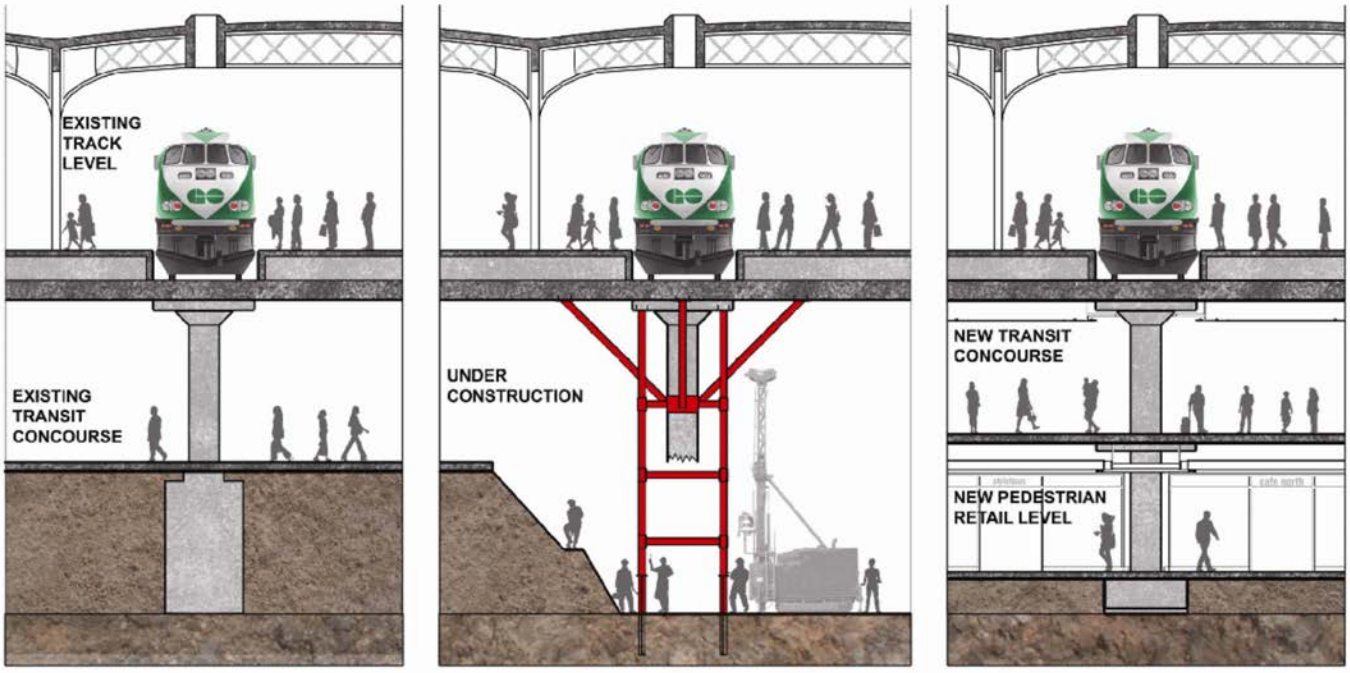
"It was a monumental ask," recalls Silvio Baldassarra, Chairman of the Board with NORR. "The City of Toronto had bought Union Station six years earlier and was looking for a partner who could take over the complete restoration of the station."

The City's goals were three-fold: rehabilitate the heritage building, create a commercial retail destination, and – perhaps most importantly – enable the station to better serve the millions of annual passengers who passed through its gates.

"At the time, Union Station was seeing up to 65 million people come through it annually, and the City was expecting that volume to grow up to 130 million by 2030," Baldassarra explains. "The station wasn't built to accommodate that many passengers and it needed someone to find an economical way of moving more people without impacting this heritage site."

It was a monolithic task on a sensitive site. At first, the challenge fell to Union Pearson Group, which spent years attempting to find an economical solution before stepping back. Soon after, the City approached NORR to get the project back on track.

"There were a lot of smart architects and engineers that came before us with various ideas, but after those proved unfeasible, we knew we needed a different approach," says Baldassarra. "That's when we came to the City and said, 'What if we could perform the restoration and create this commercial space not by touching the heritage building but by digging down?"



We were inspired by what they'd done at Grand Central Station in New York," he adds, "It had never been done before in Canada or even anywhere in the world at this level, but we were confident we could pull it off."

Breaking ground

It was the most technically innovative architecture and engineering solution ever to be implemented at its scale in Canada. And while it took some convincing, NORR's decades of experience, industry reputation, and success with similar initiatives at the Toronto Pearson International Airport won the City's approval.

NORR's dig-down strategy involved excavating additional space 13 feet below the station basement to create two floors offering 110,000 sq. ft. of new passenger concourse space. The work needed to be done while maintaining full station services and without negatively impacting any of the heritage assets.

"That meant supporting the building above while we cut columns, which from a structural point of view was no small challenge," says Hassan Saffarini, Principal at NORR. "It's one thing to support something vertically, but it's another to support something while you have the constant breaking force of a train coming in, stopping, and leaving regularly through the day."

This was one of the many logistical challenges that put NORR's expertise to the test. Another was selecting and installing a waterproofing membrane for the new underground space that could withstand the site's demanding soil conditions and provide long-term performance.

"That's where we came in," says Marla Cosburn, President of DRE Industries. "NORR was looking for a highly durable membrane that could guarantee longevity, and they selected CETCO's CoreFlex 60 system, which is our highest-end waterproofing product."

CETCO's system was selected for numerous factors, including its dual membrane properties (60 mils welded membrane and active layer), extremely low permeability, and comprehensive warranty.

"Given Union Station's importance as the

biggest transportation hub in Canada, and the high-end use of the second basement, we sought the most reliable waterproofing system," notes Saffarini, explaining, "The basement slab and foundation walls are within the water table level in parts of the station and installation had to be made as blindside waterproofing, and CETCO CoreFlex 60 was the right solution. And together with the high quality control during construction, it also ensured a watertight retail mall and concourse."

"It was a complex and demanding project, so we were quite pleased that they felt our product was the right one for the job," adds Cosburn.

A Canadian-first installation

A specialized membrane requires specialized skills. To that end, Duron Ontario Ltd. was selected to install the CoreFlex 60, conducting what would become the largest heat-welded waterproofing system installation in the country.

"This system required an approved and skilled applicator," says Elisa Gorniak, Manager of Waterproofing with Duron's Roofing & Mastic Department. "For example, it required heat welding of every single seam and penetration using heat guns at a very specific heat level and rate to ensure everything welded together to form a continuous bond."

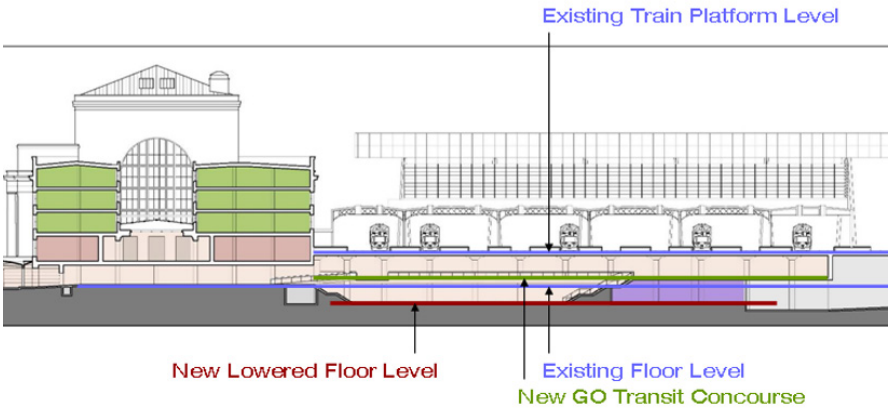
To ensure success, NORR and Duron worked in close collaboration with CETCO's CAD department during the design phase to develop over 100 project-specific details (e.g., penetrations, tiebacks, various column footings, pipe penetrations, and pipe banks).

As Saffarini reports, "DRE Industries went over several options at the early stages of the design development. And once the right solution was selected, DRE and CETCO provided extensive detailing to ensure continuity of waterproofing,"

"In many cases, site challenges required that these details be adapted to meet such unique conditions," he continues, "and this collaboration continued through the construction stage."

With designs locked down, the first challenge for the entire team was to transport the waterproofing material and equipment into the underground site. After granular was placed and the site was prepped, Duron worked alongside crews to install the CoreFlex 60 membrane over graded clear stone.

To say the job was complex would be an understatement. The work involved booting and clamping thousands of penetrations using various details, and fastening and welding the CoreFlex 60 to the wall in an offset seam to create a fully-welded membrane.



"The seaming of the system was extremely important, as any weak area risks letting the water in, and that simply was not an option," says Gorniak.

In addition to ensuring a continuous membrane throughout the site's complicated layout, the crew also facilitated a watertight termination to a cast-in-place tunnel. After waterproofing was complete, a layer of Voltex (a thick bentonite-like carpet) was then laid on top for protection.

Sealing the deal

Union Station's revitalization has been a long time coming. Thanks to the collaborative efforts of NORR, Duron, and DRE, it is now home to the additional commercial and commuter space it needs to be ready for future travellers.

"We added an incredible amount of area to the station that reinvents it and makes it a real process or a transportation processor that will be flawless for the next 50 years," says Baldassarra. "One thing we're all proud of is the fact we met the City's goals without changing the look of this beautiful heritage building. We believe the station's original architect would be proud that we paid respect to their vision."

Certainly, working on the Union Station Revitalization has been a hallmark experience for all involved. That includes Cosburn and her team at DRE Industries, who says the team's success is owed largely to a united approach.

"There were just so many moving parts over multiple years, and all were taking place in this critical space below a busy station," she says. "Without the constant communication and cohesion between the team, we wouldn't have been able to make this a success."

"It's definitely a historic endeavor and a very high-profile project," adds Gorniak. "It's one of the most important and iconic buildings in the city, so to be involved in this project and be included in the Trillium Award win was very special."