

ONE

THE MAGAZINE OF AECON GROUP INC.
WINTER 2017, VOLUME 4, ISSUE 1



THE WAY OF THE FUTURE
Eglinton Crosstown
LRT Project

AT THE CORE
Darlington Nuclear RFR
Project (Execution Phase)

COMING FULL CIRCLE
Northeast Anthony Henday
Drive (NEAHD) Project

MAKING THE CONNECTION
Bell Canada Gigabit
Fibe service



PREVENT. PREDICT. PROTECT.

PREVENT UNSAFE WORKING CONDITIONS BY ASSESSING FOR HAZARDS AND RISK.

PREDICT POTENTIAL SAFETY OPPORTUNITIES THROUGH INSPECTIONS AND MONITORING THE WORKPLACE.

PROTECT EMPLOYEES, THE PUBLIC AND THE ENVIRONMENT BY FOLLOWING BEST PRACTICES.

SAFETY MATTERS ... MOST!

Aecon



AECON'S VISION:

To be the first company people go to for building things that matter.

ONE is a magazine published by Aecon Group Inc. for its employees and clients. For more information about Aecon, visit our website at aecon.com.

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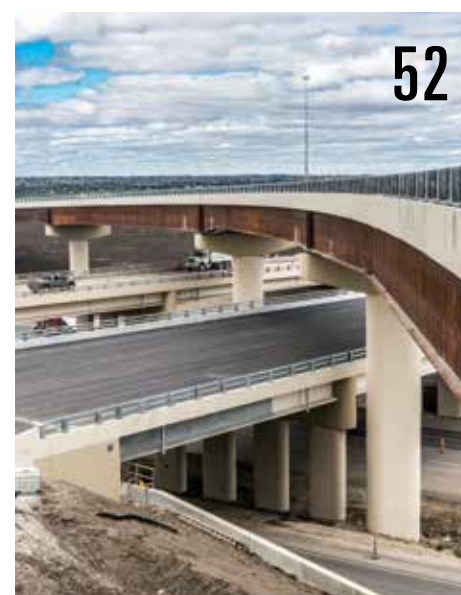
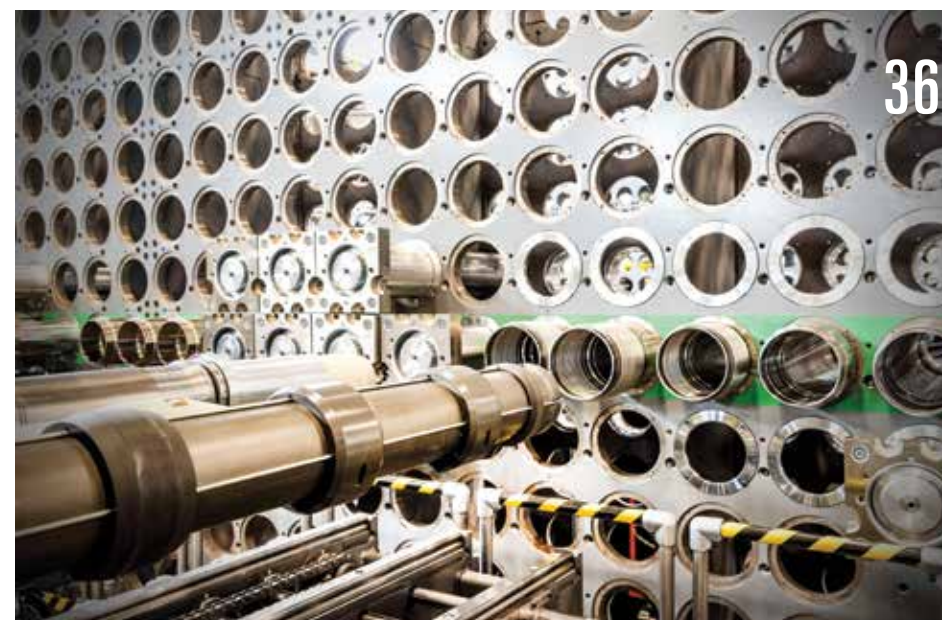
ON THE COVER:

A worker training on the nuclear reactor vault mock-up at Darlington Energy Complex in Clarington, Ontario

BACK COVER:

Northeast Anthony Henday Drive (NEAHD) Project in Edmonton, Alberta

This magazine includes certain forward-looking statements that contain information concerning possible or assumed future results or operations of Aecon. These forward-looking statements are based on current operating plans and competitive, financial and economic data but are subject to risks and uncertainties. Although Aecon believes the expectations reflected in these forward-looking statements are reasonable, it can give no assurance the expectations of any forward-looking statements will prove to be correct.



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STAYING RESILIENT IN TIMES OF CHANGE

By John M. Beck
President and CEO of
Aecon Group Inc.



Tunnelling on the eastern portion of the Eglinton Crosstown LRT route

If there is one word to describe Aecon's presence in the marketplace, it is “resilient.” Our ability to respond to transitions within our industry and our company, and to capitalize on emerging opportunities, is a direct reflection of our people, and our strategic commitment to diversity.

Despite tough economic times and strong headwinds in Alberta's oil and gas sector, Aecon continues to flourish in key market sectors. A multitude of announced projects in the Canadian transportation sector offers unprecedented growth opportunities for our Infrastructure and Concessions businesses. In fact, the number of large-scale road, bridge, light rail transit (LRT) and subway projects is greater today than at any other time in Canada's history. Rest assured, Aecon is well positioned to successfully deliver on a number of these opportunities.

When we think of Aecon's contribution to today's transportation industry, one project in particular garnered major attention in 2016, and for good reason. Toronto's Eglinton Crosstown LRT is one of the largest Public-Private Partnership (P3) projects in the world today. Aecon is one of four equal joint venture partners in Crosslinx Transit Solutions – the P3 project team that will be responsible for designing,

building, financing and maintaining the Eglinton Crosstown LRT. The construction contract alone is \$5.3 billion. Work is now well under way, and Aecon is extremely proud to be a part of it.

Much like the 407 ETR in the 1990s, the Eglinton Crosstown LRT is a watershed transportation project for our company, and the resources required are just as monumental. The Crosslinx joint venture team that's bringing it to fruition has continued to grow and evolve. More than 65 Aecon employees have been added to the roster of this fully integrated team. Thank you to all of our seconded employees for taking on this opportunity with such commitment and enthusiasm. This issue of *ONE Magazine* provides an introductory overview of the project and its related scope of work. It will be several years before the 19-kilometre LRT is completed, but we will keep you posted on its progress and key milestone achievements.

If the Eglinton Crosstown LRT represents our largest transportation project to date, the Darlington Nuclear Refurbishment project in Clarington, Ontario, is our largest-scope project in the energy sector. Aecon's role in carrying out the execution phase of the Nuclear Re-tube and Feeder Replacement Project for Darlington affirms our reputation in the nuclear industry. The exceptional work we're doing on Darlington will position us well for future opportunities in the nuclear sector, including potentially working alongside Bruce Power on a similar nuclear refurbishment project. Good news has also come to our Mining team, despite market challenges in the oil and gas sectors. With the successful completion of our civil works contract for Suncor Energy at its new Fort Hills mine in Alberta, we were able to extend our service offering to include construction of the site's new ore processing plant – OPP Dry. And adding to our roster of international initiatives, we are pleased to be in the process of developing an exciting P3 airport project in Bermuda.

While projects of this magnitude are considerable accomplishments, it's important to stay focused on the road ahead. We must remain mindful of the fact that our industry continues to evolve and the introduction of new technologies such

as drones, autonomous vehicles and 3D printing, is ever-present. These technologies will undoubtedly have a major – perhaps even disruptive – impact on both our industry and business in terms of productivity, how we operate and the safety of our teams. To explore these changes and stay ahead of the curve, Aecon has formed an Innovation Council led by senior executives, which we introduce in this issue. The Council's mandate is to research new technologies that Aecon can leverage as we pursue a leadership position in technological innovation within the construction industry.

As I review all that we've accomplished in 2016, I am reminded that the work our employees do every day remains the foundation of Aecon's success. As we continue to propel Aecon toward new growth and prosperity, I would like to thank each and every one of you for your continued hard work and dedication. Most of all, I remind you of our commitment to safety and ensuring that you and your co-workers go home safely every night. I look to the future with great optimism and wish you and your families all the best in 2017.

John M. Beck is the President and CEO of Aecon Group Inc.

“In fact, the number of large-scale road, bridge, light rail transit (LRT) and subway projects is greater today than at any other time in Canada's history. Rest assured, Aecon is well positioned to successfully deliver on a number of these opportunities.”

MAJOR PROJECTS AT A GLANCE

Current and recently completed projects with a contract value of > \$100 million



JOHN HART GENERATING STATION
CONTRACT VALUE: **\$375M**



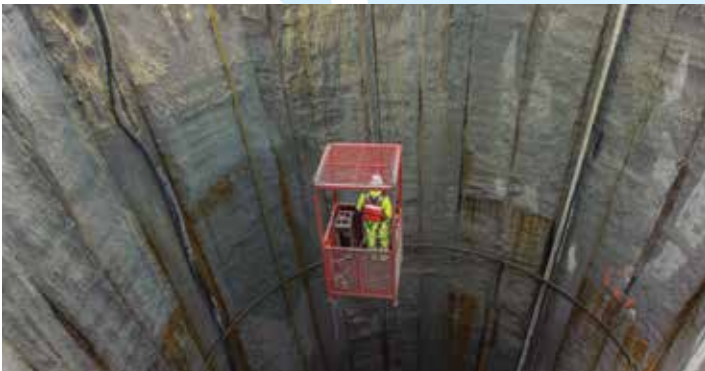
1 SUNCOR FORT HILLS ORE PREPARATION PLANT
CONTRACT VALUE: **\$105.9M**
2 FORT HILLS — HEAVY CIVIL CONSTRUCTION
CONTRACT VALUE: **\$123M**



AREVA RESOURCES CANADA INC. McCLEAN LAKE MILL UPGRADE
CONTRACT VALUE: **\$212.2M**



NORTHEAST ANTHONY HENDAY DRIVE
CONTRACT VALUE: **\$1.81B**



PORT MANN MAIN WATER SUPPLY TUNNEL
CONTRACT VALUE: **\$150M**



LAFARGE — EXSHAW EXPANSION
CONTRACT VALUE: **\$100.5M**



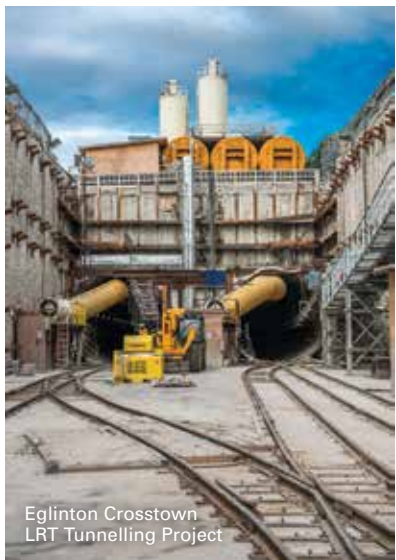
INTER PIPELINE EXPANSION
CONTRACT VALUE: **\$800M**



K+S POTASH CANADA LEGACY
CONTRACT VALUE: **\$200M**



REGINA WASTEWATER TREATMENT PLANT
CONTRACT VALUE: **\$158M**



1 YORK VIVA BUS RAPID TRANSIT
CONTRACT VALUE: **\$261M**

2 HIGHWAY 410 WIDENING
CONTRACT VALUE: **\$156M**

3 TTC SHEPPARD SOUTH STATION TUNNEL
CONTRACT VALUE: **\$279M**

4 EGLINTON CROSSTOWN LRT
CONTRACT VALUE: **\$5.3B**

5 EGLINTON CROSSTOWN LRT TUNNELLING
CONTRACT VALUE: **\$177M**

6 UNION STATION TRAIN SHED REVITALIZATION
CONTRACT VALUE: **\$196M**



DARLINGTON NUCLEAR RE-TUBE & FEEDER REPLACEMENT (DEFINITION PHASE)
CONTRACT VALUE: **\$600M**

DARLINGTON NUCLEAR RE-TUBE & FEEDER REPLACEMENT (EXECUTION PHASE)
CONTRACT VALUE: **\$2.75B**

DARLINGTON NUCLEAR TURBINE GENERATOR REFURBISHMENT
CONTRACT VALUE: **\$265M**

DARLINGTON NUCLEAR RE-TUBE WASTE PROCESSING BUILDING
CONTRACT VALUE: **\$127M**

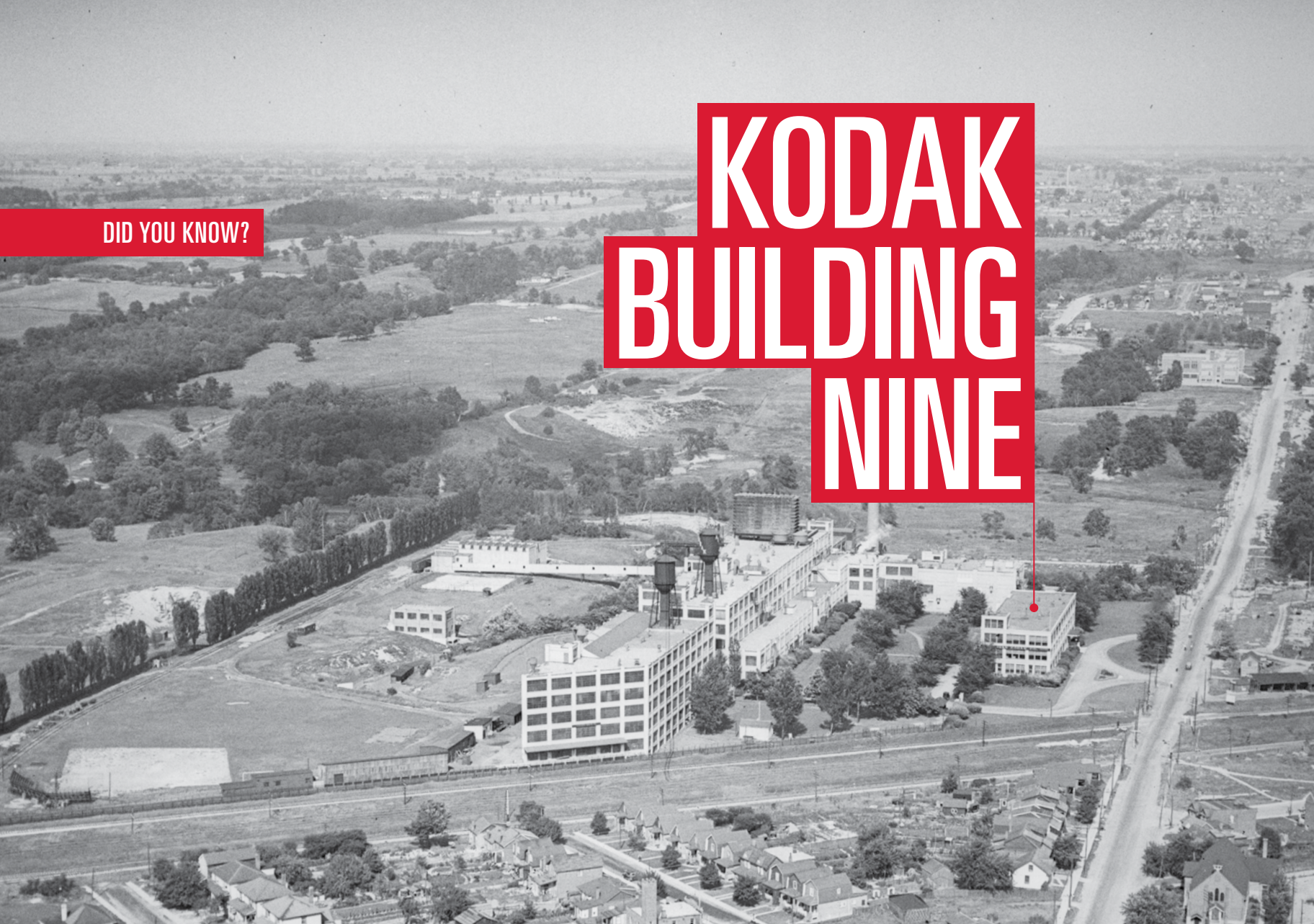


REGION OF WATERLOO'S ION STAGE 1 LRT
CONTRACT VALUE: **\$500M**

DAWN-PARKWAY EXPANSION
CONTRACT VALUE: **\$250M**

DID YOU KNOW?

KODAK BUILDING NINE



Anders Persson, Project Segment Director, Eglinton Crosstown LRT, stands in front of Building Nine on "moving day"

Aerial view of Kodak Lands at Eglinton Avenue West in Toronto, 1930 (photo courtesy of City of Toronto Archives)

EGLINTON CROSSTOWN LRT PROJECT BRIDGES PAST AND PRESENT

For nearly a century, film and camera manufacturer Kodak operated a large plant at the current intersection of Black Creek Drive and Eglinton Avenue in the Mount Dennis neighbourhood of Toronto.

The plant closed in 2005, and today only one building remains – Building Nine – thanks to its landmark status as a community hub for the Kodak employees who lived in the area. The building played host to numerous recreational, wedding and holiday events for employees' families but was perhaps most fondly remembered for its movie house, which played major motion pictures (produced on Kodak film) for employees' families.

As with many fine buildings whose once-celebrated purpose falls prey to changing times, Building Nine quickly fell

into disrepair. Although it still stood proudly as a landmark designation amidst the urban sprawl, the building became a sad, dilapidated reminder of its former glory, patiently awaiting its fate.

That new lease on life came in 2012 when Metrolinx, the GTA's regional public transportation entity, bought the building with the plan to restore and integrate it into the construction of the new Eglinton Crosstown LRT project, one of the largest transportation projects in the country, for which Aecon is an equal joint venture partner (see story page 14).

Plans for the heritage building called for it to become a new kind of landmark: the entranceway into Mount Dennis Station, the westernmost station on the new 19-kilometre LRT route. In order to fulfil

the role, however, the building would first have to be moved. And although the distance was a mere 60 metres, when you're shifting a 3,000-tonne heritage building, nothing's taken lightly.

After considerable prep work, including trash and asbestos removal, and hours of precision planning, Project Segment Director (and Aecon-seconded employee) Anders Persson led the charge to physically move the building in late summer 2016.

Construction crews carefully hoisted the venerable building off its foundation and onto "wheeled" steel girders, and the hydraulic system employed for the task began quietly pushing the building forward. At a mere 20 centimetres per minute, the pace rivalled that of a snail. Crews checked the building's progress every step of the way.

Two hours later, the move was complete. Building Nine was standing tall in its new permanent location, ready to be refurbished and integrated into Toronto's newest transportation hub. No longer neglected, the historic structure will once again welcome people through its doors.



Rendering of the future Mount Dennis Station as part of the Eglinton Crosstown LRT

MAKING THE CONNECTION IN DIGITAL INNOVATION

BELL CANADA GIGABIT FIBE SERVICE



Workers blowing cable into the ground



One of Aecon's corporate core values is Passion for Excellence. It is a reflection of our company's collective effort to be an innovative industry leader, always striving to find better methods and increased value for our clients. It's also the philosophy behind Aecon's latest venture with long-time client partner Bell Canada. Its newly launched Bell Gigabit Fibe service, a \$1.4-billion investment from Bell, is Canada's largest gigabit infrastructure project that promises users an Internet download speed of close to one gigabit per second. With Aecon's help, Bell has been deploying the service quickly and efficiently, while revolutionizing the way that Internet access is delivered to customers' homes.

"When Bell announced the launch of their largest-ever fibre deployment project, it made sense that Aecon would be a big part of it," says Eric MacDonald, Aecon Senior Vice President, Utilities. "We have been working on every major Bell strategic program in recent history, and that's prepared us for what we're embarking on now."

The plan for Gigabit Fibe comes as part of Bell's overall \$20-billion investment in its broadband fibre and wireless networks.

Over the next five years, Bell aims to make Gigabit Fibe available to 1.1 million homes and businesses across Toronto, as well as Quebec and Atlantic Canada. The first rollout involved nearly 50,000 Toronto properties in late 2015. The projected completion date for the current scope is 2018.

"We're helping Bell bring their latest technology right to the home, and we're doing that neighbourhood by neighbourhood," notes Dereck Oikawa, Aecon Telecommunications Director. "When it comes to technology, nobody knows what's coming next. In thinking ahead, Bell is investing in a network that prepares for future technological evolution."

A SOLID HISTORY

Aecon is no stranger to working with Bell Canada. The two companies have a long-standing partnership that was solidified even further through a fibre-to-the-node (FTTN) program. The FTTN project called on Aecon to install and connect fibre-optic cables into numerous neighbourhoods across Ontario. This time around, Aecon takes it a step further by extending Bell fibre network installation directly to the homes of individual

subscribers through Bell's fibre-to-the-home (FTTH) program.

"This project is a continuation of our strong partnership with Bell Canada in deploying the latest technology to their customers," says Oikawa. "And if Bell plans to move forward with the network deployment over the next 10 years, we want to be a part of it because we have the best people, resources and knowledge to design it, construct it and deploy it."

SCOPE OF WORK

When Aecon first joined forces with Bell several decades ago, telecommunications services were delivered via a copper network. Over time, that technology was updated with the faster hybrid fibre optic network known as FTTN, which essentially involved laying fibre over the copper network to deliver faster Internet access to neighbourhoods.

As time progressed, so did the technology. Bell, knowing its neighbourhood node set-up wasn't going to provide enough bandwidth for consumers' ever-growing Internet and entertainment demands, was intent on bringing the fibre network even closer to its customers.

"It was the next logical step for Bell,"



Worker fusing fibre

PROJECT FILE

BELL CANADA GIGABIT FIBE SERVICE

LOCATION: Toronto, Ontario

CLIENT: Bell Canada

AECON BUSINESS UNITS: Utilities (AUE, Aecon Fibre, QX Locates, QX Splicing)

PROJECT TIMING: 2015 to 2018

TYPE OF CONTRACT: Design-Build

SCOPE:

- Design
- Construction
- Locates
- Splicing

AECON EMPLOYEES ON SITE AT PEAK: 100

KEY EMPLOYEES:

Eric MacDonald – Senior Vice President, Utilities
Dereck Oikawa – Telecommunications Director
Larry McFadden – Telecommunications Manager
Angelo Salvatore – Director, Ontario Operations
Adam Budd – Operations Manager
Sean Roberge – General Manager, Fleet
Ross Deal – Manager, Fleet Operations
Adrienne Clarke – Manager, QX Locates
Jacob Barber – Superintendent
Stewart Fraser – Project Manager
Abel Amorim – Safety Advisor



// BELL GIGABIT FIBE



A worker operating a directional drill in order to place new conduit

Fusing fibre



A worker blowing cable into a conduit

THE COMPLETION OF THIS PROJECT IN 2018
WILL INVOLVE UPGRADES TO

27

BELL CENTRAL OFFICE FACILITIES.
THE INSTALLATION OF SOME

9,000

KILOMETRES OF NEW FIBRE
THROUGH MORE THAN

10,000

UNDERGROUND MANHOLES
AND ON AN ESTIMATED

80,000

POLES

explains Oikawa. "That's why we're helping them to extend their neighbourhood footprint right into the individual houses."

From the time Bell announced its new network investment, several Aecon business units have been diligently working on making Bell's vision a reality. The initial work phase called upon Aecon Utilities Engineering (AUE) to design plans for the new fibre cable layout, as well as to assist Toronto Hydro with hydro pole inspection around the city before aerial construction commenced. For underground construction, QX Locates was engaged to mark specific utility locations that construction crews would use as reference points for installing new ducts and fibre optic cables. The QX Locates team was also responsible for providing fibre connectivity to customers.

To optimize the execution of Bell's program, Aecon committed full-time labour and fleet resources through the establishment of a new business unit called Aecon Fibre, which has since been responsible for all of the trenching work, directional drilling and aerial installations for Bell Gigabit Fibe.

The completion of this project in 2018 will involve upgrades to 27 Bell central office facilities across the Greater Toronto Area and the installation of some 9,000 kilometres of new fibre, through more than 10,000 underground manholes and on an estimated 80,000 poles.

THE LAST MILE

For Bell, updating its legacy copper network with the faster, more user-friendly fibre optic network is part of a long-term plan, and Aecon has been a partner in the network evolution from the beginning.

Copper networks deliver data using electrons, which travel at less than one per cent of the speed of light. Fibre cables, by contrast, transmit information using protons, which can travel at an impressive 60 per cent of the speed of light. It's this significant shift into information highway overdrive that Bell is depending on to support its Gigabit Fibe customers with connection speeds fast enough to download a three-gigabyte, high-definition movie in just 25 seconds.

RAISING THE BAR ON PARTNERSHIP

For the Bell Canada Gigabit Fibe project, Aecon has taken the extra step of aligning with Bell from a partnership perspective by branding our fleet of vehicles with a new design. Now, Aecon vehicles servicing the many neighbourhoods earmarked for Gigabit Fibe service conversion will feature Bell's iconic blue-and-white logo.

"By wrapping our trucks with the new Bell signage, we are demonstrating the close partnership between Aecon and Bell," says Oikawa. "We want Bell customers to understand that we play an important role in the construction portion of this, but also that they are going to benefit from the end goal, which is this exciting new network we're helping to install."

"We really want people to understand why we're doing this," adds Eric MacDonald. "We're extremely proud of the fact that we're deploying a world-class network in some of the biggest cities in Canada, for one of our most important clients."



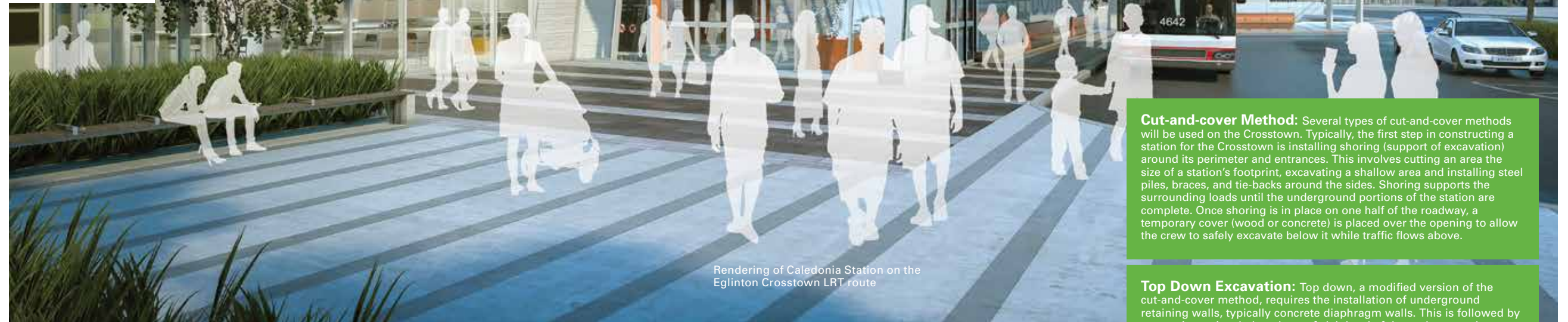
THE WAY OF THE FUTURE

EGLINTON CROSSTOWN LRT PROJECT

Aecon leads the way as an equal consortium partner in one of North America's largest transit infrastructure projects.



It's a state-of-the-art light rail transit (LRT) line and Aecon's largest contract value project undertaking to date. Upon its completion in 2021, the Eglinton Crosstown LRT will offer millions of Torontonians an enhanced public transit route across the city. Aecon is proud to play a key role in making it happen. We are one of four equal joint venture partners in Crosslinx Transit Solutions, the team responsible for building the rail line under a Public-Private Partnership (P3) model. Working together as one, the team's already leading the charge on this remarkable journey to the end of the line.



Rendering of Caledonia Station on the Eglinton Crosstown LRT route



Cut-and-cover Method: Several types of cut-and-cover methods will be used on the Crosstown. Typically, the first step in constructing a station for the Crosstown is installing shoring (support of excavation) around its perimeter and entrances. This involves cutting an area the size of a station's footprint, excavating a shallow area and installing steel piles, braces, and tie-backs around the sides. Shoring supports the surrounding loads until the underground portions of the station are complete. Once shoring is in place on one half of the roadway, a temporary cover (wood or concrete) is placed over the opening to allow the crew to safely excavate below it while traffic flows above.

Top Down Excavation: Top down, a modified version of the cut-and-cover method, requires the installation of underground retaining walls, typically concrete diaphragm walls. This is followed by excavation to just below the roof slab level of the underground structure, with the retaining walls and struts supporting the soil at the sides. The roof slab is then constructed providing a massive support across the excavation. Work then proceeds through the station's future entrances, downwards to the base slab level of the underground structure. Once the base slab is finished, side walls are built and the intermediate struts are gradually removed.

EGLINTON CROSSTOWN LRT: PROJECT OVERVIEW

It's full steam ahead for the Eglinton Crosstown project, a 19-kilometre LRT line that will bring much-needed relief to the transit woes of Torontonians. Traversing the city in an east-west slice across the midtown artery of Eglinton Avenue, the Crosstown rail line involves a combination of 15 underground stations and 10 at-grade surface stops. It is one of the largest transit infrastructure projects under way in North America today. Aecon has joined partners ACS Infrastructure Canada, EllisDon, and SNC-Lavalin to form Crosslinx Transit Solutions (Crosslinx), the joint venture project team that will bring it to fruition.

As with many of today's mega public transportation projects, the Crosstown LRT follows the Public-Private Partnership (P3) model. Aecon is an equal partner in the \$5.3-billion Crosslinx consortium to develop the Eglinton Crosstown LRT project in Toronto. Upon the LRT's completion in 2021, Metrolinx, the region's transit authority and also the project client/owner, will turn to the Toronto Transit Commission (TTC) to operate it.

The impact of this highly anticipated LRT line on commuters in the Greater Toronto Area (GTA) is expected to be dramatic and immediate once the first train leaves the station five years from now. In fact, Metrolinx is estimating that within its first 10 years of service, the Crosstown line will be carrying 5,500 passengers per hour (in peak direction) and making 100 million passenger trips annually.

VALUE OF PROJECT IN CONSTRUCTION COSTS



A COLLABORATIVE CULTURE

When Metrolinx selected Crosslinx in July 2015 as the preferred team to deliver the Eglinton Crosstown LRT project, the partnership of Aecon/ACS Infrastructure Canada/EllisDon/SNC-Lavalin hit the ground running with its unique team structure. Unlike some joint venture arrangements where each partner tackles a specific scope of work, the Crosslinx team has melded into one entity, pooling all resources and then assigning best-fit roles to those with the greatest expertise. Since the Crosstown project contract signing, the Crosslinx team has grown to more than 420 employees.

"What's really impressive is that our four companies, which all have different missions on a larger scale, have come

together as one," notes Denisa Leiba, People and Culture Director, Crosslinx Transit Solutions, and a seconded employee from Aecon. "There has been an intermingling of talents and experience but, the reality is, success will only come when we're all successful."

From the Aecon perspective, more than 65 employees have been seconded to the Crosslinx team to date. For the duration of the project, they will be Crosslinx "employees," as will their counterparts from the other consortium companies. Together, the hybrid Crosslinx team will tackle each segment of work scope with a single-source approach until the project's completion in 2021.

"The philosophy of the consortium is that we are a fully integrated team; there is no scope split," explains Leiba. "Because we are joint in commercial contractual terms, this ultimately means that we're totally in this together."

SCOPE OF WORK

To say the Crosstown LRT project is a massive undertaking is an understatement. It's a beast, albeit an intricate, expansive and strategically engineered beast. Nineteen kilometres long, the LRT line features 25 stations and stops – 15 underground stations and 10 at-grade surface stops. It links to 54 bus routes, three TTC subway stations, various GO Transit lines and the Union Pearson Express.

Crosslinx will employ three key building methods to construct the 15 underground stations: top down excavation, sequential excavation method (SEM), and cut-and-cover method. The surface stops will include dedicated right-of-way tracks separate from the rest of the traffic, as well as transparent and spacious shelters. At the

western end of the line, a maintenance and storage facility will be built, north of Mount Dennis Station – the first stop on the line. Situated on 42 acres of land commonly referred to as the Kodak Lands, the complex will provide a space for train maintenance and repairs, as well as employee and office parking.

A compelling feature of the Crosstown LRT is the incorporation of a singular elevated guideway at the west end of the line, connecting Mount Dennis Station to Keelesdale Station. The viaduct structure with bridge spans will feature aesthetically pleasing columns, portals and retaining walls.

And when it comes to operational speed, the Crosstown LRT reigns supreme as an urban public transit option. With an average speed of 28 kilometres per hour, Crosstown trains are expected to travel faster than existing TTC trains, buses and streetcars.



Sequential Excavation Method: Following the installation of shoring, the area is divided into manageable segments for excavation. Using a planned sequence, a crew mines below street level. The excavated cavern is lined with primary concrete “shotcrete.” Then, the station box is constructed within the cavern to accommodate the associated platform and rail infrastructure. The sequential excavation method is used in tight urban areas to minimize the relocation of utilities.

MAKING THE TEAM TRANSITION: THE AECON PERSPECTIVE

Aecon's largest contract value project to date, the Crosstown LRT calls for immense resources and expertise.

More than 65 Aecon employees have been seconded to the Crosslinx team from across several Aecon business units: Mining, Nuclear, Heavy Civil, Utilities, Project Controls, Legal, Concessions, Buildings, Corporate, Transportation, and Human Resources. The seconded employees are filling a range of roles from operations to support services, including leadership roles, such as: Roger Howarth, Commercial Director; Anders Persson, Segment Director; Denisa Leiba, People and Culture Director; Charles Todd, Contracts Director; Phil Holliday, Interface Director; David Levett, Chief Technical Officer; George Nohos, Maintenance Manager; Gabriel Patron, Deputy Segment Manager; and Tim Russell, Deputy Segment Director.

Aecon's contribution as an equal consortium partner actually reaches back to the bid process, when the four companies first joined forces.

“The pursuit for the Crosstown project started over three years ago when we all came together,” explains Marty Harris, Senior Vice President, Aecon Transportation East. “As a partnership team, we selected a number of people who became dedicated to preparing the bid and putting into place the strategies that would oversee how our Crosslinx team would be organized, and what the various site segments would include.”

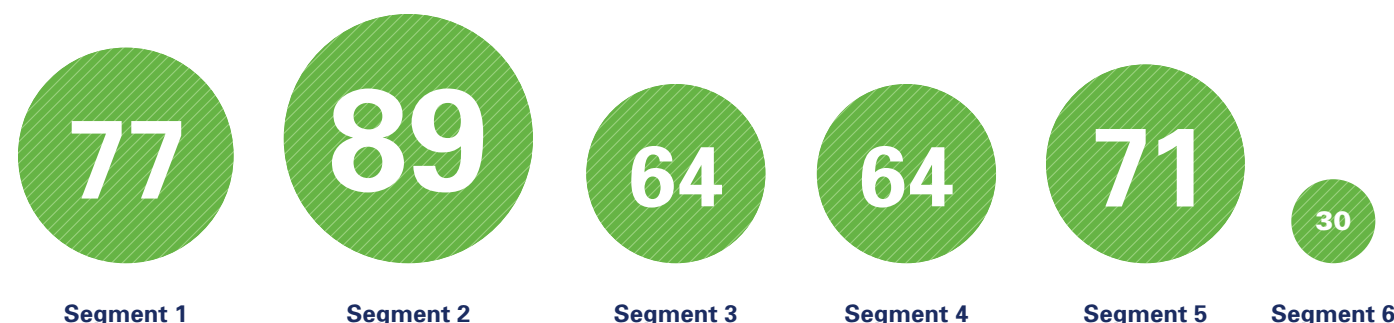
Shortly after Metrolinx selected Crosslinx as the preferred proponent to build the Crosstown LRT in July 2015, seconded employees from all of the four partnering companies made their transition to the Crosstown project. The newly created

Crosslinx Transit Solutions team was organized under six major project segments. For ease of reference, the segments were assigned numbers rather than names, as the scope of work for each is intricate and fully integrated.

As a Segment Director, Anders Persson's main focus in the initial phase of this five-year project has been to ensure his team is cohesive and execution-oriented. Crosslinx is still in its initial growing stages, so Persson has the task of orienting and integrating new employees almost daily.

“Without a proper team in place, this type of project can definitely get a whole lot more demanding,” says Persson. “It has been an interesting ride so far, in many different ways, and I think most individuals in our industry live for these types of challenges because they get the opportunity to help solve them. This particular project has been challenging due to the sheer size of it but overcoming obstacles is also what can make coming into work every day so exciting.”

ESTIMATED NUMBER OF STAFF PER SEGMENT (AS OF OCTOBER 2016)



TIMELINE OF MILESTONES



SEPT
2008

Contractual milestones Construction milestones

Metrolinx unveils a 25-year, \$50-billion-dollar regional transportation plan to coordinate and integrate transportation and transit in the Greater Toronto and Hamilton Area. The largest project in this plan is the construction of the Eglinton Crosstown LRT.

2012

The City of Toronto green-lights the construction of the Eglinton Crosstown LRT from Weston Road in the west to Kennedy Station in the east.

SEPT
2012

Before the line can be built, initial tunnelling takes place to accommodate the planned underground stations. Under separate contracts from the LRT line construction, Metrolinx issues and awards the first of two tunnelling contracts. With this in place, the first round of tunnel construction begins at the west launch shaft in June 2013 with two tunnel boring machines (TBMs) named Dennis and Lea journeying east from near Black Creek Drive to Yonge Street.

JAN
2013

Infrastructure Ontario issues a request for qualifications (RFQ) to shortlist companies for Eglinton Crosstown LRT line construction. Aecon partners with ACS Infrastructure Canada, EllisDon and SNC-Lavalin to form Crosslinx Transit Solutions and pursue the bid.

NOV
2013

While the mega-contract for LRT line construction is still in the RFQ/RFP stages, the 50/50 joint venture partnership of Aecon and ACS Infrastructure Canada is awarded a \$177-million tunnelling contract for the eastern portion of the planned Crosstown, between Yonge Street and Laird Drive. Construction begins in September 2015.

JUL
2015

Aecon and its three consortium partners form Crosslinx Transit Solutions and are awarded the \$5.3-billion-contract to design, build, finance, and maintain the Eglinton Crosstown LRT.

MAR
2016

Crosslinx begins construction on Keelesdale Station – the first of 25 planned stations and stops – located second from the end of the line at the west end of the Crosstown LRT route.

JUN
2016

Crosslinx begins construction on the future Laird Station, the second underground station.

JUL
2016

Excavation work begins for the construction of the maintenance and storage facility located on the former Kodak Lands at Black Creek Drive and Eglinton Avenue.

AUG
2016

The TBMs reach Yonge Street, signalling the completion of all Crosstown tunnelling work. Building Nine of the former Kodak factory complex is temporarily moved to make way for one of three entrances to Mount Dennis Station – the westernmost station on the Crosstown route.

SPRING
2017

The Crosslinx project schedule calls for Building Nine to be shifted back to its original location, following the construction of a new foundation for the building to support one of the Mount Dennis Station fully accessible entrances and connections to the lower concourse and platform below it.

2021

Current timeline completion date for the Eglinton Crosstown LRT project.

PROJECT FILE

EGLINTON CROSSTOWN LRT PROJECT

CLIENTS: Metrolinx and Infrastructure Ontario

LOCATION: Toronto, Ontario

TYPE OF CONTRACT: Public-Private Partnership (P3)

CONTRACT VALUE: Aecon is an equal partner in the \$5.3-billion Crosslinx Transit Solutions consortium to develop the Eglinton Crosstown LRT project in Toronto.

JOINT VENTURE PARTNERSHIP: Aecon joins ACS Infrastructure Canada, EllisDon, and SNC-Lavalin as equal partners under the consortium name Crosslinx Transit Solutions.

AECON BUSINESS UNITS: ACML, AME, Constructors, Utilities, Aecon Foundations, AGITT

SUMMARIZED SCOPE OF WORK FOR AECON JOINT VENTURE GROUP (CROSSLINX):

- A 19-kilometre route of LRT track running along Eglinton Avenue (10 kilometres underground and nine kilometres at-grade), from the future Mount Dennis Station in the west to Kennedy Station in the east
- 25 LRT stops, of which 15 are underground stations and 10 at-grade surface stops, separated from traffic
- A maintenance and storage facility
- Communications systems
- 30-year maintenance and lifecycle activities

TIMING: Preparatory works for construction on stations under way since fall 2015; construction on stations began in spring 2016; scheduled for completion in 2021.

EMPLOYEES ON SITE AT PEAK: 3,500

SAFETY: 0 Lost Time Injuries (LTIs) since project start (as of Fall 2016)

KEY CROSSLINX EMPLOYEES:

Bill Henry – President and Project Director
Geoff van der Lee – Implementation and Deputy Project Director
Steve Riddell – Health & Safety Director
Manuel Ruiz – Segment Director
Bruce Blair – Segment Director
Juan Azofra – Segment Director
Javier Rey – Segment Director

KEY AECON EMPLOYEES:

Roger Howarth – Commercial Director
Anders Persson – Segment Director
Denisa Leiba – People and Culture Director
Charles Todd – Contracts Director
Phil Holliday – Interface Director
David Levett – Chief Technical Officer
Spencer Cameron – Project Manager
George Nohos – Maintenance Manager
Gabriel Patron – Deputy Segment Director
Tim Russell – Deputy Segment Director

TRACKING THE FUTURE

500

NUMBER OF SUBMISSIONS RECEIVED BY METROLINX FROM THE GENERAL PUBLIC OFFERING SUGGESTED NICKNAMES FOR THE PROJECT'S TUNNEL BORING MACHINES (TBMS)

163

NUMBER OF PASSENGERS THAT CAN BE ACCOMMODATED ON ONE LRT VEHICLE

490

NUMBER OF PASSENGERS ACCOMMODATED AT ONCE BY LINKING THREE VEHICLES

28km/h

AVERAGE SPEED OF LRT

29

PERCENTAGE DECREASE IN GREENHOUSE GAS EMISSIONS PER PERSON THROUGH CROSSTOWN PASSENGER TRANSPORTATION

3,500

NUMBER OF EMPLOYEES ON SITE AT PEAK

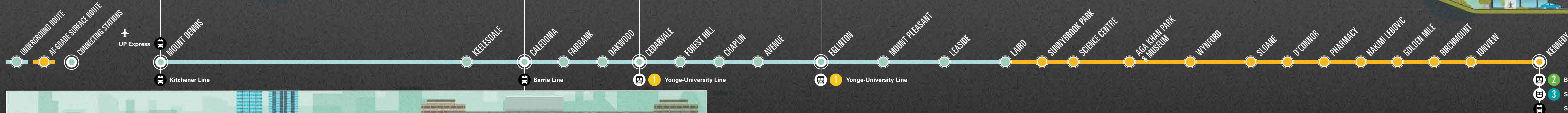
100M

PROJECTED NUMBER OF LRT PASSENGER TRIPS ANNUALLY BY 2031

E | C

5,500

PROJECTED RIDERSHIP OF THE CROSSTOWN PER HOUR IN THE PEAK DIRECTION BY 2031



EGLINTON CROSSTOWN: CALEDONIA STATION

EGLINTON CROSSTOWN: SEGMENTS

SEGMENT

1

Two underground stations

Mount Dennis

- Including the refurbishment of Building Nine as main entrance to station (see page 19 for more on this landmark building)

Keele

- A 13,500-square-metre maintenance and storage facility
- A 418-metre elevated guideway
- A mobility hub, housing a bus terminal offering connections to GO Transit, UP Express, TTC, and the LRT

SEGMENT

2

Five underground stations

Caledonia

- Including GO Transit and the TTC bus terminal integration

Fairbank

Forest Hill

Chaplin

Avenue

SEGMENT

3

Two underground interchange stations

Eglinton

Cedarvale

- Both will act as mobility hubs, connecting the new LRT line to the city's existing TTC Eglinton West and Eglinton subway stations

SEGMENT

4

Four underground stations

Oakwood

Mount Pleasant

Leaside

Laird

SEGMENT

5

Ten at-grade surface stops

Sunnybrook Park

Wynford

O'Connor

Hakimi Lebovic

Birchmount

Science Centre

Both stations to include utility and tunnel portals

Aga Khan Park & Museum

Sloane

Pharmacy

Golden Mile

Ionview

Kennedy

SEGMENT

6

System-wide installation/construction and tunnelling fit-out

All track work, communication and signalling



WHAT IS THE DIFFERENCE BETWEEN A SUBWAY AND AN LRT?

Similar to subways, LRT systems consist of modern, electricity-powered vehicles that carry passengers in dedicated lanes, separated from motor vehicle traffic. Both can be boarded at all doors, sometimes travel underground, and can carry a large number of passengers.

What puts the LRT ahead of the game is that it provides significant transit

capacity without the (comparative) expense and infrastructure required for subway systems. LRTs travel at a faster speed than subway trains and can offer greater travel convenience for passengers due to more frequent stops across shorter distances. What's more, from an environmental perspective, LRT vehicles generally require less power to operate than traditional subway trains.

PREPPING FOR THE CROSSTOWN LRT: TUNNEL WORK AND AECON

Before Aecon and its Crosslinx Transit Solutions joint venture partners were awarded the \$5.3-billion mega-contract to build the Eglinton Crosstown LRT stations and track, client Metrolinx had to first address the project's initial construction deliverable: excavating two tunnels to facilitate the flow of below-grade transit traffic in both directions across the city.

To get the job done, Metrolinx ordered four tunnel boring machines (TBMs) and issued separate tunnelling contracts for the western and eastern legs of the Crosstown line. Aecon, in a \$177-million, 50/50 joint venture partnership with ACS Infrastructure Canada, won the eastern portion of the tunnelling work in November 2013.

Built by Caterpillar, the TBMs are massive machines. They are the quintessential iron workhorses for tunnel work, as they can bore through any amount of earth. Each of the four Crosstown TBMs was dubbed an affectionate nickname: Dennis, Lea, Humber and Don. The latter two were assigned to the Aecon joint venture project team. Work got under way in September 2015. As with the TBMs

assigned to the joint venture group carrying out the western tunnelling work, the earth boring was completed in pairs. One pair of TBMs tunnelled the west portion from Black Creek Drive to Yonge Street, while the Aecon/ACS Infrastructure Canada TBMs worked their way from east of Brentcliffe Road (near Laird Drive) westward to Yonge Street.

Each TBM measures about 10 metres long and weighs approximately 430 tonnes. The earth boring takes place about 16 to 20 metres below ground. The rotating cutter-heads of each TBM begin the work of carving the tunnel at a diameter of 6.5 metres, inching forward 15 metres per day. Up to 10 operators are required to maintain the pace. The earth generated by the TBM actually moves through the machine itself and is deposited onto a conveyor belt. From there, it is dumped onto a continuous conveyor belt set along the length of the tunnel and makes its way up to the surface.

As the TBMs power forward, crews work at the rear of each machine and are responsible for installing pre-cast concrete rings. They bolt them together and pump in grout behind them to fill the space between the excavation and the exterior surface of the rings. These same crews operate the rail cars, move the earthworks and install utilities and track.

By the time all tunnelling work reached completion in August 2016, it was estimated the volume of material excavated was wide enough to fill the rink surface of the city's Air Canada Centre and would, if set vertically, challenge CN Tower height status.

PROJECT PROFILE EGLINTON CROSSTOWN LRT TUNNELLING PROJECT KEY AECON EMPLOYEES

Juan Tineo – Project Manager
Hazem Sharaf – Project Engineer
Andrew Inouye – Project Engineer
Mario Valle – General Superintendent



Bermondsey platform stop

EGLINTON CROSSTOWN LRT: IMPACT AND INTERSECTIONS

As it stands today, buses are the only form of public transit servicing the 19-kilometre lateral stretch of Eglinton Avenue earmarked for the Crosstown LRT. Once the Crosstown tracks are complete and the LRT is fully functional,

the impact for transit riders is expected to be immediate, both in terms of speed and convenience. With more than half of the Crosstown LRT – an estimated 10 kilometres – located below ground, daily factors affecting transit effectiveness, such as traffic and weather, are largely taken out of the equation.

“Anyone travelling on the Crosstown will find that their journey will be pretty consistent and reliable,” says Roger Howarth, Crosslinx Commercial Director and a seconded Aecon employee. “It will connect people with the backbone of the TTC subway system, specifically at major intersections like Allen Road and Yonge Street. All of the buses that used to be

deployed along Eglinton Avenue will now be redeployed into different routes to feed the Crosstown, as well as to broaden the existing transportation network across the city.”

The team working behind the Crosstown also hopes the project, in the long run, will implement a wave of revitalization across some of the neighbourhoods the Crosstown will now be running through.

“The construction work may be somewhat challenging for people right now but once we’re done, the value of the land, the retail, and the residential areas will improve dramatically,” predicts Howarth.

PRESERVING A COMMUNITY LANDMARK

With a mega-project the size and scope of the Crosstown LRT, the focus is typically on the present and the future, anticipating what needs to be done today in order to manage the expectations of the future. But the formative stages of this five-year transportation project have also included preservation of the past. Of particular note is one building that client Metrolinx and the Crosslinx project team have been addressing over the last number of months to ensure it gets the attention its storied history warrants.

In project terms, it’s known as Building Nine. But to its neighbouring community and generations of residents, it’s fondly remembered as the Kodak Building. It stands tall and imposing at the western end of the Crosstown LRT line, the last remaining building on what used to be a sprawling Kodak factory complex – the “Kodak Lands” – at Black Creek Drive and Eglinton Avenue.

Despite never having been fully designated a heritage building by the City of Toronto, Building Nine is considered a venerable community landmark due to its rich history, now echoed by its barren walls. Following two years of public consultations, Metrolinx made the decision to repurpose the building to become the main hub of the Crosstown LRT’s Mount Dennis Station. Building Nine will now act as one of three fully accessible entrances to the westernmost stop on the



Secondary entrance to Mount Dennis Station

Crosstown line, and it will provide key access to GO Transit and the Union Pearson (UP) Express connections.

“There’s an agreement between the community and Metrolinx that the former Kodak building will be retained, and most of it will be heritage-treated and refurbished,” explains Aecon’s Anders Persson in his role as Segment Director, on the Crosslinx team. “One of the reasons that building is so treasured by the community is because, as kids, the current residents of this neighbourhood used to go there with their parents, who worked at Kodak, and watch pre-screenings of the movies that were made on Kodak film at the time.”

Built in 1939, the four-storey, 11,000-square-foot structure sitting in the triangle formed by Eglinton Avenue, Industry Street, and Black Creek Drive was

used as a dedicated recreation facility for valued Kodak employees who worked at the plant complex. The complex is now long gone, leaving Building Nine to carry on the Kodak legacy.

From a Crosstown project perspective, the repurposing of the building falls under “Segment 1” deliverables. The team has already excavated and separated Building Nine from its foundational roots, and then repositioned it 60 metres away on steel girders. Next steps call for the Crosslinx team to demolish the building foundation, excavate the site and construct a new foundation in its place. Following an estimated eight months of construction work, the building will be moved back to its final resting spot and secured to its new foundation.

For more about Building Nine, turn to page 6 or visit aecon.com.

Aerial view of Mount Dennis Station



Kodak Building Nine before construction began

CONNECTING COMMUNITIES

REGION OF WATERLOO'S ION STAGE 1 LRT PROJECT

As a member of the GrandLinq consortium, Aecon helps Ontario's Waterloo Region link its ever-growing urban communities with the construction of a new light rail transit (LRT) public transportation system.

A portion of the ION LRT servicing northern Waterloo, including the University of Waterloo and Wilfrid Laurier University

A new platform stop along the ION LRT route

500km

OF NEW LANE ROADS WOULD BE NEEDED TO ACCOMMODATE EXPECTED GROWTH IN THE REGION IF THERE WERE NO ION

36,000

PEOPLE PROJECTED TO BE LIVING WITHIN 600 METRES OF THE WATERLOO LRT, ONCE IT IS FULLY FUNCTIONING

THE PROJECT

When the Region of Waterloo — a tri-city municipality in southern Ontario known for its burgeoning high-tech industry — approved plans for a new light rail transit (LRT) system in June 2011, it was welcome news to the Region's estimated half-million residents. As with many of Canada's fast-growing regions, there has been a striking need to connect local communities. The new LRT connects Cambridge, Kitchener and Waterloo and links them to other rapid transit systems including GO Transit and VIA Rail, through an effective public transportation system.

The Region of Waterloo awarded the design, build, finance, operation and maintenance of the new \$500-million LRT system to the GrandLinq consortium, consisting of Aecon, Keolis, Kiewit, Meridiam, and Plenary Group. The design-build portion of the project was, in turn, subcontracted to GrandLinq Contractors, a 50/50 joint venture (JV) partnership between Aecon and Kiewit. The scope of work for the JV team called for the construction of a 19-kilometre dual-track system (from Conestoga Mall in Waterloo to Fairview Park Mall in Kitchener); 19 LRT stations; two rest stations; the Operations, Maintenance and Storage Facility (OMSF); the Light Rail Vehicle (LRV) Car Wash Facility; and the Wayside Maintenance Facility.

200,000

NEW RESIDENTS PROJECTED TO MOVE TO WATERLOO REGION OVER NEXT 20 YEARS

Tom Cressman, EHS Advisor, GrandLinq



TACKLING UTILITIES

"The real challenge behind any urban LRT construction is dealing with utility relocations," notes John Almeida, GrandLinq Construction Manager and a seconded Aecon employee.

For the Waterloo Region LRT project, Almeida says some 56 kilometres of underground pipe was installed, including new storm sewers, watermain and sanitary systems. Before any construction on the track could begin, however, crews had to relocate several utilities that run under the LRT route, including telecommunications, electrical, gas, and wet service infrastructure, such as storm, sanitary, and water mains.

"The underground work here was a very sizable job," he confirms, adding there was a large number of deep and complex systems that had to be moved away from under where the LRT tracks were being built.

In fact, repositioning utilities away from the tracks represented a significant portion of the overall scope on this project. It was also considered a pre-emptive measure to ensure future access to the region's underground chambers without disruption to the LRT service.

Despite the inevitable challenges associated with third-party utility relocation work, Almeida says a decided advantage was the "ONE Aecon" contributions and expertise of Aecon Utilities carrying out the work.

"Just to be able to interface with the Aecon Utilities group and actually coordinate face-to-face with them was a huge benefit," he notes. "There's a definite 'value-added' aspect to the service we're able to provide our client by working directly with our own Aecon business units that were in turn, working for third party utility companies."

PROJECT FILE

REGION OF WATERLOO'S ION STAGE 1 LIGHT RAIL TRANSIT (LRT) PROJECT

LOCATION: Kitchener/Waterloo, Ontario

CLIENT: Region of Waterloo

AECON BUSINESS UNITS: ACML, AME, Utilities, AGI Traffic Technologies, Buildings, AUE, Concessions

JOINT VENTURE PARTNERSHIP: GrandLinq Contractors, a 50/50 joint venture and fully integrated partnership between Aecon and Kiewit (under the GrandLinq consortium comprised of Aecon, Keolis, Kiewit, Meridiam, and Plenary Group)

PROJECT TIMING: 2014 to 2017

CONTRACT VALUE: \$500 million (Aecon portion: \$250 million)

TYPE OF CONTRACT: Design, Build, Finance, Operate and Maintain

SCOPE:

- 19 kilometres of light rail connecting Conestoga Mall in Waterloo to Fairview Park Mall in Kitchener
- Operations, Maintenance and Storage Facility (OMSF)
- Light Rail Vehicle (LRV) Car Wash Facility
- Wayside Maintenance Facility
- 19 LRT stops
- 2 driver relief stations

EMPLOYEES ON SITE AT PEAK: 800

SAFETY: 0 Lost Time Injuries (LTIs) as of November 2016

KEY EMPLOYEES:

John Almeida – Construction Manager and Vice President, ACML
 Brian Pigott – General Superintendent
 Steve Buttenham - Safety Manager
 Mirek Futkowski – OMSF Senior Project Manager
 Gillian Olpoko – Environmental Manager
 Albert Furlong – Project Controls Manager
 Domenic Spalvieri – Traffic Signals & Systems Construction Manager
 John Cancelli – Project Superintendent

THE VEHICLES AND SERVICE SCHEDULE

Once the Waterloo Region LRT is fully operational, each light rail vehicle (LRV) is expected to comfortably carry 200 passengers. The Region's transit schedule calls for LRVs to run every eight minutes during morning and afternoon rush hours, and every 10 to 15 minutes during off-peak times. The trip between the two terminus points of Conestoga Mall (Waterloo) and Fairview Park Mall (Kitchener) is estimated to take about 40 minutes. While the LRT isn't expected to drastically adjust a passenger's trip duration, it is expected to be more dependable in adhering to schedule given its dedicated lane separate from vehicular traffic.

Throughout the course of the rail track construction, crews installed the Overhead Catenary System (OCS) – a system of overhead wires running above the rail tracks – that supplies electric power to the LRVs. All told, by the time the system is completed and fully functioning, crews will have installed 830 footings and 730 poles.



AN UNEXPECTED DISCOVERY

In spring 2016, construction on the new ION LRT system was temporarily halted in Uptown Waterloo after a section of "corduroy road" was discovered under King Street. A pioneering road built by Euro-Canadian settlers in the Region between the late 1790s and 1816, a corduroy road consisted of sand-covered logs laid tightly together across the direction of travel, much like railway ties. They were typically constructed over low or swampy areas.

"In keeping with requirements of the Ontario Heritage Act, work was immediately stopped and GrandLinc's Environmental Department was informed about the find," explains Almeida. "It was later determined that this was a corduroy road that was more than 100 years old and a significant archaeological find."

The crews made way for a team of archaeologists to enter the work site and plot the route of the corduroy road, which runs north along King Street from William Street to the railroad tracks near Waterloo Town Square. In order to

avoid delays in construction, the archaeologists worked long hours in tandem with the Ontario Ministry of Tourism, Culture and Sport to expedite the review request.

Although it took nearly two months for the archaeologists to uncover and document these unexpected findings, the crews used the time to focus attention on areas outside of the archaeologically sensitive zone and, eventually, re-sequence their work. To speed up the process, GrandLinc requested an exemption to noise bylaws so that construction crews could work longer hours to compensate for any time lost as a result of the historical find.



19km
OF LRT TRACK
56,000
SQUARE METRES OF NEW SIDEWALK

A portion of the ION LRT route that's a centre-running double track before it splits into single-lane tracks

200

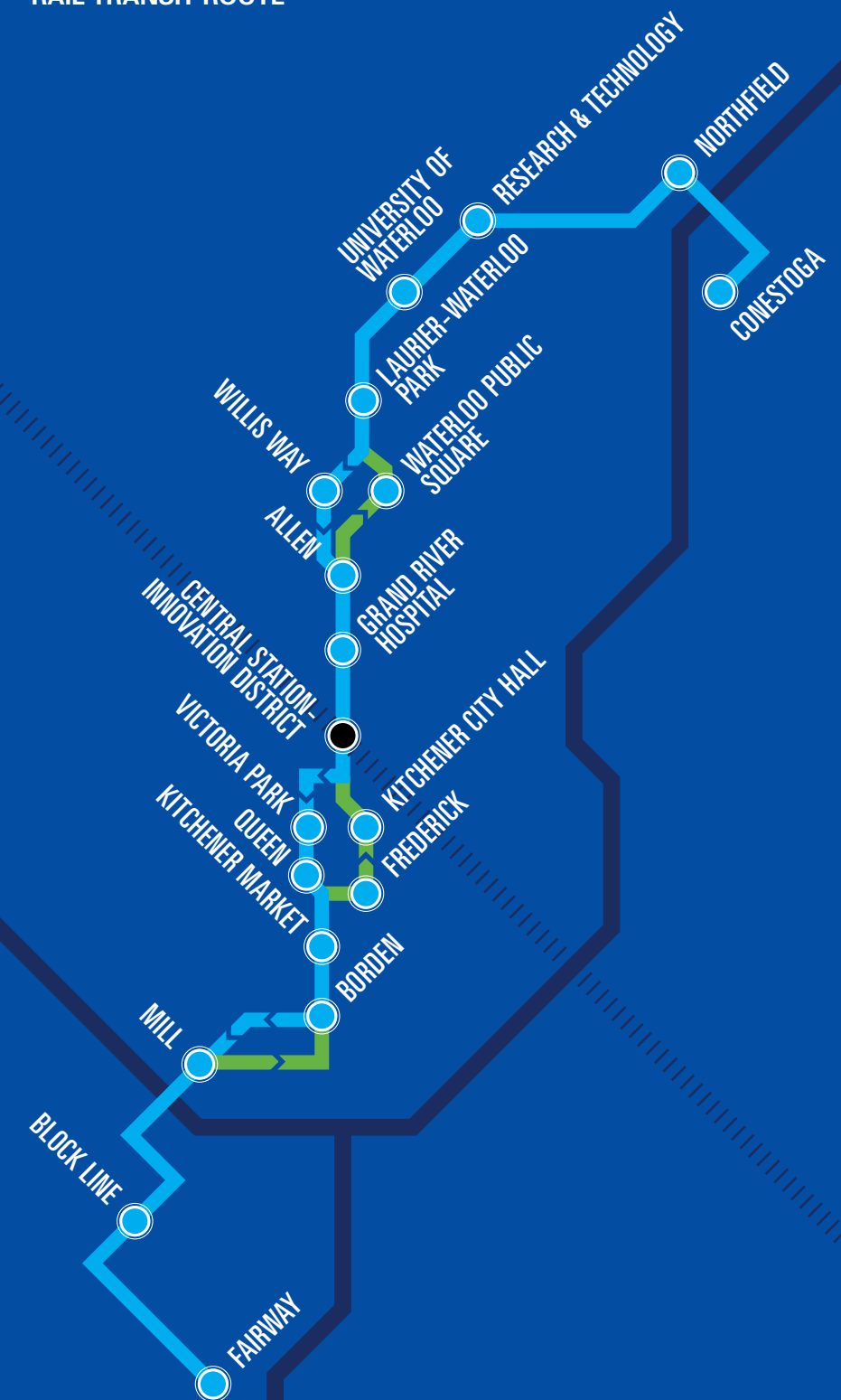
PASSENGERS EXPECTED TO BE CARRIED BY EACH LIGHT RAIL VEHICLE (LRV)

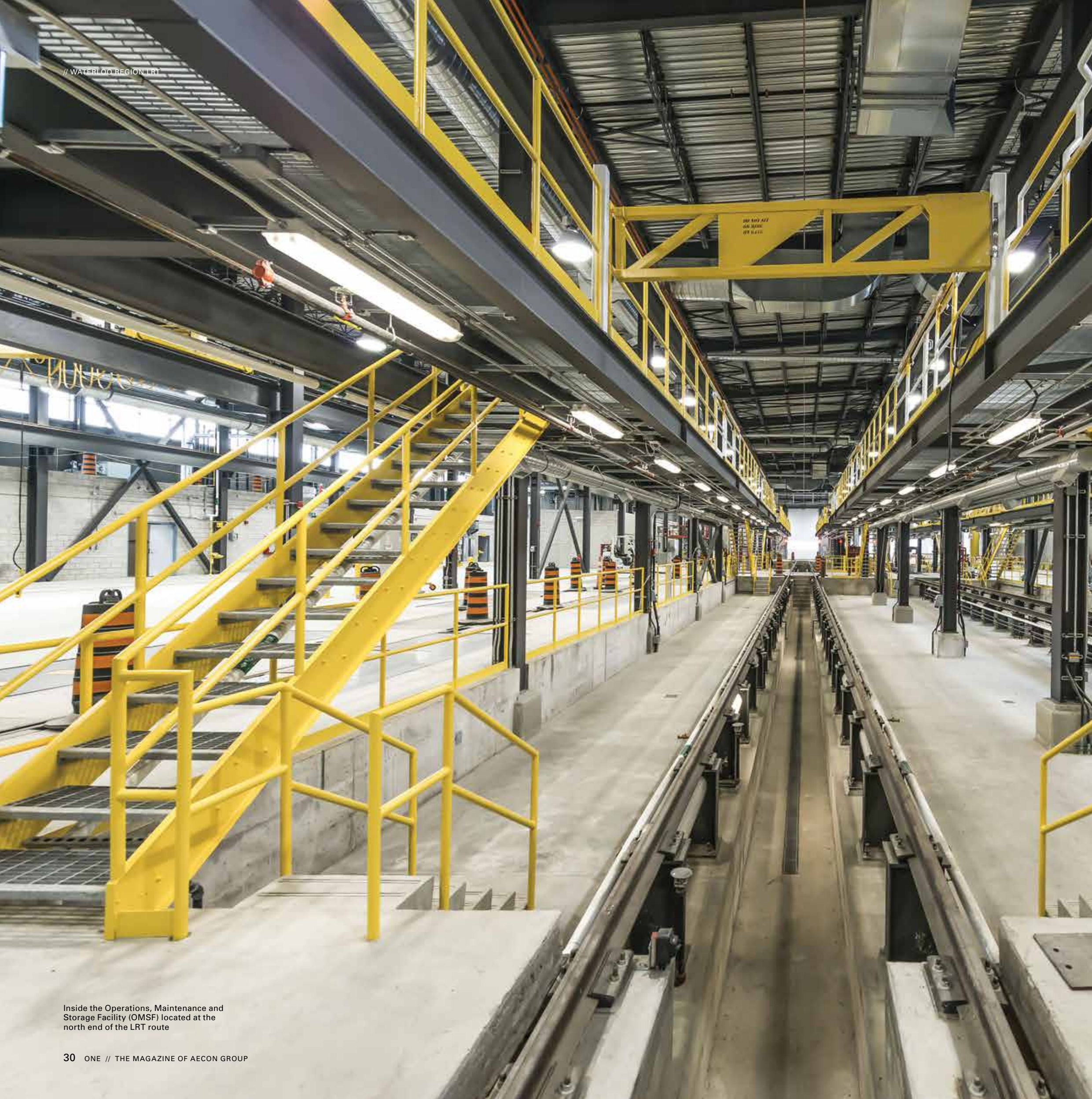
THE ROUTE

Construction on the 19-kilometre ION Stage 1 LRT system (the term "ION" means "going" in Greek) began in August 2014 and is expected to reach completion in 2017. The new LRT route operates entirely at grade, with electric trains running on a dedicated rapidway separated from, but running congruent to, vehicular traffic.

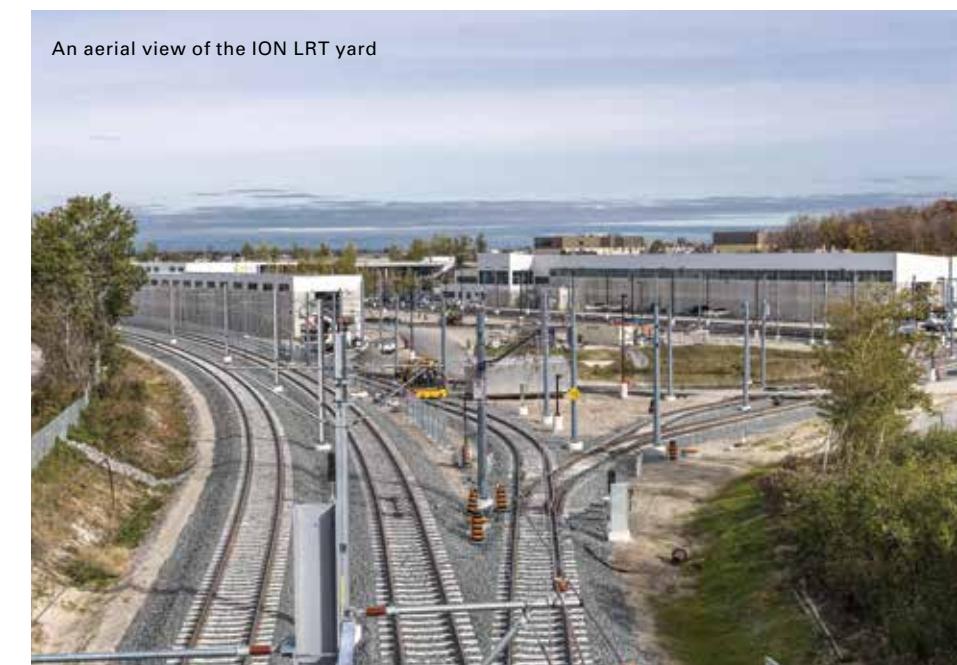
For the vast majority of the LRT route, the trains will run on a double-track system down the centre of the roadway. Where the road narrows, the double track splits off into single-lane tracks running at the sides of the road rather than down the centre. A portion of the track is embedded in concrete to protect the surrounding materials and provide electrical isolation, noise reduction, and vibration mitigation. Other portions of the track run on conventional ballasted rail, meaning they run on a track-bed of crushed stone packed between, below, and around the railroad ties.

ION STAGE 1 LIGHT RAIL TRANSIT ROUTE





Inside the Operations, Maintenance and Storage Facility (OMSF) located at the north end of the LRT route



An aerial view of the ION LRT yard

IN THE YARD

Conveniently situated in one depot location at the north end of the Waterloo LRT route is the yard housing all the facilities integral to supporting ongoing operations. Work on the yard began in November 2014 and reached completion in October 2016. There are three main buildings on site – the Operations, Maintenance and Storage Facility (OMSF), LRV Car Wash Facility, and Wayside Maintenance Facility. All three buildings are in close proximity and connected by seamless track movement in and out of each building and the yard.

The OMSF houses all requisite structures, equipment (including a wheel truing machine), tools, spare parts, storage and other ancillary components related to LRT maintenance and operations. It is also home to the Paint Shop, the Welding Shop, the Central Control Facility (CCF), which is equipped with essential operations, such as train control, traffic management, security, yard operations and communications, as well as the LRV Maintenance and Repair Shop for all LRV general train repairs.

The Wayside Maintenance Facility is designated for the inspection and

preventive/corrective maintenance of secondary vehicles associated with the transit system, including road vehicles, light and heavy trucks, and snowplows. Equipped with traction power substations, train control, communications, and track-work and other associated wayside components, this hub will be used for the repair and potential fabrication of track components, fasteners, signs and graphics, as well as for rail cutting and drilling, maintenance and repair of support equipment.

Finally, we come to the LRV Car Wash Facility, which houses all necessary equipment for the exterior and interior cleaning of the LRVs. The building has been constructed to meet strict environmental control standards, such as rinse water recycling. About 90 per cent of all water used is reclaimed and stored in tanks. All unreclaimed water is treated before it's discharged into the local sewer system. As each LRV enters the car wash, it passes through a series of water and detergent sprays, rotary brushes, and blowers. The car interiors are cleaned with the help of a centralized vacuum cleaning system that includes wall-mounted hose connections along the cleaning platform placed at intervals aligned to vehicle doorways.

PEOPLE MATTER

MEET: LARRY BROKENSHERE

STRATEGIC EXECUTIVE ADVISOR
AECON ENERGY EAST

“I’ve grown very close to a lot of the people that I’ve worked with throughout my entire career... After so many years, it’s not just a work relationship anymore, it becomes a very strong friendship...”



Larry Brokenshire’s career with Aecon goes back more than 50 years, starting with one of the company’s predecessors, Adam Clark Company Ltd. His childhood curiosity about subjects like physics and geometry pulled him away from a potential path of competitive swimming. Instead, he embarked on a journey that would see his career come full circle under the Aecon umbrella.

Over the years, Larry has had his fair share of personal struggles, yet, in overcoming them, he has embraced a life dedicated to community work and volunteering. Today, he is not only an invaluable member of Aecon Energy East but also the face of Aecon in the community of Cambridge, Ontario. Both groups have come to rely on Larry’s unwavering dedication to their well-being and success.

What was your first role in the construction industry?

I started my career with Adam Clark Company in Hamilton in 1964 as a summer intern. After I graduated from Ryerson in 1966, they took me on as a full-time employee. In layman’s terms, I started out as a “gopher” – go-for-this, go-for-that – and, eventually, as the project managers started to get busy, I was given small projects to look after. I continued to work in the project manager capacity up until about 1975, after which I was elevated to the position of Industrial Division Manager.

Your career with Aecon spans half a century, but did you always know that you wanted to get into construction?

My dad was a doctor of optometry and I had thought about that as a career. About half way through my last year

of high school, I had an interview with the guidance counsellor and found out that I was missing one science credit that would let me get into optometry. I tried to pick it up midway through the year but that didn’t work. My brother, Jack, had already gone to Ryerson for technology at the time, so I followed in his footsteps.

How did your position with Adam Clark eventually lead you to working for Aecon?

I left Adam Clark in 1977 to join Nicholls-Radtke, here in Cambridge [Ontario]. Bill Nicholls and Dave Radtke both worked with me at Adam Clark and, when they left, they offered me an opportunity to join them as a minor owner. Over the years, the always-evolving business allowed me to have 50 years of working within the same company! It started in 1985,

when Banister Foundation bought 50 per cent of Nicholls-Radtke. By the time Bill and Dave retired between the mid- to late 1990s, Banister had come to own Nicholls-Radtke, changing the name to BFC Industrial. Armbro proceeded to purchase Banister and change the company name to Aecon in 2001. That same year, Lockerbie and Hole out of Edmonton bought Adam Clark, and, in 2009, Aecon acquired Lockerbie and Hole. That's how my career went full circle all within the Aecon family.

How did your actual role within the various companies change throughout the years? After leaving Adam Clark, I brought automotive sector opportunities to Nicholls-Radtke and, within that company, I've held numerous positions, including Vice President of Automotive. As time went on, the automotive sector became more and more difficult to work in, so we reduced our automotive clients down to one – Toyota – and reorganized our two divisions – Automotive and Projects – into one big construction group. Over the years, I moved off into a position reporting to the President and my title then became Vice President of Strategic Initiatives. When that vice presidency ended about two years ago, I became Strategic Executive Advisor.

What would you say has been the most significant part of your role under the Aecon umbrella to date? One of the most important roles I have, besides a number of initiatives that I do directly for Ian Turnbull [Senior Vice President, Aecon Energy East], involves my work with labour relations. I've spent my whole career working with high-level union building trade management and I specifically work with them to mediate through any labour issues that may come up. Obviously, our main concern, and one of the goals of my job, is to not end up at the Ontario Labour Relations Board (OLRB), as it is a very

costly and time-consuming process. At this stage in my career, and because I've put a lot of time into building relationships with the building trades, I can pick the phone up or meet with them in person to work out an agreement that satisfies both sides, without the issue going any further within the company.

In a past issue of *Industrial Matters* magazine, you mentioned overcoming some past struggles with substance abuse. What impact did that experience have on you? Back in 2007, I was given an opportunity to join an organization called De Novo as a Director, and later, Vice Chair of their Board of Directors. The De Novo Treatment Centre is an alcohol and drug treatment service operated as a partnership between contractor associations and the unionized members of Ontario's construction building trades. The way it works is, for every hour of work that a member of a local participating union completes, two cents of their pay goes to De Novo and is matched by the contractor. Working with De Novo is something that's very close to my heart because of the personal struggles I've had over the course of my career, and it gives me an opportunity to give back what was freely given to me.

Are other members of this organization from the construction industry? The Board of Directors is made up of contractor association members, as well as union management from participating union locals. The current chair, Patrick Dillon, is both a union representative and Business Manager of the Provincial Building & Construction Trades Council of Ontario. Being involved in De Novo is also a large part of my relationship with the unions. The key lies in the fact that, in the province of Ontario, the unionized construction industry takes care of its own. As an example, union members can go to



De Novo as clients but so, too, can an Aecon or contractor employee, because as members of contractor associations, we'll match the two cents each union member contributes.

When we last spoke with you, you were very involved with the Cambridge Rotary Club. Are you still actively involved? For the past 24 years, I have been very active in the community through the Cambridge Rotary Club. I led a Group Study Exchange team to the Republic of Korea for a month in 2002. It involved a Rotarian Team Leader and four young business professionals between the ages of 25 and 40. It's best described as a vocational/cultural exchange, with a focus on world peace and understanding. It was a life-altering experience for me because it was in an area of the world I've never really experienced before and we had the opportunity to stay in the Rotarians' homes. I've been to Japan a couple of times for work, but the culture and hospitality of the Korean people really impressed me. Everybody was so welcoming toward our team.

What other type of volunteer work are you involved with? Every Board I sit on, or have sat on, has been volunteer work; it's my way of giving back. I sat on the Board for Women's Crisis Services of Waterloo Region for about seven years. I got involved because my wife, Rosanne, was a volunteer, then an employee, and our rotary club did some hands-on projects at the shelters. During my time there, I was shocked to find out that the women's shelter here in Cambridge was constantly full, despite the fact that we all live in such an affluent community. Our goal was to eliminate the need for this shelter. In other words, the ultimate goal was to get to a point where the shelter wasn't needed anymore because women no longer had to deal with domestic violence. At the end of the day, it's a necessary

facility, and women and their children need to be protected, which is why more people need to step up to the plate to make sure they always have a safe space.

What is it about working for Aecon that has motivated you to go to work every morning for so many years? I've grown very close to a lot of the people that I've worked with throughout my entire career. These people have shared a lot of different experiences with me. After so many years, it's not just a work relationship anymore, it becomes a very strong friendship; we became connected within the workplace. I've also had the opportunity to work closely with my son Greg for 23 years – up until about three years ago – and I really enjoyed watching him grow in this industry. I also appreciate working with the younger people in the company, either through the mentorship program or on a labour relations issue, and having the ability to pass down my knowledge to them. Those are the kinds of things that make me want to get up in the morning and go to work.

Are you planning on retiring anytime soon? What do the next few years look like for you? I'm planning on ending my full-time career with Aecon at the end of December [2016], but there is always the possibility of my continuing to stay on in some capacity, either on a part-time basis or as a consultant. That would allow me to slowly wind down this stage in my career but still continue to contribute, and that's important to me. After 50 years of working for this company, I've become quite attached to it. Even when I was struggling, Aecon was very, very supportive of me, and I will always appreciate that. It's something I want to take with me into my retirement.

EMPLOYEE FILE

LARRY BROKENSHERE

POSITION: Strategic Executive Advisor

DIVISION: Aecon Energy East

EXPERIENCE:
1966 – 1977 Adam Clark Company Ltd. –
· Assistant Project Manager
· Project Manager
1977 – 1997 Industrial Division Manager
Nicholls-Radtke Ltd. –
· Automotive Sector Project Manager
· Gas Transmission Project Manager
· Automotive Sector Vice President
1997 – 1999 BFC Industrial –
· Project Manager
· Fabrication Manager
· Estimating Manager
2000 – present Aecon Industrial –
· Vice President, Automotive
· Vice President, Strategic Initiatives
· Strategic Executive Advisor

EDUCATION:
Ryerson Polytechnical Institute (1966) – Diploma in Mechanical Technology, Certified Engineering Technologist (C.E.T.)

AECON FAMILY CONNECTION:
Gregory Brokenshire (son) – Worked for Aecon Industrial Central for 23 years

HOMETOWN: Hamilton, Ontario

CURRENT HOME: Cambridge, Ontario

HOBBIES AND INTERESTS: Exercising, golfing, volunteering

ASSOCIATIONS:
· Association of Millwrighting Contractors of Ontario (AMCO)
· Construction Legislative Review Committee (CLRC)
· Cambridge Chamber of Commerce
· Ontario Erectors Association (OEA)
· Ontario Construction Users Council (OCUC)
· Women's Crisis Services of Waterloo Region (WCSWR)
· Ontario Construction Secretariat (OCS)
· The Rotary Club of Cambridge (Preston-Hespeler)
· Ontario Association of Certified Engineering Technicians and Technologists (OACETT)

AWARDS:
· 1998 BFC Humanitarian Award
· 2005 Aecon Humanitarian Honourable Mention Award
· 2006 Aecon Humanitarian Award
· 2011 Aecon Outstanding Team Award (RFR Team)
· 2013 Ontario Construction Secretariat (OCS) Tripartite Leadership Award
· Six-time recipient of the Rotary Paul Harris Fellowship

PROJECT MATTERS

AT THE CORE

OF BUILDING THINGS THAT MATTER

After more than four years of meticulous preparation on the multi-billion-dollar Darlington Nuclear Re-tube & Feeder Replacement Project, Aecon’s Nuclear group has officially transitioned from dress rehearsal to centre stage as an equal joint venture partner on Canada’s largest clean energy infrastructure project to date.

It’s been more than four decades since Aecon’s first foray into the nuclear sector, but that inconspicuous beginning is virtually unrecognizable in terms of where the company stands today.

Aecon, in an equal joint venture (JV) partnership with SNC-Lavalin, celebrated a major milestone last summer with the completion of the initial “definition” phase of the multi-billion-dollar Darlington Nuclear Re-tube & Feeder Replacement (RFR) Project. It was a remarkable achievement for the JV team, which has been hard at work for more than four years planning, preparing and testing for the refurbishment of four CANDU nuclear reactors at Darlington Nuclear Generating Station, east of Toronto. With the pivotal shift from the test facility to the power plant now complete and the team firmly entrenched in the “execution” phase of the project, the JV team is operating in a live nuclear environment to fulfil the massive reactor refurbishment scope under a \$2.75-billion contract awarded by client Ontario Power Generation (OPG). The scope will be carried out over the next 10 years, with Aecon’s share representing \$1.375 billion under the SNC-Aecon 50/50 JV agreement.

As Aecon’s largest energy sector project to date, the Darlington RFR project represents the culmination of four decades of knowledge and expertise in the highly specialized nuclear field. And although the JV team’s shift on the Darlington site from test facility to power plant can be measured as less than five kilometres, the real leap comes when measuring the project’s impact for Aecon and the industry.

“The Canadian nuclear industry has a very high stake in the success of this project,” notes Ian Turnbull, Senior Vice President, Aecon Energy East. “Both OPG

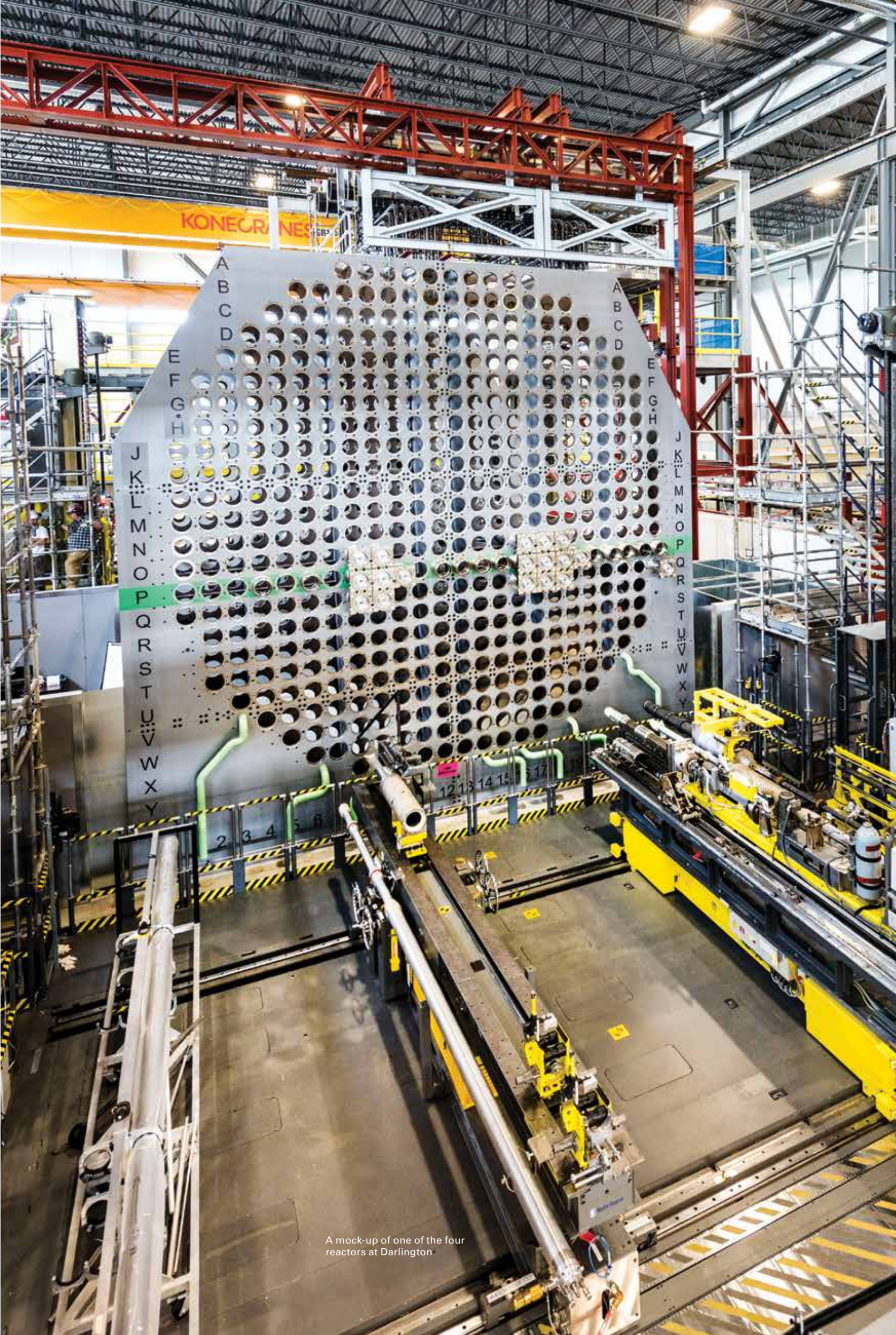
and the Ministry of Energy consider it a destiny project for future CANDU refurbishments.

“From an Aecon perspective, it’s the largest project ever for Aecon’s Energy segment, with the execution phase representing a 25 per cent contribution to our [Aecon] backlog and great value for our shareholders. There’s definitely more confidence about Aecon’s future as a top-line EPC (Engineering, Procurement, and Construction) company because of this project.”

BUILDING THE NUCLEAR PORTFOLIO

Since the 1970s, Aecon has played a role in the building, refurbishing and maintenance of more than 100 nuclear energy projects across Canada. In 2012, Aecon Industrial Central’s experience within the nuclear sector, coupled with two years of meticulous work compiling a comprehensive nuclear fabrication quality program, earned the group special accreditation for the design and construction of equipment for nuclear power plants in the form of the coveted “N Stamp” from the American Society of Mechanical Engineers (ASME).

The N Stamp designation was a major accomplishment for Aecon’s Nuclear group and solidified the team’s stellar capabilities in this niche industry. The first Darlington RFR project contract followed soon thereafter, with long-standing client and industry partner OPG awarding the definition phase to the SNC-Aecon JV team. The four-year definition contract consisted of both fixed-price and cost-reimbursable elements and carried the expectation of generating more than \$600 million in revenue for the JV, including more than \$100 million in revenue for Aecon.



A mock-up of one of the four reactors at Darlington

PROJECT FILE

DARLINGTON NUCLEAR RE-TUBE & FEEDER REPLACEMENT PROJECT (EXECUTION PHASE)

CLIENT: Ontario Power Generation (OPG)

LOCATION: Clarington, Ontario

CONTRACT VALUE: \$2.75 billion

JOINT VENTURE PARTNERSHIP: SNC-Aecon 50/50 Joint Venture (JV)

AECON BUSINESS UNIT: Aecon Nuclear

SUMMARIZED SCOPE OF WORK:

- Replacement of 3,840 feeder pipes and 1,920 fuel channels for four CANDU reactors at the Darlington Nuclear Generating Station
- Procurement of materials and preparations for Units 1, 3 and 4
- Additional training of trades workforce

TIMING: Summer 2016 to Fall 2026

EMPLOYEES ON SITE AT PEAK: 700

SAFETY: More than 2 million LTI-free manhours (as of October 2016)

KEY EMPLOYEES:

Aaron Johnson – Deputy Project Director
Dan Olson – Construction Manager
Todd Hamilton – Operations Manager
Jeff Acorn – Operations Manager
Tommy Hansen – Shift Supervisor
Stacy Brent – Shift Supervisor
Sebastian Wojewoda – Construction Support Manager
Caitlin Holdbrook – Project HR Manager
Cheryl McCulloch – EHS Manager
Devin Grant – QC Manager
Angelo Lalkovski – Materials Manager
Hugh Loughborough – Contracts Manager
Amanda O’Brien – Onboarding Training Manager
Tom Wigglesworth – Technical Training Manager
Ziad Saad – Project Manager, Materials

AECON STEERING COMMITTEE MEMBERS:

Ian Turnbull – Senior Vice President, Aecon Energy East
Sam Bambino – Vice President, Aecon Nuclear

4

CANDU NUCLEAR REACTORS

1,920

FUEL CHANNELS TO BE REPLACED

3,840

FEEDER PIPES TO BE REPLACED

1.5M

PLANNED TRAINING HOURS

2M

LTI-FREE MANHOURS (AS OF OCTOBER 2016)

The scope of work on the RFR definition phase called for:

- Construction of a full-scale nuclear reactor mock-up for simulated testing (carried out by Aecon's Nuclear team)
- Development of specialized project tooling (carried out by SNC-Lavalin)
- Development of a detailed scope, schedule and budget for the first reactor's refurbishment
- Procurement of critical reactor components for the first unit
- Preparation of all engineering and construction planning documentation

The JV team initiated work in spring 2012, with Aecon focused on the construction of the full-scale nuclear reactor mock-up in Darlington's Energy Complex building, where workers could train in a safe, inactive environment. The mock-up was an exact replica of an existing CANDU (Canada deuterium uranium) nuclear reactor unit found just down the road at Darlington's power plant.

"The definition phase was our dress rehearsal," explains Aaron Johnson, Deputy Project Director, Darlington RFR project. "It allowed us to do all of our

detailed planning, pre-training and procurement of components in preparation for when the first reactor unit came offline during execution phase. It sounds strange to say, but we literally worked non-stop for more than four years, and yet we're really just starting the project now."

GOING LIVE

Indeed, with the initial definition stage now behind them and the subsequent multi-billion-dollar execution phase contract awarded by OPG in 2016, the SNC-Aecon JV team hasn't skipped a beat

on the RFR project. The tools and methods developed and exhaustively tested on the mock-up reactor over the last four years are now being applied to the live environment, where Darlington's four nuclear reactors are being refurbished on a sequential basis.

This time around, however, the live environment adds a heightened level of pressure for the team. Unlike traditional construction, which typically has some allowable margin for error, in a nuclear reactor environment, "everything is to the infinitesimal tolerance," notes

Johnson. Even the slightest upset can carry a high cost.

"The team has undergone extensive planning and training for each of the re-tube and feeder replacement tasks, and we're cautiously confident as we move on to the execution phase," notes Turnbull. "For a project of this size and complexity, being ready to handle unknown and unplanned conditions is one of the key aspects of risk mitigation planning."

Adds Johnson: "It's important in this nuclear environment to have contingency plans in place in the unlikely event that

things don't go exactly as planned. That's what the last four years have been all about: meticulous planning, rigorous project controls, anticipating the unexpected, and having contingencies in place that are clearly understood."

TRAINING

As expected, the training component of this phase of work is *intense*. Operating in a live environment, workers receive comprehensive training and are consistently rotated throughout the course of the project, according to their skill sets,

to mitigate the risks of prolonged work in one area.

"We're dealing with a challenging environment," says Johnson. "We need to minimize the amount of time our workers spend in the reactor vault, so part of our mitigation strategy has been to make sure we're in and out of there in short order, which is why we also designed better tools that would allow us to take advantage of doing things more remotely."

SAFETY FIRST

With four decades of successive experience working in nuclear facilities, Aecon's Nuclear group is well versed in safety protocol associated with this specialized field.

"The safety aspects of this project are multi-faceted and based on the unique needs of the nuclear industry," says Mitch Holt, Aecon's Nuclear EHS Director. "There's an enhanced focus on safe work planning and human performance, driven by radiological and environmental concerns in addition to rigorous conventional safety requirements."

Holt says past experience with our JV project team on the Bruce Power 'Bruce A' Restart Project beginning in 2005 was extremely successful and has laid the foundation for the Aecon-led safety program now being implemented on the Darlington refurbishment projects.

"We have a dedicated [Aecon] RedBook section in our EHS program for working in nuclear facilities, which has undergone continuous improvement for the last seven years," he notes. "Aecon's safety performance on our nuclear projects remains consistently above target as we strive for a zero-incident workplace."

ECONOMIC VITALITY

With 20 per cent of Ontario's electricity currently provided by the Darlington Nuclear Power Plant, OPG expects the station's re-tube and feeder replacement will significantly contribute to the economic vitality of the province by extending the life of each reactor another 30 years, while securing the supply of emissions-free, reliable baseload electricity.

From an industry perspective, the Darlington refurbishment is expected to become a benchmark project, shining a spotlight on Aecon's industry-leading nuclear and fabrication expertise.

"We had a solid reputation in the nuclear field going into this project and we're continuing to build on that through valuable first-hand experience," says Turnbull. "Being successful on this project will put us in the ranks of only a handful of top global EPC contractors capable of managing large, complex nuclear projects. It's definitely a door opener for Aecon into global energy projects."

AECON MILESTONES AT DARLINGTON:

2007
to
2011

Darlington Master Services Agreement (MSA)

2012
to
2014

Darlington Energy Complex Reactor Vault Mock-Up

2012
to
2016

Darlington Nuclear Re-tube & Feeder Replacement (RFR) Project (Definition Phase)

2015
to
2017

Darlington Nuclear Re-tube Waste Processing Building

2016
to
2025

Darlington Nuclear Turbine Generator Refurbishment

2016
to
2026

Darlington Nuclear Re-tube & Feeder Replacement (RFR) Project (Execution Phase)



Workers training to operate the mock-up reactor vaults remotely



WHAT'S INVOLVED IN REFURBISHING A NUCLEAR REACTOR?

THE BASICS

Each of the four nuclear reactors inside Darlington's power plant houses an enormous reactor vessel permeated with 480 fuel channels. As uranium fuel undergoes a fission process inside the reactor vessel, it creates hot, heavy water. The heavy water transports the heat away from the fission process through feeder pipes – 960 to be exact – which run from the fuel channels on either end of the vessel and connect to four large headers located at the top of each reactor. The headers collect the superheated heavy water into steam generators, where it's converted into conventional (light water) steam. Consequently, the steam powers a set of turbines, which creates electricity through a generator – the product of a nuclear power plant.

THE PROCESS

The key to the Darlington refurbishment lies in the replacement of the 960 feeder pipes and 480 fuel channels that run through each reactor. Multiply that by four reactors and the JV team will be working on the painstaking replacement of a total of 3,840 feeder pipes and 1,920 fuel channels over the next 10 years.

In October 2016, work officially commenced on the first reactor – Unit 2 – as OPG took it offline and began the fuel extraction process. This entails the removal of spent fuel stored inside the reactor by way of the station's fuelling machines. The spent fuel is then transferred into storage pools, where it will sit and cool for several years.

The replacement of the feeder tubes and fuel channels on Unit 2 is expected to reach completion in 2019, at which point, the JV team will begin work on the next reactor. In accordance with Ontario's long-term energy plan, the work on each reactor will be sequential, with increased overlap as the work progresses over the years. The only exception will be the overhaul work on Unit 2, which won't overlap with any of the other reactors in order to ensure the best possible outcome. Providing that the work on the first reactor goes according to plan, on time and on budget, Units 1, 3 and 4 will follow and each reactor will be taken out of service for about three years apiece until the overall job has been completed.

DISPOSING OF WASTE

In addition to the re-tube and feeder replacement work, the disposing of the old feeder tubes and fuel channels is another substantial job in itself. As each of the original fuel channels is extracted from the reactor vessel, each is deposited into a specialized flask which is then transported into the adjoining Re-tube Waste Processing Building that's being constructed by the SNC-Aecon JV team as part of the preparations for the re-tube and feeder replacement work.

MASTERING

THE ALLIANCE OF PARTNERSHIP AND TRUST

A long-standing partnership with Union Gas Limited in Ontario has parlayed into a substantial service agreement with parent company Spectra Energy, as Aecon continues to solidify its position in Western Canada's oil and gas sector.

Since 2000 – the year Ontario-based Union Gas Limited first awarded Aecon a long-term formal Strategic Alliance contract to carry out its gas distribution work across the province – Aecon has been living up to its reputation as a contractor committed to fulfilling its clients’ goals and objectives. That kind of singular focus, combined with consistently exemplary work and a strong safety culture, has established a solid foundation of trust between Aecon and the gas distribution company over the last decade and a half. It has also laid the cornerstone for a robust new Aecon opportunity in Western Canada with Union Gas parent company, Spectra Energy.

“Spectra Energy looked at the existing work model we had with Union Gas in Ontario and they were really eager to try the same alliance-style approach in the west,” explains Aecon Energy’s Andrew Geden. “They wanted to partner with somebody who could eventually become a true alliance partner for them in Alberta and British Columbia, and that’s a real win for us.”

Aecon’s new contract with Spectra Energy is in fact a four-year Master Services Agreement (MSA) in which Aecon will construct a number of natural gas facilities for the energy company across British Columbia and Alberta. It’s a tremendous opportunity for Aecon to leverage its oil and gas experience in the east with Spectra Energy’s desire to build a productive partnership with a proven

performer in the west. In order for Aecon to carry out the construction of these facilities projects for Spectra Energy, Aecon Industrial Management Corp. (AIMC) stepped up to answer the call. Aecon Energy’s Geden heads up the business unit in the role of Vice President. The team consists of key employees from Aecon’s Energy and Mining segments.

“This absolutely is a ‘ONE Aecon’ project,” notes Geden. “We’ve been able to provide Spectra Energy with all of their required on-site services, and we can do that because of the capabilities of our various business units. We’ve set ourselves up in a way that allows us to fulfill this new contract to the highest degree possible, while adding strength and development opportunities for local and Aboriginal businesses.”

The scope of work under the MSA involves the new construction activities associated with Spectra Energy’s natural gas facilities.

A key element in the pipeline transportation of natural gas, compressor stations are used to move natural gas through a pipeline to maintain its flow and pressure as it travels long distances. Spectra Energy is entirely focused on ensuring the highest possible reliability of its compressor stations and is looking to Aecon to drive that enhanced reliability on existing stations, while also increasing Spectra Energy’s ability to distribute natural gas throughout British Columbia.

Structural steel work on one of Spectra Energy’s compressor stations

PROJECT FILE

SPECTRA ENERGY PIPELINE FACILITIES PROJECTS

CLIENT: Spectra Energy

LOCATION: British Columbia

TYPE OF CONTRACT: Master Services Agreement (MSA)

AECON BUSINESS UNIT: Aecon Industrial Management Corp. (AIMC)

SUMMARIZED SCOPE OF WORK:

- Constructability reviews
- Construction planning
- Integrated budget and estimate preparation
- Earthworks, concrete, piling
- Pipe and structural steel fabrication
- Piping, structural steel, electrical, instrumentation
- Site buildings
- Assembly and installation of permanent equipment
- Tie-ins to existing facilities
- Commissioning and turnover

TIMING: January 2016 to December 2020

EMPLOYEES ON SITE AT PEAK: 500

SAFETY:

- Over 120,000 manhours worked ending October 31, 2016, with a Lost Time Injury (LTI) rate and Total Recordable Injury Frequency (TRIF) of 0
- Over 8,200 proactive leading activities completed (Leading activities include: inspections, behavioural-based observations, safety opportunities, hazard assessments, training, and audits)

KEY EMPLOYEES:

Andrew Geden – Vice President, AIMC
Scott Ryan – Project Director
Gerry Kyne – Project Manager
Bryan Connor – Project Manager
Kevin Loy – Construction Manager
Danny Bowes – Construction Manager
Mark Adams – Technical Specialist Manager
Kevin Trotman – Technical Specialist Manager
Kevin Ford – General Superintendent (DIW)
Blaine Malberg – General Superintendent (DIW)
Bill Gelinas – General Superintendent (DIW)
Josh Harding – General Superintendent (DIW)
Mahyar Esmaeilzadeh – Project Controls Lead
Elmira Torkamani – Project Scheduling Lead
Don Dow – Safety Director
Dan Parker – EHS Lead
Billy Clarke – EHS Lead
Leslie Fowler – Aboriginal Relations
Mike Derocco – Labour Relations
Benjamin Tong – Estimating Lead



A team of DIW workers on the Spectra Energy job site in Merritt, B.C.

“Spectra Energy is maintaining infrastructure that they’ve had in place since the 1950s and bringing it up to speed with newer, state-of-the-art compressor units,” notes Geden. “Doing this work will help them improve the reliability of their system.”

Work on the compressor stations is currently under way and spread out across five separate project sites. Respective work duration ranges from two to 14 months. Three of the sites are located in northern B.C., in the Fort St. John and Dawson Creek regions. The other two projects are located in the southern part of the province, in areas surrounding the towns of 100 Mile House and Merritt.

If work goes according to plan and schedule, Geden says it is anticipated that Spectra Energy will add two years to the original term of Aecon’s MSA contract.

Immediately following the signing of Aecon’s new MSA contract in February 2016, the Aecon team initiated constructability work, including preliminary reviews of Spectra Energy’s drawing plans, executing budgets and establishing schedules. The work on-site

in southern B.C. began in May 2016, with the northern sites following in August.

As with most new project endeavours – especially those being carried out in a less-than-familiar geographic territory – the work has presented some challenges, among them the demands of a tight start-up time frame and becoming operational in these areas of B.C.

“We needed to go out and source labour from scratch, and fairly quickly in a lot of these cases,” says Geden. “Our main focus was not just getting people on-site but ensuring they were properly aligned with our company’s core values and understood the importance of this contract. That’s been the biggest challenge so far, but also the biggest opportunity.”

Indeed, Aecon’s experience with alliance partnerships and boots-on-the-ground operations has aligned nicely on its facilities work for Spectra Energy. The best indicator for Geden and his AIMC team to date has been the ongoing interaction with the Spectra Energy team and the development of new alliance objectives.

“We share the ultimate goal of having an alliance partnership between our

organizations; one where it becomes difficult to see exactly where the owner’s scope ends and the contractor’s begins. Having a fully integrated team approach takes time and a great deal of focus and commitment from both sides. Seeing this through will be the ultimate measure of success for our business as we take action toward building a true alliance partnership from this MSA.”

Geden says a second contract is in the works for maintenance work on a number of Spectra Energy’s natural gas processing facilities across B.C. The new contract will include both the planning and the execution of plant shutdown work; a service crucial to maintaining the integrity of these facilities. The term of this second agreement, appropriately named the Master Turnaround Agreement (MTA), is three years plus an automatic two-year contract renewal.

“The impact that we’ve made on this project so far has definitely led us to this second contract,” notes Geden. “Spectra Energy’s trust in us is built off of an existing alliance model, and it’s something that we’re absolutely going to continue to build on.”

First stages of construction on a Spectra Energy compressor station building



>120,000

MANHOURS WORKED WITH A LOST TIME INJURY (LTI) RATE
AND TOTAL RECORDABLE INJURY FREQUENCY (TRIF) OF 0

>8,200

PROACTIVE LEADING ACTIVITIES COMPLETED

COMING FULL CIRCLE

NORTHEAST ANTHONY HENDAY DRIVE (NEAHD) PROJECT

Aecon and its joint venture partners have closed the loop with the completion of the final section of Canada’s first free-flowing ring road in Edmonton. Now, thanks to this first-rate example of a project completed under the Public-Private Partnership building model, an estimated 40,000 motorists will have unparalleled access into and around the city.

Ring road, beltway, loop or orbital.

Although the names for these roads differ around the globe, their function is typically the same: to circumvent.

Ring roads first started appearing in North America in the 1930s and grew in popularity as urban centres began upgrading and expanding their infrastructure networks. Depending on their purpose or design, ring roads can offer a time-saving bypass for travellers wishing to circumvent a town. They can also provide multiple points of access into a busy urban centre for anyone wishing to circumvent the congestion often associated with slower inner-city traffic.

Both driving options are now available to Edmontonians with the completion of the northeast portion of Anthony Henday Drive, the final 27-kilometre stretch of road that (literally) closes the loop on Canada’s first free-flowing ring road.

The vision of an orbital road to circumnavigate the City of Edmonton was first set in motion more than four decades ago when the Alberta government purchased land surrounding the city and began construction. The road was initially called the Transportation and Utility Corridor.

Construction has progressed in sections throughout the years, but it wasn’t until 2016 that Edmontonians could finally enjoy the full benefits of a continuous ring road, as first envisioned.

CROSSING THE FINISH LINE

Aecon has played a pivotal role in this massive transportation project, the single largest highway construction job in Alberta’s history.

For the last four years, Aecon has been an integrated joint venture partner on the team responsible for carrying out the design and construction portions of the road’s final 27-kilometre northeast section, running from Manning Drive to Whitemud Drive.

Aecon carried a 22.5 per cent interest in the project scope with partners Flatiron Constructors, Dragados, and Lafarge, operating under a Public-Private Partnership (P3) framework. The team was subcontracted to complete the work by Capital City Link General Partnership (CCLGP), a P3 consortium awarded the overall \$1.81-billion contract in 2012 to design, build, operate and partially finance the Northeast Anthony Henday Drive (NEAHD) project.



PROJECT FILE

NORTHEAST ANTHONY HENDAY DRIVE (NEAHD) PROJECT

LOCATION: Edmonton, Alberta

CLIENT: Alberta Transportation

CONCESSIONAIRE: Capital City Link General Partnership (Meridiam, Hochtief, ACS)

DESIGN-BUILD JOINT VENTURE: Flatiron-Dragados-Aecon-Lafarge (FDAL)

AECON BUSINESS UNITS: ATW, Transportation, Utilities, Constructors

PROJECT TIMING: July 2012 to October 2016

CONTRACT VALUE: \$1.81 billion

TYPE OF CONTRACT: Public-Private Partnership (P3)

- SCOPE:**
- 27 kilometres of six- and eight-lane divided roadway (equivalent to 160 single-lane kilometres)
 - 6 service interchanges
 - 3 system interchanges
 - 2 road flyovers
 - 47 bridge structures including:
 - 8 rail crossing flyovers
 - 2 river bridges
 - 58 overhead sign bridges
 - 45 cantilever signs

EMPLOYEES ON SITE AT PEAK: 500 (joint venture team); 11 Aecon Supervisors

- KEY EMPLOYEES:**
- Sami Abunaaj (ATW) – Roadway Construction Manager
 - Rob Richardson (Flatiron) – Project Manager
 - Graham Wilson (Aecon Utilities) – Utilities Coordinator
 - Jeff Peroff (Aecon Utilities) – Pipeline Utilities
 - Gary Hodge (Flatiron) – Safety Manager
 - Paul Anderson (ATW) – Paving Manager
 - Stuart Nielson (ATW) – Grading Manager

- DESIGN BUILD JOINT VENTURE — AECON EXECUTIVE COMMITTEE MEMBERS:**
- Mark Rivett, EVP, Infrastructure
 - Don Brophy, SVP, Aecon Constructors
 - Greg Steels, VP, Infrastructure Operations
 - Michael Derksen, SVP, Aecon Transportation West



When the new – and concluding – stretch of road opened to the public on October 1, 2016, this milestone achievement was celebrated by all. More than just a 27-kilometre stretch of road, the Northeast Anthony Henday Drive project completion represents the grand finale of a multi-decade construction chapter and the opening of new opportunities for the City of Edmonton.

“Now that the ring road is complete, it provides tremendous advantages for motorists trying to get around the city,” notes Michael Derksen, Senior Vice President, Aecon Transportation West. “Not only will it offer greater mobility for the community as a whole, it will also impact the economy and the overall region.”

OVERCOMING THE OBSTACLES

For the four joint venture project partners involved in constructing the northeast leg of Anthony Henday Drive, their ability to meld as a cohesive operating team was put to the test from the earliest stages of this four-year project.

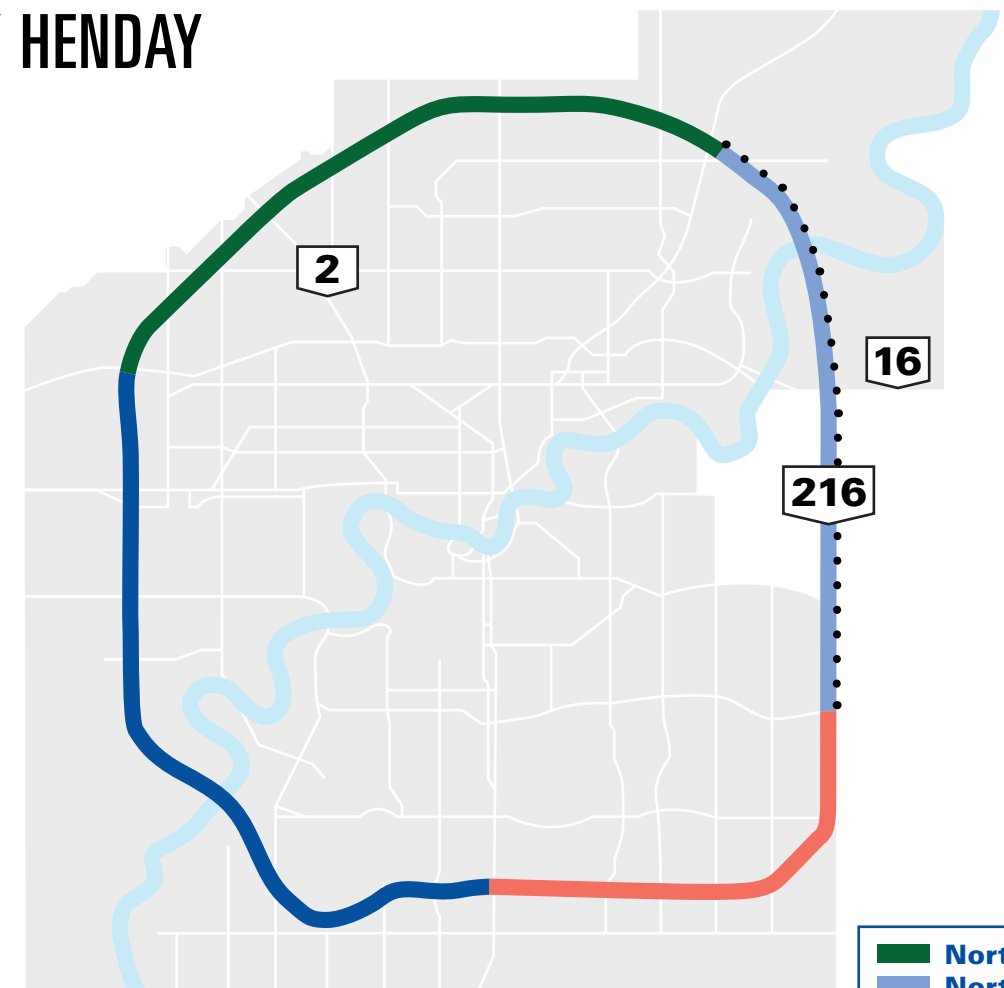
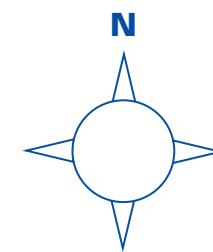
“We definitely had some major hurdles to overcome,” says Derksen. “Especially in the first part of the project timeline, when we were dealing with extreme weather conditions, including flooding, and some significant utilities infrastructure challenges.”

Indeed, the initial design phase of the Northeast Anthony Henday Drive project revealed the construction zone was actually located on numerous utility

corridors, resulting in a whopping 523 major and minor utility “conflicts” that needed to be addressed. What’s more, 100 of those conflicts had to be tended to immediately to keep the project on schedule. This involved doing integrity tests on older pipelines, getting permits and permissions from pipeline owners to relocate or protect the affected pipelines, and then carrying out the prescribed work before moving forward with the original project scope.

Mother Nature also showed her wrath over the duration of this project. In the earlier stages, weeks of non-stop rain during Edmonton’s spring season carried over into the summer months, saturating the site’s predominantly clay soil.

ANTHONY HENDAY DRIVE



■ Northwest Leg
⋯ Northeast Leg
■ Southwest Leg
■ Southeast Leg

27

KILOMETRES OF SIX- AND EIGHT-LANE DIVIDED ROADWAY

6

SERVICE INTERCHANGES

45

CANTILEVER SIGNS

47

TOTAL BRIDGE STRUCTURES

58

OVERHEAD SIGN BRIDGES

523

UTILITY "CONFLICTS" RESOLVED

A portion of the Anthony Henday ring road over the Saskatchewan River

With more than one million tonnes of asphalt to place, roadway construction was significantly slowed, pushing back scheduled paving and threatening the overall project schedule.

In the summer of 2013, while in the midst of constructing two separate four-span bridges crossing the North Saskatchewan River, project crews experienced a major flood when the river rose an alarming three metres in a matter of 14 hours. With all of the cofferdams flooded out, work came to a standstill while crews did their best to salvage the situation.

"The weather is always a significant factor and can really hamper an operation," says Derksen of the ongoing

inclement weather conditions. "We had a good plan in place, though, and had outlined the resources we needed at various stages in the game. It came down to modifying our schedules and accelerating certain portions of the project to stay on track."

While the first two years of foundation work and substructure construction were marred by unforeseen circumstances, the remaining project timeline was all about making up for lost time.

"There were a total of five segments on this project," notes Derksen. "We were challenged with completing all of them but still sticking to schedule in the final months. We added more crews and worked around the clock to

overcome some of our earlier obstacles, and it really paid off."

The last stages of the project included the pouring of multiple bridge decks, placing gravel base, asphalt paving, finishing all earthworks, installing lights and traffic signs, and setting up traffic in its final configuration.

During this final phase, Aecon played an integral role in coordinating with the client, Alberta Transportation, to ensure project completion was aligned with the highest standards of construction. This meticulous process entailed completing a checklist of essential items, reviewing all records for quality control, and addressing any outstanding issues before final client sign-off.

FINISHING TOUCHES

Once the majority of all heavy road construction was completed in September 2016, crews and subcontractors turned their attention to the finishing touches: multi-use trails (MUT), top soiling, seeding and grassing, as well as any remaining final clean-up work. To make way for these changes, traffic was regulated and redirected almost on a daily basis, which required a lot of precise decision-making and skilled time management.

"Because we were getting down to the final pieces of the puzzle towards the end, there were traffic changes happening every couple of days," notes Derksen. "To get the job done, our on-site guy, Sami Abunaaj [Vice President, ATW] was tremendous in keeping the City of Edmonton, Alberta Transportation, and

the driving public all updated with the traffic changes taking place."

From a landscape perspective, earthworks crews had created storage ponds early on in the project to manage stormwater flows during construction. There are 24 storage ponds in all, featuring inlet ditching, outfalls, and related piping that captured runoff water during the building of various portions of the road.

"These ponds were initially created as part of a detailed stormwater modelling system, and they will continue to reside as permanent wetland areas," reports Greg Steels, Vice President, Infrastructure Operations. "We enlisted a subcontractor to station a variety of plants in and around the pond areas in order to extend their lifespan. It's one of the nicest features of this project."

From the beginning of the project, Steels has maintained the joint venture project team bringing this northeast section of Anthony Henday Drive to fruition. The team had both the experience and tenacity required to overcome all obstacles and stay on schedule. Now that the final stretch of road has opened and an estimated 40,000 motorists are enjoying the freedom of a free-flowing road around the City of Edmonton, the project has been safely delivered on time to client Alberta Transportation.

Says Derksen: "The experience of working on this project has been an exceptionally rewarding one. Getting such a tremendous amount of work done in such a short period of time comes with a great sense of accomplishment."

Putting in final touches before opening the final leg of the Anthony Henday ring road to the public

**“The experience
of working on this
project has been
an exceptionally
rewarding one.”**

— Michael Derksen, Senior Vice President,
Aecon Transportation West

Workers paving the final stretch of the
Anthony Henday ring road

FORT HILLS ORE PREPARATION PLANT



Leveraging Aecon’s reputation for diversity, a stellar safety record, and previous surface mining work for Suncor, Canonbie Contracting delivers on its multi-million-dollar ore processing plant contract for northern Alberta’s new Fort Hills mine.

Alberta is a top producer of bitumen – the thick, sticky oil that emanates from the oil sands. The province boasts 85 per cent of the world’s total natural bitumen reserves, the majority of which is found in northern Alberta’s Athabasca region. Although the reserves are plentiful, turning bitumen into a market-ready product is considerably more complex than with conventional oil reserves. Emerging from beneath the ground via open pit mining, the oil sands offer up a clumpy fusion of sand, water, clay and bitumen that must move through multiple extraction and processing phases in a bitumen production facility before it’s market-ready.

At the new Fort Hills mine site in northern Alberta, about 90 kilometres north of Fort McMurray, Aecon subsidiary Canonbie Contracting has spent the last two years hard at work on the front end of this bitumen process. Canonbie has just successfully completed a \$124-million contract to construct the “Wet” section of the mine’s new 22,000-square-foot ore processing plant (OPP). Once the mine is fully operational and begins to produce oil in late 2017, the “OPP-Wet” will be the second step in the bitumen production process once it has been mined.

Canonbie has been on-site at Fort Hills since 2014, when it was first awarded the processing plant contract by Fort Hills LLP

– a partnership of Suncor Energy, Teck Resources Limited and Total E&P Canada. Canonbie Vice President and General Manager Cam Green says a major factor in winning the work was Canonbie’s proven track record with the mine’s operating partner, Suncor.

“We’ve been working with Suncor for almost a decade now, which has given us the opportunity to really deliver on a number of projects and foster that relationship.”

Canonbie Senior Project Manager Rob Strohmann concurs. “The project team we currently have on-site has developed a very good relationship with Suncor over the years. As one of our major clients, Suncor fully understands what we’re able to offer as a company, what we do. The work that we’ve done for them has been successful in the past and now we’re building off of that.”

By the time Canonbie was initiating construction on the Fort Hills OPP in late 2014, another Aecon business unit – Aecon Mining – had already secured its own scope of work: a separate \$123-million contract from the same client for nearby work on the Fort Hills mine. Whereas Canonbie was working on the processing plant, the Aecon Mining team was focused on mine development, constructing the main open pit tailings, dikes and haul roads, and making the initial mining cut.



PROJECT FILE

FORT HILLS ORE PREPARATION PLANT (FORT HILLS OPP)

CLIENT: Fort Hills Project Partnership: Suncor Energy Inc., Total E&P Canada Ltd., Teck Resources Limited

LOCATION: Athabasca region, northern Alberta

TYPE OF CONTRACT: Target Price Cost Reimbursable

CONTRACT VALUE: \$124 million (\$115-million general contract and \$9-million miscellaneous contract)

AECON BUSINESS UNIT: Canonbie Contracting Limited

SUMMARIZED SCOPE OF WORK:
Civil, structural steel, building erection, heating, ventilation, roofing, cladding, mechanical, piping, electrical, instrumentation, and scaffolding construction of the OPP-Wet
Assembly and installation of three rotary wet screens and twelve 4,000-horsepower slurry pumps

TIMING: July 2014 to November 2016

EMPLOYEES ON SITE AT PEAK: 340

KEY EMPLOYEES:
Rob Strohmann – Senior Project Manager
Cam Green – Vice President & General Manager
Jeff Light – Construction Manager
Frank Kattluss – Assistant Construction Manager
Jim Henderson – Quality Project Manager
Justin Cooke – Turnover Manager
Ryan Lloyd – EHS Manager
Bart Simpson – EHS Lead
Kevin Ford – General Superintendent
Wil Meade – General Superintendent
David Bohonis – General Superintendent
Garry Kennedy – Mechanical Superintendent
Cory Smith – Scaffolding Superintendent
Josh Harding – Electrical Superintendent
Andrew Helps – Electrical Superintendent

A portion of the Fort Hills Ore Preparation Plant (OPP) in Alberta

3

ONE-MILLION-POUND ROTARY
WET SCREENS THAT ARE

70

FEET LONG AND

25

FEET IN DIAMETER



Canonbie employees from left to right: Paula McCann, Jarrett Chasse, Remi-Pierre DeGrace, Landon Halpin, Mike McLeod, and Josh Nielsen



Interior of the Fort Hills Ore Preparation Plant (OPP)

For the Canonbie team, significant detailed planning with Suncor and engineering firm Worley Parsons preceded construction start on the “OPP-Wet” in November 2014. The scope of work involved civil, structural steel, building erection, heating, ventilation, roofing, cladding, mechanical, piping, electrical, instrumentation, and scaffolding construction.

Typically, an OPP facility consists of two separate sections: OPP-Dry and OPP-Wet. OPP-Dry is the material-handling plant where the mined ore is

deposited into crushers, loosely broken down and conveyed to OPP-Wet. There, the crushed ore is mixed with warm water and conditioned to create slurry. The slurry, in turn, is transported via hydro-transport lines with the assistance of booster pumps to the facility’s primary extraction stage. It is in the extraction process that the bitumen is removed from the sand, further treated through several procedures, and eventually readied for shipping.

For Canonbie’s construction of the OPP-Wet, the project team took an

entirely different route than a typical, conventional OPP build. Rather than construct the structure first, the workers preassembled the building and fitted all the HV ducting, roof cladding and electrical components in the truss space at grade level. They then installed the structural steel using large panels that were lifted into place. By doing so, the crews were able to minimize the safety risk of working at heights and increase productivity throughout the course of the project.

The other unique component of this project was the assembly and installation

of three one-million-pound rotary wet screens that had been shipped to the Fort Hills site in eight separate sections by American equipment manufacturer, McLanahan Corporation. Canonbie’s job was to assemble the three massive rotary wet screens at ground level and then lift them onto concrete piers 60 feet above ground using 500- and 660-tonne Demag cranes.

Measuring 70 feet long and about 25 feet in diameter, the enormous rotary wet screen barrels are used at the start of the OPP-Wet’s slurry process. They combine

the crushed ore with warm/hot water in order for the newly formed slurry mixture to aerate and entrain air bubbles.

“We’ve never done anything like this before,” says Canonbie Construction Manager Jeff Light, “but we were able to complete it all through our constructability, and with the help of our millwright and our structural, and welding superintendents. For sure, the safety factor was our number one priority.”

Canonbie’s scope of work on this project is now complete, and the Fort Hills mining project is one step closer to being

able to mine and process its projected 110 million tonnes of oil sands per year, yielding an average of 180,000 barrels of bitumen per day at full production.

“I’m really proud of the work the team has done on this job,” says Green. “The project was completed on time and with a stellar safety record. The team was challenged in some of the work scope, but they really rose to the occasion and did it in the safest possible way.”

**“As one of our
major clients,
Suncor fully
understands
what we're
able to offer
as a company.”**

— Cam Green, Vice President and
General Manager, Canonbie

AECON INNOVATION COUNCIL

“Our aim is to create a work environment that encourages and nurtures our employees’ innovative ideas.”

— John M. Beck, President and CEO,
Aecon Group Inc.

AECON'S INNOVATION COUNCIL

EXECUTIVE COMMITTEE:

- John M. Beck, President and CEO
- Paula Palma, EVP & Chief People and Information Officer
- Mathew Kattapuram, Senior Vice President, Strategic Business Development

CURRENT MEMBERS:

- Melissa Maki, Surveying Manager (Infrastructure)
- Linda Gregatto, Contracts Manager (Infrastructure)
- Scott Waters, Vice President and General Manager, Energy West (Energy)
- Bill Clarke, Vice President, Business Development and Aboriginal Affairs (Energy)
- Scott Ryan, Project Director (Mining)
- Patrick Maillet, Engineering Manager (Mining)
- John Hillborn, Director of Business Solutions (Information Services)
- Steve Payne, Aecon Concessions Director (Concessions)
- Mike Archambault, Senior Vice President and Chief Safety Officer (Safety)

STAYING AHEAD OF THE CURVE

When it comes to approaching the work we do with an innovative lens, the words spoken by Aecon's President and CEO John M. Beck perfectly encapsulate his vision of positioning Aecon at the forefront of our industry.

From a bird's-eye view, the general consensus regarding construction and innovation is that ours is an industry that typically lags behind most other industries in the world. In fact, many would say the construction trade hasn't made any truly significant advances for the last half-century.

And yet, the lightning speed with which our world continues to evolve due to year-over-year advances and convergences in technology — such as artificial intelligence, robotics, and

nanotechnology resulting in exoskeletons and drones — has conditioned us to start thinking differently. Aecon has always remained diligent in employing the latest technologies in our day-to-day work — from field equipment to company-wide support platforms like SAP — but these introductions have largely been functional rather than visionary; they are implemented to address an immediate need rather than strike a movement.

Until now.

“It's time to start thinking outside the box when it comes to innovation,” says Mathew Kattapuram, Aecon Senior Vice President, Strategic Business Development. “We're focused on being at

the sharp end of this modern-day technological convergence and taking advantage of the opportunities in front of us so that we are seen as leaders and early adopters of new technologies.”

To create a culture of innovation across the company and provide a forum to facilitate its advancement, Aecon has established an Innovation Council. It is composed of an executive committee to oversee decision-making and representative members from across Aecon's operating segments. The Council is focused on challenging Aecon employees and fostering both their engagement and leadership in the development of innovative strategies that will enhance the efficiency and productivity of Aecon's existing businesses or lead to new business opportunities.

“The engagement of representatives from our business segments is vital,” explains Kattapuram, “because these are the people who have an in-depth understanding of our business and the lens for what kinds of innovations can be

brought forward to better improve our service offering.”

Since its inception in early 2016, the Council has been meeting quarterly to discuss and evaluate new advances in the technology sector that can be applied to our industry. In order for a proposed idea to gain traction, it must first align with Aecon's core values and overall business strategy. The first step is for members to present a supportive business case to the Council's executive committee to determine if the idea merits study or development. A green light at this stage triggers resources to further study the innovation and/or fund its implementation.

A vital role of the Council is to act as a platform for expanding the many proven innovative concepts currently in operation in pockets across the company.

“There are a lot of great people at Aecon with a lot of great concepts, but we're definitely not talking about them on a big, corporate scale when it comes to innovation,” explains Council member Melissa Maki, (Survey Manager, Transportation, Aecon Infrastructure).

“Being a part of the Council allows us to highlight the things that are already happening in the field and then helping to get them implemented in a cohesive way across the entire company.”

As one of Aecon Infrastructure's representative members, Maki has brought to the Council innovations in mobile mapping and unmanned aerial vehicles (UAVs). These technologies have already been adopted in her operating segment for photography and 3D project site mapping applications. Now, however, as a member of the Innovation Council, Maki has had the opportunity to play a pivotal stewardship role in introducing this type of technology across all of Aecon. The ability to leverage valuable knowledge and lessons learned to new adopters across the company reduces redundancy and, in itself, creates process efficiencies.

“What you don't want to be doing is developing something fairly innovative to save time and then someone on the other side of the company has to go out and do the very same thing, starting from scratch,” she explains. “We're trying to

take these new concepts and get them out to everybody so that we can avoid repeating the same challenges and mistakes.”

Maki's contributions to the Council — and to Aecon as a whole — represents a fraction of the potential that lies within the new Aecon Innovation Council through its collective membership. Backed by the mandate and mechanism of this new forum, the vision of Aecon as an innovation trailblazer has suddenly made a substantial leap forward.

“Ultimately, our goal is to stay ahead of the curve in this industry,” notes Kattapuram. “This Council will be the vehicle to help us get there, but we absolutely need the input of our people. They're the ones in the field, and they're the ones that will keep us out in front.”

HARNESSING INNOVATION AND TECHNOLOGY TOWARD CONTINUOUS IMPROVEMENT IN HEALTH AND SAFETY

By Mike Archambault
Senior Vice President, Chief Safety Officer



Workers wearing a new ErgoSkeleton, which is a postural support device that when worn, encourages best practices in lifting and material handling by offering feedback on ergonomics and posture

The Aecon Environmental Health and Safety (EHS) program is grounded in key elements that support the overall goal of an incident- and injury-free workplace, including health and safety training, hazard assessments, workplace inspections, behavioural observations and our Aecon Safety Opportunity program. All of these elements are routinely updated and modified with the goal of supporting continuous improvement in our overall EHS performance. In the last few years, the shift to leading indicators versus trailing indicators has enabled Aecon to adopt a predictive approach to identifying potential health and safety hazards, risks and prevention strategies. With this shift comes a natural focus on human performance – the way people think about, react to and perform their work activities.

Amidst the activities and proactive measures we practise on a regular basis, innovation and new technology are playing a greater role in the strengthening and evolution of our EHS program. Here's an overview of new tools – some already implemented and some under consideration – that can help make our workplaces safer and more efficient:

AIMS

The Aecon Incident Management System (AIMS) improves the way in which we track incidents, notify staff and keep detailed records of workplace incident investigations. Through AIMS, Aecon now has a live and paperless process in place that has enhanced efficiencies and deepened knowledge transfer.

ON-THE-GO ACCESS

With many of our proactive leading activities, we have introduced mobile forms to complete safety opportunities, behavioural observations and inspection reports in an effort to leverage the increased presence of mobile devices in our workplace. This offers our workers immediate, real-time updates regarding potential issues or concerns.

SENSORS

Mobile devices and databases can be further complemented by technology to enhance our health and safety programs. Consider a worker on a construction project wearing standard personal protective equipment (PPE) such as a hard hat, a high-visibility vest, respirators or safety glasses.

The opportunity to place high-tech sensors on these items has the potential to:

- Notify the operator of heavy equipment when a worker is in a hazardous position or blind spot
- Monitor an employee's vital signs, such as heart rate and temperature, to better manage the individual's exposure to extreme hot or cold working conditions
- Monitor and locate people working alone or in remote locations
- Take live readings of airborne contaminants or noise levels for each individual worker
- Overlay worker locations onto 3D modelling
- Track the location of workers in the event of an emergency

Sensors have the ability to capture and monitor information and transmit it to us through mobile devices, cloud networks and other systems. Consider the concept of human performance and the ways in which work is performed. Having access to information that provides insight on how to better assist our employees is an invaluable opportunity to ensure all tasks are completed safely. Additionally, many of

the manufacturers and vendors Aecon partners with are already in the process of integrating tools such as cameras, sensors and cloud compatibility as standard features for new safety equipment.

Sensors on heavy equipment that work in conjunction with workers' personal protective equipment (PPE) are another example of new technology supporting safety in the workplace. For example, a PPE item is equipped with a small sensor tag that, in turn, initiates an alarm visible to the worker operating a piece of heavy machinery. The alarm notifies the operator to promptly stop if a worker gets too close to the back of moving equipment. The same technology can be used in congested areas with sensitive processing equipment or structures. Placed in specific locations, these small tags can notify the operators of heavy equipment when they are too close to a sensitive area. Aecon is currently piloting applications of this and similar technologies throughout various projects.

DRONES

Several Aecon project sites have also served as platforms for the introduction of drones, or unmanned aerial vehicles

(UAVs). These drones successfully capture the progress of some of our largest projects through the use of film and photography. They also offer the value-added ability to autonomously scan and estimate the amounts of material left in pits and quarries, effectively removing the risk of surveyors being exposed to various hazards such as working in pits and quarries at heights or around heavy equipment.

ERGOSKELETON

Similar to a backpack, the ErgoSkeleton is a postural support device that when worn, encourages best practices in lifting and material handling by offering feedback on ergonomics and posture. It provides feedback to the wearer when to adjust posture if they are bending or twisting in a manner that has the potential to increase the risk of a musculoskeletal injury.

As exciting as new technologies may be, there is one thing that remains a constant – human performance. While technological advances may help us to handle material more effectively, use drones to scan our projects, and apply sensors to track and signal potentially

hazardous situations, they will never fully replace human performance. Instead, we aim to incorporate new technologies into our existing EHS program to further strengthen and evolve it.

Safety First, Aecon's number one core value, will continue to serve as the foundation for ensuring everyone remains safe each and every day. While we enthusiastically embrace new technologies, they will only ever be as good as our safety culture and personal commitment to executing all activities while following safe work practices. Technology is simply a tool to add levels of safety and innovate the way we build things that matter.



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