

CORTELLUCCI VAUGHAN HOSPITAL

Built Just in Time: A State-of-the-Art Community Hospital Pivots to Critical Pandemic Resource



THE CANADIAN COUNCIL FOR PUBLIC-PRIVATE PARTNERSHIPS
2021 NATIONAL AWARDS CASE STUDY

The Canadian Council for
Public-Private Partnerships



Le Conseil Canadien pour
les Partenariats Public-Privé



The Canadian Council for Public-Private Partnerships 2021 National Award Case Studies

National Award Case Studies Gold Award for Infrastructure:
Cortellucci Vaughan Hospital

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Introduction

For nearly 30 years, The Canadian Council for Public-Private Partnerships (CCPPP) and its members from the public and private sectors have played a strong role in refining the P3 model and promoting new approaches to infrastructure development and service delivery.

Governments across Canada are using the public-private partnership (P3) model to build, maintain and operate much-needed infrastructure, from schools and hospitals to bridges and highways. In 2021, there are close to 300 active P3 projects in operation or under construction valued at more than \$139.4 billion.

Along the way, the 'made-in-Canada' P3 model has become globally renowned but, as the winners of the 2021 National Awards for Innovation and Excellence in Public-Private Partnerships demonstrate, it has never stopped evolving.

This year, CCPPP is publishing three case studies on these exemplary projects, joining the more than 80 that have been published to date. Designed to inspire others to consider innovative and efficient models for procuring infrastructure, the studies highlight many of the lessons learned about P3s. Each case provides a close look at how a successful P3 has worked, including how the partnership was established, its structure and operation and its resulting benefits.

It is important to learn from these complex projects as we move forward. After all, investment in infrastructure is critical for the future of our communities and country because it creates jobs, drives growth, stimulates productivity, and builds a legacy for us to thrive.

Canadians want — and expect — critical infrastructure to be built quickly and with the best value for taxpayers. Using public-private partnerships is an advantage given their greater potential to offer a fixed price and on time delivery, risk allocation and improved life cycle maintenance and operations.

In 1998, CCPPP established the National Awards for Innovation and Excellence in Public-Private Partnerships to honour governments and/or public institutions and their private sector partners who have demonstrated excellence and innovation in P3s. Gold, silver and bronze Awards of Merit are given in the areas of project development, financing, infrastructure, service delivery or other notable attributes to projects from across the country and at all levels of government.

Winning projects are chosen on the basis of the following criteria:

- Innovative features;
- Relevance or significance as a national and/or international model;
- Economic benefit (job creation, enhanced economic value, export potential, etc.);
- Measurable enhancement of quality and excellence of service or project;
- Appropriate allocation of risks, responsibilities and returns between partners; and
- Effective use of financing and/or use of non-traditional sources of revenue.

2021 Award Winners



Cortellucci Vaughan Hospital, Ontario – Gold Award for Infrastructure

This \$1.3-billion project, the first hospital built in the City of Vaughan and the first net new hospital to be built in Ontario in the last 30 years, has a state-of-the-art emergency department, capacity for up to 350 beds with flexibility to expand, and is the first hospital in Canada to feature fully integrated smart technology, enabling systems and medical devices to communicate directly with one another. In February 2021, as it prepared to open, the hospital pivoted to temporarily become a system-wide resource supporting Ontario's COVID-19 response. From its initial opening until its full opening in June 2021, the facility cared for some of the highest volumes of COVID-19 patients in Ontario. The awards committee was impressed by how well the hospital pivoted ahead of its opening and the innovations deployed by the consortium to keep the complex project on time and on budget such as the use of prefabricated bathroom modules.

Partners: Mackenzie Health, Infrastructure Ontario and Plenary Health



Valley Line West LRT, Alberta – Gold Award for Project Development

This \$2.67-billion, 14-kilometre light-rail extension is the second stage of the City of Edmonton's Valley Line. The design-build-finance project, which entered its RFP phase and reached financial close during the pandemic in 2020, bundles together design, system integration and construction into one contract. It also is the first to embed a community benefits agreement for a major capital project in Edmonton. With its 14 street-level stops and two elevated stations, the extension will help connect city neighbourhoods and reduce congestion, with LRT stops downtown at all major city hospitals and the city's largest tourist attraction, West Edmonton Mall. Once the west line is operational, both stages of the Valley Line will operate contiguously with no transfer points or perceived break in service for passengers despite the fact both are being delivered using different P3 consortiums, noted the awards committee.

Partners: City of Edmonton and Marigold Infrastructure Partners



L.F. Wade International Airport Redevelopment Project, Bermuda – Gold Award for Infrastructure (International)

By using innovative thinking and Canadian P3 expertise, Bermuda was able to achieve what many small airports in the world have struggled to do — attract private sector investment to finance a major capital redevelopment. The US \$300-million project is the largest P3 infrastructure deal in Bermuda's history. The bespoke government-to-government contract and guarantee mechanism, supported by an underlying P3 commercial and financing structure,

enabled the new 288,000-square-foot facility to meet the latest international standards while still dramatically lowering the project's initial capital budget. In addition, the new terminal is infused with the latest technology. Built sustainably and factoring in the impacts of climate change, the terminal can now withstand windspeeds of 277 kilometres an hour — equivalent to a Category 5 hurricane. Playing a part in the revitalization of Bermuda's economy, nearly US \$400 million in private investment was mobilized, more than 400 Bermudian companies were engaged, and 885 Bermudians worked on the project. The awards committee recognized the success of the project, which not only sets new standards internationally for others to follow but showcases Canadian companies and Canadian innovation on the world stage.

Partners: Government of Bermuda, Canadian Commercial Corporation and Aecon Concessions



New Adult Mental Health Addictions Facility, Newfoundland and Labrador – Silver Award for Project Development

This \$330-million project will help transform and destigmatize mental health and addictions treatment in Newfoundland and Labrador, reflecting the move away from an inpatient-centred model to one that balances care and healing close to home. The new 24,000-square-foot facility, co-located at the Health Sciences Centre in St. John's, is replacing a facility constructed in the 1800s. It will house a 102-bed hospital and a new 60-bed hostel. Rooms will be oriented to capture daylight with windows designed to keep out the cold of the province's blustery winter weather. Terraces will also have built-in snow melting systems. This design-build-finance-maintain project was one of the few P3s globally to close during the height of the pandemic, the significance of which was not lost on the awards committee. Lockdowns posed challenges for teams to travel to the island and led the partners to explore ways to optimize risk transfer to avoid supply chain issues and delays.

Partners: Government of Newfoundland and Labrador, the Eastern Regional Health Authority and Avalon Healthcare Partnership



GO Rail Expansion, Highway 401 Rail Tunnels, Ontario – Silver Award for Infrastructure

This \$132-million design-build-finance project created twin tunnels under 21-lanes of traffic, without disrupting travel on the busiest highway in North America and the world's busiest truck route — a significant achievement that was recognized by the awards committee. Completed in July 2021, the tunnels will increase capacity on the GO Kitchener Rail Corridor as part of Metrolinx's GO Rail Expansion program. The new 176-metre twin tunnels beneath the access ramps of Highway 401 and Highway 409 will enable the simultaneous passage of two trains travelling in opposite directions without any speed restrictions. The project sets a new standard for tunnel construction and design in Canada, using a new-to-Canada auger borer, as well as a pipe roof system that helped drastically minimize risk, speed up the schedule and protect workers. A sequential excavation method rather than traditional cut-and-cover tunnelling also helped avoid traffic disruption and a complex network of monitors tracked any deviations in the highway and surrounding soil as a safety precaution.

Partners: Infrastructure Ontario, Metrolinx and Toronto Tunnel Partners

Acknowledgements

CCPPP has a team of dedicated Award selection committee volunteers who review the applications, select the winners and provide feedback on the case studies. Using their extensive P3 knowledge and experience, they select the winners from a pool of very qualified applications and then ensure the case studies provide a learning tool for seasoned practitioners, as well as those new to the P3 model. The following panelists comprised the 2021 selection committee:

- Brad Nicpon, Chair of the Awards Selection Committee and Partner, McCarthy Tétrault LLP

- Shariq Alvi, Managing Director, Infrastructure and Project Finance, CIBC
- Rupesh Amin, Managing Partner, Infrastructure & Development, Forum Equity Partners
- Peter Hepburn, Managing Director and Head, Infrastructure and Project Finance, National Bank Financial Markets
- Alain Massicotte, Partner, Blake Cassels and Graydon LLP
- Johanne Mullen, Partner, National Capital Projects and Infrastructure Leader, PwC Canada
- Dr. Alan Russell, Professor Emeritus, Department of Civil Engineering, University of British Columbia
- Lindsay Wright, Senior Manager, Global Infrastructure, KPMG LLP

Mark Schildroth and **Chris Sawczak**, Aecon Group Inc.; **Holly MacNeish** and **Stephanie Williamson**, Plenary Americas; **David Stolte**, Mackenzie Health; and **Shannon Peacocke**, Ernst & Young Orenda Corporate Finance Inc. authored the 2021 Award Case Studies, which were developed with significant input and review from the project partners and procurement agencies as well as the diligent work of the researchers.

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CCPPP would like to thank them for their contributions as well as Infrastructure Canada for its research support for the case studies.



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Canada**

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About CCPPP

Established in 1993, CCPPP is a national not-for-profit non-partisan, member-based organization with broad representation from across the public and private sectors. Our mission is to collaborate with all levels of government, Indigenous communities and the private sector to enable smart, innovative and sustainable approaches to developing and maintaining infrastructure that achieve the best outcomes for Canadians.

Our reports, case studies, guidance and surveys are available on CCPPP's website at www.pppcouncil.ca

Additional resources include: P3 Spectrum (www.p3spectrum.ca), Canada's premier source for up-to-date P3 project info.

Quick Facts – Cortellucci Vaughan Hospital Project¹

Project type

Design-Build-Finance-Maintain (DBFM)

Asset/Service

34-year DBFM agreement for a new hospital consisting of an 11-storey tower plus a five-storey podium for a total of approximately 1.2 million square feet. The new hospital is the first hospital in Canada to feature fully integrated “smart” technology, enabling systems and medical devices to communicate directly with one another to maximize information exchange. The new hospital also features:

- Up to 350 beds with the flexibility to expand to 550 beds in future
- A state-of-the-art emergency department
- Modern surgical services and operating rooms
- Advanced diagnostic imaging
- Specialized ambulatory clinics and intensive care beds
- Approximately 90 per cent single occupancy acute care patient rooms for infection prevention and control, and
- Unique shared room features, including a separate washroom for each bed in the room (i.e., two-bed rooms have two washrooms and three-bed rooms have three washrooms)

Design and construction period:

- 4 years

Maintenance period:

- 30 years

Status

Operational February 2021 (COVID-19 resource)

Operational June 2021 (Full community hospital operations)

¹ Background and facts in this case study rely on the information contained in the award application submitted.

Partners

Public Sector

- Mackenzie Health
- Infrastructure Ontario (IO)
- Ontario Ministry of Health and Long-Term Care

Private Sector

- Plenary Health comprised of:
 - Plenary Americas
 - PCL Investments Inc.
 - PCL Constructors Canada Inc.
 - Johnson Controls LP

Other participants

Public Sector

- Gowling WLG – Legal Advisor
- KPMG LLP – Transaction Process Advisor
- Zeidler Partnership Architect – Technical Advisor
- SEG Management Consultants Inc. – Fairness Advisor

Private Sector

- Plan Group – Electrical Contractor
- Modern Niagara – Mechanical Contractor
- Fasken Martineau DuMoulin – Lenders Legal Advisor
- Davies Ward Philips & Vineberg LLP – SPV Counsel
- Stantec Architecture Ltd.

Project cost, financing and Value-for-Money (VfM)

Total project cost

- \$1.3 billion (contract value)

Project financing

- Equity: \$33 million
- Long-term bond: \$278 million
- Short-term credit facility: \$150 million

Public sector

- Construction period payments: \$237 million
- Substantial completion payment: \$234 million

Payments

During Construction

- Construction period payments started once private capital invested in the project exceeded 50 per cent of the total funding requirement (between months 29 and 45)

During Operations

- Monthly service payments over a 30-year period to cover the cost of construction, building maintenance, life cycle repair and renewal, and project financing
- Subject to financial deductions based on performance requirements established in the project agreement

Value-for-Money – DBFM

- \$254.4 million or 17.9 per cent NPV²

Project highlights and innovative features

- Increased access to care: As the first hospital to be built in the City of Vaughan and the first net new hospital to be built in Ontario in the last 30 years, the new Cortellucci Vaughan Hospital is bringing much-needed health services to the community.
- COVID-19 resource: As Mackenzie Health prepared to open the doors to the hospital, it was asked to temporarily adjust its plans and transition the hospital into a systemwide resource supporting Ontario's COVID-19 response. From its initial opening in February until its full opening in June, the facility cared for the highest proportion of COVID-19 patients in Ontario during the third wave of the pandemic.
- Smart technology: All hospital data is hosted through a high-performance network, enabling health-care staff to use the first-in-Canada Epic electronic health record (EHR) system for patient care.
- Modular construction: Running critical work activities in parallel with on-site construction was crucial to maintaining project schedule while reducing site congestion. The team manufactured 290 modular washroom pods that were 95 per cent complete upon delivery to the site.
- Central utility plant: The plant is designed as a subtle addition on the ground level outside the main building. This design and construction approach played a large role in advancing the schedule as the team was able to add critical building systems without waiting for the hospital structure to be built. It also allowed for more room dedicated to patient care.

² Infrastructure Ontario, Value-for-Money Assessment, Mackenzie Vaughan Hospital Project. October 2016, page 2 file:///C:/Users/Owner/AppData/Local/Temp/VFM_Mackenzie_Vaughan_Hospital_2017.pdf (February 2, 2022)

Project websites

<https://www.mackenziehealth.ca/about-us/cortellucci-vaughan-hospital>

<https://infrastructureontario.ca/Mackenzie-Vaughan-Hospital/>

<https://www.pcl.com/ca/en/insights/delivering-a-system-solution--cortellucci-vaughan-hospital>





Overview

Located in one of the fastest growing regions in Canada, Cortellucci Vaughan Hospital³ is the first hospital to be built in the City of Vaughan, and the first net new hospital to be built in Ontario in the last 30 years.⁴ The city is home to a large population of seniors — a population expected to grow by more than 50 per cent between 2016 and 2025.

Until 2021, residents of Vaughan were served by the Mackenzie Richmond Hill Hospital, home to one of the busiest emergency departments in the Province of Ontario, operating over capacity more often than not. For the first six months of 2019, Mackenzie Richmond Hill Hospital was billed as the most overcrowded hospital in Ontario⁵. Building a second hospital for western York Region was clearly a priority.

The \$1.3-billion project, which broke ground in 2016, includes the design, build, finance and maintenance of the new hospital, consisting of an 11-storey tower plus a five-storey podium for a total of approximately 1.2 million square feet. The new facility has capacity for up to 350 beds, with flexibility to expand to 550 beds.

³ Formerly known as the Mackenzie Vaughan Hospital when procurement started, the hospital was renamed in 2020 following a \$40-million donation by the Cortellucci family. See <https://www.mackenziehealth.ca/about-us/news/~136-Cortellucci-family-donates-40-million-to-new-Mackenzie-Vaughan-Hospital>

⁴ As of time of publication in fall 2022

⁵ Crawley, Mike. Some of Ontario's biggest hospitals are filled beyond capacity nearly every day, new data reveals. CBC News. January 22, 2020. <https://www.cbc.ca/news/canada/toronto/ontario-hospital-hallway-medicine-healthcare-beyond-capacity-1.5420434> (Accessed May 5, 2022).

⁶ Mackenzie Health, internal data. (Accessed July 2021).

The 30-year contract, procured by Infrastructure Ontario (IO) and Mackenzie Health, was awarded to the Plenary Health consortium in 2016 following a competitive procurement process. Commercial and financial close were achieved in October 2016 with construction starting immediately.

Plenary Health (including Plenary, PCL and Johnson Controls) has been involved in eight hospital P3 projects across Canada, including the award-winning Humber River Hospital and Bridgepoint Hospital. The consortium achieved substantial completion on Cortellucci Vaughan Hospital on-time and on-budget in August 2020 during the pandemic.

In January 2021, when the Mackenzie Health team was in the midst of final preparations to open this hospital, the province requested it pivot and change the way the hospital would open. On February 7, 2021, Cortellucci Vaughan Hospital opened exclusively to support the provincial pandemic response with critical care and general medicine beds. The emergency department remained closed, and programs set to move from Mackenzie Richmond Hill Hospital to Cortellucci Vaughan Hospital were delayed.

This pivot was made possible by a team of administrators, operational readiness leads, nurses and physicians that stepped up to support the community when asked. The community was also asked to make a sacrifice for the greater good, delaying the opening of the hospital they had waited so long to see built.

Between February and June 2021, Mackenzie Health cared for 514 COVID-19 patients — the highest proportion of COVID-19 patients in Ontario. They were transferred to Cortellucci Vaughan Hospital through the GTA Incident Management System (IMS), a structure introduced to transfer patients from overwhelmed hospitals to those with the available resources to care for them.⁶

Cortellucci Vaughan Hospital was ideally suited for this role. It already had nurses and physicians trained and ready to staff up a new hospital along with the infection prevention and control features that were carefully incorporated into the initial build and design of the hospital.

The hospital is also considered to be the first in Canada with fully integrated smart technology, featuring systems and medical devices that can speak directly to one another to maximize information exchange.

While digital technology has existed for some time, smart technology takes digitization one step further. Ultimately, smart

technology becomes a digital member of the care team, helping to foresee what comes next in a patient's health-care journey.

For patients, it means more control, increased convenience, deeper knowledge and better outcomes. For the health-care team, it means spending less time filling out paperwork, locating equipment and other staff, and gathering information from multiple places. Above all, there's more time to spend taking care of patients.

“At the height of the pandemic, Mackenzie Health delayed the full opening of the new Cortellucci Vaughan Hospital to act as a systemwide resource for our health-care system, providing care to some of Ontario’s most vulnerable patients. We are incredibly grateful for the compassion and generosity of our York Region community and are thrilled that York Region will benefit from the exceptional care provided at this new, state-of-the-art hospital.”

~ Christine Elliott

Ontario Minister of Health

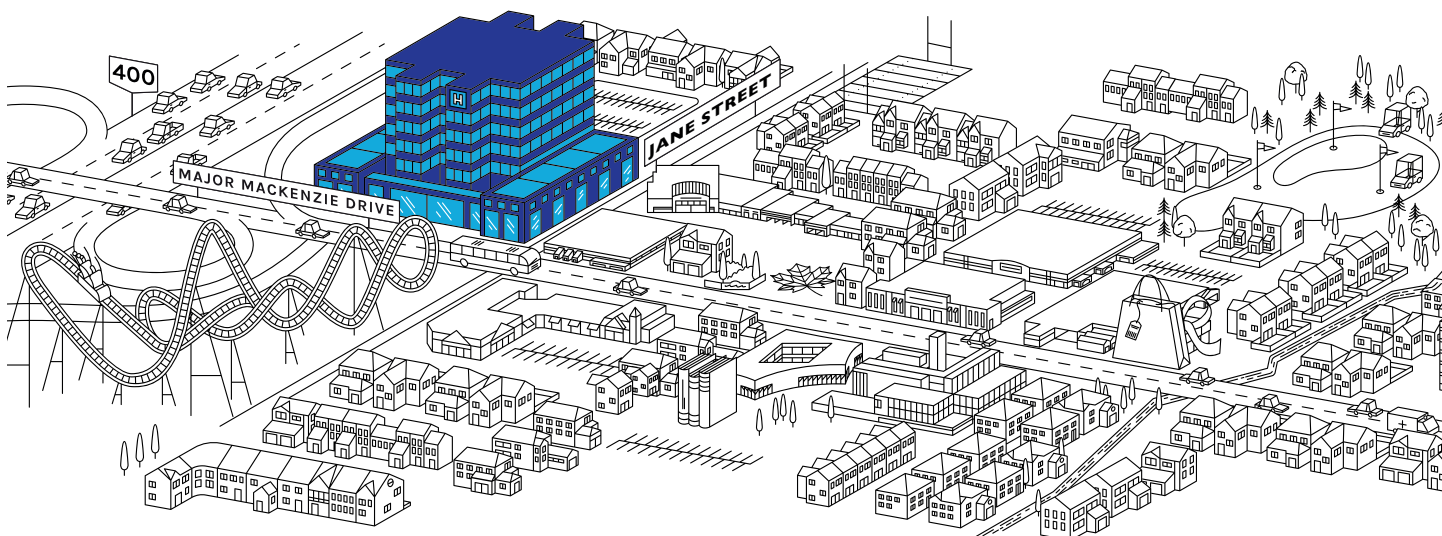
Since opening as a full-service community hospital in June 2021, Cortellucci Vaughan Hospital and Mackenzie Richmond Hill Hospital have continued to care for a large proportion of the province's COVID-19 patients, Mackenzie Health reported in February 2022.⁸

This case study will examine distinctive features of the project, which won gold for infrastructure at the 2021 National Awards for Innovation and Excellence in Public-Private Partnerships, presented by The Canadian Council for Public-Private Partnerships. The awards committee was impressed by how well the hospital pivoted ahead of its opening and the innovations deployed by the consortium to keep the complex project on time and on budget such as the use of prefabricated bathroom modules.

7 Ibid.

8 Mackenzie Health Insider, Marking one year since opening as a system solution on February 7, 2021, February 2022 <https://www.mackenziehealth.ca/about-us/news/~293-Marking-one-year-since-opening-as-a-system-solution-on-February-7-2021> (Accessed March 17, 2022).

9 York Central Hospital, York Central Hospital Receives Approval to Build New Hospital in Vaughan, July 21, 2011, <https://www.mackenziehealth.ca/about-us/news/~50-York-Central-Hospital-Receives-Approval-to-Build-New-Hospital-in-Vaughan> (Accessed March 17, 2022).



Cortellucci Vaughan Hospital opened on February 7, 2021 to alleviate hospital capacity pressures caused by the COVID-19 pandemic in Ontario. It opened for full service on June 6, 2021.

Background and Rationale

In July 2011, the Ontario Ministry of Health and Long-Term Care provided Mackenzie Health (formerly known as York Central Hospital) with official approval to build a new hospital in Vaughan,⁹ in recognition of the urgent need for closer-to-home access to health care for the residents of western York Region including Vaughan, Richmond Hill and King. With more than 550,000 residents, the region's population is expected to grow by more than 35 per cent over the next 20 years. The seniors' population is growing at three times the rate of the average population and is expected to comprise 21 per cent of the population by 2031.

Vaughan was also the fastest growing city and the largest city in Canada without its own hospital.

Between 2012 and 2015, more than 4,000 people participated in live and online community consultations contributing to the development of the hospital's vision. More than 60 community groups were also consulted, including seniors' organizations, service clubs, cultural and religious groups, and community advisory councils.

The hospital is the second in the portfolio of Mackenzie Health, a public hospital organization under the *Ontario Public Hospitals Act*, which also operates Mackenzie Richmond Hill Hospital.¹⁰ When determining services to be provided at the new facility, Mackenzie Health considered the following criteria:

- Limited duplication of services
- A high level of distinction between the two sites
- Increased clinical efficiency
- Reduced bed numbers
- Volume projections based on MOHLTC-approved methodology and evidence-based criteria
- Clinical service plans in 14 clinical areas to inform functional programming, and
- An evolution and growth strategy to further evolve the service model in order to optimize quality, efficiency and accessibility

Cortellucci Vaughan Hospital is now home to a full-service emergency department, specialized programs and core services such as surgery, medicine and critical care. It is also the new home of Mackenzie Health's Woman and Child and Inpatient Mental Health programs and the Sorbara Integrated Stroke Unit.

¹⁰ Mackenzie Health, About Mackenzie Health <https://www.mackenziehealth.ca/about-us/cortellucci-vaughan-hospital> (Accessed February 15, 2022).

Description of the Project

Planning Principles

To guide the planning and decision-making process, the Mackenzie Health team established the following planning principles:

- Deliver the project on-time and on-budget
- Provide equitable access to state-of-the-art health-care services
- Support change through flexible facility design
- Achieve excellence in sustainable "green" design
- Apply technology to optimize patient, staff and physician experience
- Optimize the patient and family experience through the eyes of the patient
- Organize services around optimal and efficient delivery of quality patient care
- Standardize and apply leading practices where possible
- Design an environment congruent with Mackenzie Health core values
- Integrated delivery of care across sites
- Safety and wellness of patients, staff, physicians and volunteers is paramount
- Enable integration of innovation and education

The hospital was built on a greenfield site at Major Mackenzie Drive and Jane Street in Vaughan, across the street from Canada's Wonderland and approximately 10 kilometres west of Mackenzie Health's existing Mackenzie Richmond Hill Hospital. The 11-storey tower with five-storey podium and a lower-level features:

- A state-of-the-art emergency department
- Modern surgical services and operating rooms
- Advanced diagnostic imaging
- Specialized ambulatory clinics and intensive care beds
- Up to 350 beds with a capacity to expand to up to approximately 550 beds using two full floors of shell spacing, as well as miscellaneous soft and shelled spaces throughout the facility, and
- Approximately 90 per cent single occupancy acute-care patient rooms for infection prevention and control

Measuring 1.2 million square feet (including the central utility plant and mechanical & electrical floor), the hospital is also the first in

Canada with fully integrated smart technology. The systems (such as heating, cooling, lighting, IT) and medical devices can speak directly to one another, speeding up the sharing of information on patients and vital hospital systems with health-care providers, as well as the maintenance provider.

The facility was designed and built to achieve excellence in sustainable, green design with low overall energy use, water conservation, green roofs and construction waste diversion. In 2021, Cortellucci Vaughan Hospital was awarded LEED silver certification.¹¹



Design

Smart Hospital Vision

A Smart Hospital Design is an all-encompassing initiative that covers every aspect of the health-care environment, including facility design, building systems and operations, clinical systems and technology infrastructure.

The focus is to provide a facility that provides everyone, including caregivers, patients, family members and operational staff, with the tools and information to fully meet their needs, at the time that is most efficient and through a method that is most effective.

Hospitals employ some of the most sophisticated technologies and systems available. But historically these systems have been implemented using a fragmented and disconnected approach, which isolates systems leading to limited functionality, duplication, inefficiency and an overall disconnected architecture.

In the last decade, there have been exponential advancements in both process and supporting technologies for hospitals. Prior to its involvement in Cortellucci Vaughan Hospital, Plenary Health designed, delivered and configured all ICAT (Information, Communication, Automation and Technology) deliverables for Humber River Hospital, one of Canada's most technologically advanced health-care facilities when it opened in 2015.

Key consortium members also had previous experience delivering a somewhat lighter version of such scope on both the Peel Memorial Centre and Milton District Hospital projects in Ontario. Plenary Health was able to bring this experience to the table, ensuring Cortellucci Vaughan Hospital benefited from both the challenges and successes experienced in similar projects.

¹¹ Mackenzie Health Insider, 12 milestones of 2021, December 16, 2021 <https://www.mackenziehealth.ca/about-us/news/~289-Mackenzie-Health-Insider-12-milestones-of-2021> (Accessed March 17, 2021).

At Cortellucci Vaughan Hospital, the Plenary Health team installed a high-performance network to host all hospital data and deliver fast data transmission. The network includes more than 23,000 data outlets and distributed antenna systems, providing versatile connectivity for a range of equipment, and enabling wireless communication to emergency services.

As part of a real-time locating system (RTLS), Mackenzie Health integrated infrared sensors into staff badges and dome light indicators outside of patient rooms. RTLS is also used to track medical samples, pharmaceuticals, other miscellaneous assets, and high-risk patients, which helps provide quality patient care, improve safety and reduce costly workflow inefficiencies.

Mackenzie Health's state-of-the-art information technology first piloted at Mackenzie Richmond Hill Hospital and introduced at Cortellucci Vaughan Hospital led to the organization winning IT World Canada's 2021 Digital Transformation Award in the Large Public Sector division,¹² setting the stage for future smart hospitals worldwide.

This network infrastructure enables Mackenzie Health's first-in-Canada Epic electronic health record (EHR) system and incorporated innovation units to create a digital health-care experience. The EHR system, allows patients digital access to their personal health records and allows for seamless connectivity between Mackenzie Health's sites.

Mackenzie Health has two data centres — one at each hospital site — connected by a fibre-optic cable along Major Mackenzie Drive. This is a first in Ontario. In the event of an outage at one site, a backup is available at the other site ensuring minimal downtime. This means nurses and physicians are able to provide continuous care to patients without interruption.

Infection Control

As a result of lessons learned from outbreaks such as SARS, and in conjunction with clinical best practices, infection prevention and control (IPAC) was a top priority for the new hospital, with IPAC features carefully incorporated into its design and build from the start. This included the design of designated pandemic zones within the emergency department, critical care and patient units.

¹² IT World Canada. Innovation leaders lauded at Digital Transformation Awards, July 14, 2021. <https://www.itworldcanada.com/article/innovation-leaders-lauded-at-digital-transformation-awards/455741> (Accessed May 5, 2022).

The IPAC features enabled the hospital to be prepared for all possible future pandemic situations — even though no one anticipated in 2016 when they broke ground on the project that they would be opening a hospital in the midst of a pandemic.

The hospital was designed with 90 per cent single occupancy acute care patient rooms and at the time of publication in the fall of 2022 had 36 airborne isolation rooms. Isolation rooms and pandemic zones are airtight, with negative air pressure to prevent airborne diseases and contaminated air from escaping the room through specialized filtration systems.

Extensive commissioning is required to ensure these rooms achieve the pressures required. Along with the typical temperature and humidity level monitoring that occurs in other clinical spaces in the hospital, the pressure readings from these isolation rooms are integrated into the Building Automation System (BAS) for 24/7 monitoring and maintenance. These systems ensure exhaust air is rerouted promptly and fresh air is pumped in several times each hour. High-efficiency particulate air is filtered before being released into the atmosphere to ensure airborne viruses are properly contained.

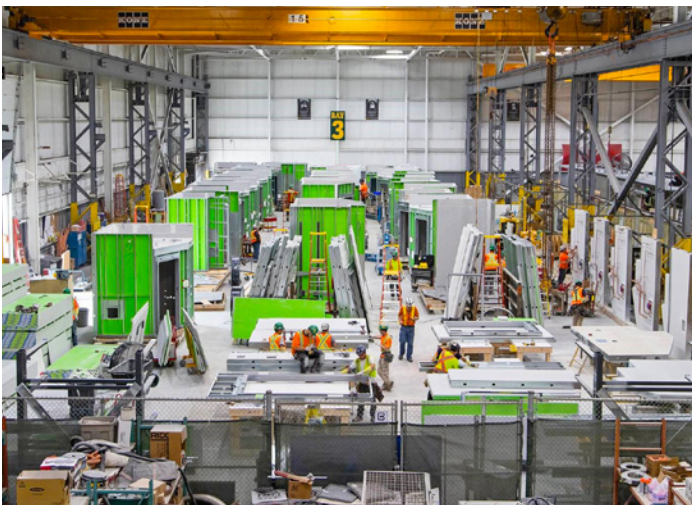
The availability of these rooms was a critical component in the Ontario government's request and Mackenzie Health's acceptance to temporarily transition the hospital into a systemwide resource supporting the province's COVID-19 response.



Construction Innovations

Smart sensors

During construction, the Plenary Health team needed a way to quickly respond to drastic winter temperature changes if one of the hospital's 52 temporary construction heaters stopped working. PCL placed 100 of its in-house IoT (Internet of Things) smart sensors in key areas where low or high temperatures had the potential to cause damage, such as during concrete placement. The sensors alerted the team if temperatures went outside of the specified range, ensuring conditions were always exactly as required.



PCL manufactured 290 modular washroom pods for Cortellucci Vaughan Hospital off-site in a factory located in Etobicoke, ON.

Modular construction

Running critical work activities in parallel with on-site construction was crucial to maintaining the project schedule while reducing site congestion. In its RFP submission for the project, Plenary Health offered to use an innovative solution: modular construction components to accelerate the master schedule.

PCL manufactured 290 modular washroom pods varying in size from 27.4 metres (90 feet) to 30.5m (100 sq. feet) and weighing approximately 2268 kilograms (5,000 pounds) each. Specific types of pods were built — woman and child, mental health, and medical surgical — with 10 variations to ensure ease of installation and integration with the hospital layout.

The pods were 95 per cent complete upon delivery and were preassembled with flooring, wall protection, major accessories, mechanical and electrical rough-ins and millwork. Modular washroom fabrication, including material fabrication, occurred off-site in Etobicoke, ON, and took approximately 20 weeks to complete; pods were then shipped to the hospital construction site in stages.

The use of modular construction enhanced schedule and quality. It also reduced pressures on schedule coordination, workforce safety, loading and quality reviews, allowing for a better end-product, delivered in less time. Based on the success of modular construction used at Cortellucci Vaughan Hospital, Plenary Health is reviewing the inclusion of this construction methodology on future projects where applicable.



A crane lifts one of the modular washroom pods while another waits to be unloaded. The pods were 95 per cent complete upon delivery to the hospital site.

Prioritizing worker safety

Sending every worker home safely at the end of each day should always be the highest priority on infrastructure projects. The pandemic only heightened this imperative.

In March 2020, as businesses, schools and other public facilities went into lockdown across Ontario, PCL implemented enhanced safety measures on site and followed all health and safety protocols in alignment with government guidelines. Sanitizing stations were deployed, social distancing was enforced, and masks were required on site.

Thinking a step further, a program was developed to conduct pre-screenings before workers entered the site. With more than 900

workers during the peak of construction, PCL delivered the project without a COVID-19 outbreak on site while achieving an industry leading safety record, surpassing three million worker hours without a lost-time injury.¹³

Communication between partners (both private and public) was key to PCL's success in navigating ongoing changes to government pandemic health and safety regulations. As COVID-19 spread, and new regulations and guidelines were issued by the government and relevant public health authorities, PCL regularly updated its health and safety policies and on-site practices for screening, personal hygiene, personal protective equipment (PPE), physical distancing, and cleaning practices to reduce the possibility of transmission.

In tandem, PCL also promptly informed Plenary Health and Mackenzie Health of any potential impacts on project costs or schedule from these measures (such as reduced workforce, travel restrictions, manufacturing and shipping delays, work inefficiencies due to social distancing), referencing Project Agreement mechanisms as appropriate. The company also complied with Mackenzie Health COVID-related requirements, which were even more stringent than the provincial measures. PCL provided mitigation strategies for issues in order to maintain the substantial completion date of August 26, 2020.

Pivoting to a COVID-19 resource

In early 2021, as Mackenzie Health prepared to open the doors to Cortellucci Vaughan Hospital, it was asked to transition the hospital temporarily into a systemwide resource supporting Ontario's COVID-19 response. The hospital opened on February 7, 2021, providing a total of 185 beds (35 critical care beds and 150 general medicine beds) dedicated exclusively to supporting the province's pandemic response.

The Plenary Health operations team assisted Mackenzie Health in its efforts to make this temporary transition. In addition to day-to-day maintenance activities, the operations team also provided upgrades and modifications to the hospital and the surrounding site, such as security and electrical upgrades, to prepare for this pivot.

The unusual circumstances in which the hospital opened presented numerous challenges. Safe work procedures and

precautionary measures needed to be created and implemented to accommodate trade and technician considerations to ensure the hospital continued to receive these crucial services. Lead times for critical building infrastructure were also impacted by COVID-19, particularly where cross-border resources were required. To address this challenge, Plenary Health proactively procured mission critical spare parts (such as door hardware, filters, etc.) prior to the need arising, and Mackenzie Health assisted with alleviating border restrictions where possible. Deficiency rectification work by PCL was prioritized in the departments being opened as part of the COVID-19 response. Once those departments opened on February 7, deficiency rectification work priority was shifted to other locations in the hospital to prepare for the full opening.

Procurement Process

Selecting the P3 model

The selection of a procurement approach for the project was based on an assessment of the relative benefits and value of the P3 model compared to a more traditional approach. This analysis was undertaken by Infrastructure Ontario (the procuring entity) prior to initiation of the P3 process. It was determined the value inherent in the P3 approach outweighed the traditional model and this procurement methodology was adopted. As is typical of these types of projects, the project is open to an independent, third-party review by the Auditor General's office.

Selecting a partner

The procurement process for the project had two stages: Request for Qualifications (RFQ) and Request for Proposals (RFP). It took two years and seven months to complete the process from RFQ to financial close.

Request for Qualifications

An RFQ was issued by Infrastructure Ontario on March 7, 2014. Almost six weeks later, IO received statements of qualifications from three teams. Following evaluation of the submissions, the three teams were shortlisted: Hospital Infrastructure Partners; Mackenzie Vaughan Health Partnership; and Plenary Health.

¹³ Interview with PCL.

Table 1: Qualifying teams¹⁴

Hospital Infrastructure Partners	Mackenzie Vaughan Health Partnership	Plenary Health
Fengate Capital Management Ltd.	Innisfree Limited	Plenary Group (Canada) Ltd.
EllisDon Capital Inc.	HOCHTIEFF PPP Solutions North America Inc.	Stantec Architecture Ltd., RTKL
Carillion Canada Inc.	Bondfield Construction Company Ltd.	PCL Constructors
Adamson Architects	HDR Architecture Associates, Inc.	Johnson Controls Canada LP
Parkin Architects	Canadian Turner Construction Company	RBC Capital Markets
CIBC Capital Markets	Honeywell Limited	
	BMO Capital Markets	

Request for Proposals

The RFP was issued on June 29, 2015.¹⁵ Proponents were given 10 months to prepare high-quality, competitive proposals which were to include technical and financial submissions. The RFP period closed on April 21, 2016.

Two proponents submitted bids on time: Hospital Infrastructure Partners and Plenary Health. The third shortlisted team, Mackenzie Vaughan Health Partnership, withdrew from the RFP process.

From April to August 2016, the bid submissions were evaluated using criteria set out in the RFP. The evaluation committee was comprised of subject matter experts from IO, Mackenzie Health and technical consultants enlisted by the public sector partners.

Preferred Proponent

On August 29, 2016, IO and Mackenzie Health selected Plenary Health as the preferred proponent. Plenary Health best demonstrated the ability to meet the specifications outlined in the RFP, including technical requirements, construction schedule, price and financial backing.

Commercial and Financial Close

Commercial and financial close were achieved on October 25, 2016, and IO and Mackenzie Health awarded a fixed-price contract to Plenary Health to design, build, finance and maintain the new hospital.

Construction Phase

Construction began with a groundbreaking event in October 2016.

Maintenance Phase

The maintenance phase began at substantial completion (August 26, 2020) and Cortellucci Vaughan Hospital became operational in February 2021. Plenary Health is providing maintenance and life cycle services for a 30-year period.

Fairness of the process

SEG Management Consultant Inc. was engaged by Infrastructure Ontario to act as the fairness monitor for the project. It reviewed and monitored the communications, evaluations and decision-making process, ensuring the fairness, equity, objectivity, transparency and adequate documentation for the procurement process. In its report, SEG Management Consulting Inc. certified that these principles were maintained throughout the RFQ and RFP stages.¹⁶

¹⁴ Infrastructure Ontario, Companies Shortlisted for Mackenzie Vaughan Hospital Project, September 30, 2014. <https://www.infrastructureontario.ca/Media-Release-Shortlisted-Bidders-Mackenzie-Vaughan-Hospital/> (Accessed February 15, 2022)

¹⁵ Queen's Printer for Ontario, Infrastructure Ontario and Mackenzie Health Alternative Financing and Procurement for the Mackenzie Vaughan Hospital Project Request for Proposals RFP NO. 14-124P file:///C:/Users/Owner/AppData/Local/Temp/Mackenzie-Vaughan-Hospital%20-%20RFP.pdf (Accessed on February 15, 2022).

¹⁶ Infrastructure Ontario, Value-for-Money Assessment, Mackenzie Vaughan Hospital Project. October 2016, page 17 <https://www.infrastructureontario.ca/WorkArea/DownloadAsset.aspx?id=36507222259> (Accessed February 4, 2022)

“The evaluation process and criteria described in the RFP were applied consistently and equitably ... We certify that the principles of openness, fairness, consistency and transparency have been, in our opinion, properly established and maintained throughout the procurement process. Furthermore, we were not made aware of any issues that emerged during the process that would impair the fairness of this initiative.”

Table 3: Project timeline

<p>October 2009</p> <p>Government of Ontario designates Mackenzie Health (formerly known as York Central Hospital) to plan, build and operate the future Mackenzie Vaughan Hospital¹⁸</p>	<p>October 5, 2012</p> <p>The City of Vaughan and Mackenzie Health sign Cooperation Agreement to further work together in developing the new hospital site²¹</p>
<p>April 2011</p> <p>Mackenzie Health submits Stage One proposal to the Ministry of Health and Long-Term Care for a new hospital¹⁹</p>	<p>March 2013</p> <p>Mackenzie Health submits Stage 2 plan to the Government of Ontario, a full month ahead of schedule²²</p>
<p>July 2011</p> <p>Government of Ontario announces its support for the hospital's construction as part of Building Together, a multi-year infrastructure investment plan</p>	<p>May 15, 2013</p> <p>Mackenzie Health and Infrastructure Ontario sign memorandum of understanding, beginning the transaction phase for the project²³</p>
<p>February 2012</p> <p>Government of Ontario grants approval for Mackenzie Health to proceed to Stage Two of planning²⁰</p>	<p>October 9, 2013</p> <p>Zeidler Partnership Architects selected to lead the planning, design and compliance aspects of the project²⁴</p>
	<p>March 7, 2014</p> <p>RFQ issued</p>
	<p>April 17, 2014</p> <p>RFQ closed</p>

18 Mackenzie Health, Mackenzie Health Reaches Another Key Milestone in Vaughan Hospital Planning, May 15, 2013 <https://www.mackenziehealth.ca/about-us/news/~85-Mackenzie-Health-Reaches-Another-Key-Milestone-in-Vaughan-Hospital-Planning> (Accessed on February 15, 2022).

19 Mackenzie Health, Mackenzie Health's New Vaughan Hospital Project, April 10, 2013 <https://www.mackenziehealth.ca/about-us/news/~80-Mackenzie-Health-s-New-Vaughan-Hospital-Project> (Accessed on February 15, 2022).

20 Mackenzie Health, Vaughan Hospital Approved for Next Stage of Planning, February 3, 2012, <https://www.mackenziehealth.ca/about-us/news/~54-Vaughan-Hospital-Approved-for-Next-Stage-of-Planning> (Accessed March 17, 2022).

21 Mackenzie Health, City of Vaughan and Mackenzie Health Cooperation Agreement, October 5, 2012 <https://www.mackenziehealth.ca/about-us/news/~66-City-of-Vaughan-and-Mackenzie-Health-Cooperation-Agreement> (Accessed on February 15, 2022).

22 Mackenzie Health, Planning, Design and Compliance Team Selected for New Mackenzie Vaughan Hospital, October 9, 2013 <https://www.mackenziehealth.ca/about-us/news/~95-Planning-Design-and-Compliance-Team-Selected-for-New-Mackenzie-Vaughan-Hospital> (Accessed March 17, 2022).

23 Mackenzie Health, Mackenzie Health Reaches Another Key Milestone in Vaughan Hospital Planning, May 15, 2013 <https://www.mackenziehealth.ca/about-us/news/~85-Mackenzie-Health-Reaches-Another-Key-Milestone-in-Vaughan-Hospital-Planning> (Accessed on February 15, 2022).

24 Mackenzie Health, Planning, Design and Compliance Team Selected for New Mackenzie Vaughan Hospital, October 9, 2013 <https://www.mackenziehealth.ca/about-us/news/~95-Planning-Design-and-Compliance-Team-Selected-for-New-Mackenzie-Vaughan-Hospital> (Accessed on February 15, 2022).

<p>July 8, 2014</p> <p>Ground breaking/early work preparation starts on site by City of Vaughan (construction of road, stormwater, water and wastewater servicing needs for the 33-hectare site)²⁵</p>	<p>May 3, 2018</p> <p>100% CD Submission</p>
<p>September 30, 2014</p> <p>Three qualifying teams announced</p>	<p>June 25, 2020</p> <p>Occupancy Achieved</p>
<p>June 29, 2015</p> <p>RFP issued</p>	<p>August 26, 2020</p> <p>Substantial completion and start of maintenance services</p>
<p>April 21, 2016</p> <p>RFP closed</p>	<p>February 7, 2021</p> <p>Operational to support the provincial COVID-19 pandemic response</p>
<p>August 29, 2016</p> <p>Preferred proponent selected</p>	<p>June 6, 2021</p> <p>Operational as full-service community hospital</p>
<p>October 25, 2016</p> <p>Commercial & financial close / construction starts</p>	<p>October 21, 2021</p> <p>Cortellucci Vaughan Hospital awarded LEED silver certification</p>
<p>August 10, 2017</p> <p>100% DD Submission</p>	<p>July 17, 2050</p> <p>Expiry Date (Hand back/End of P3 agreement)</p>



25 Mackenzie Health, Early Work Preparation to Begin on Site of New Mackenzie Vaughan Hospital, July 8, 2014, <https://www.mackenziehealth.ca/about-us/news/~225-Early-Work-Preparation-to-Begin-on-Site-of-New-Mackenzie-Vaughan-Hospital> (Accessed March 17, 2022).

Overall Structure of the Agreement

Partner roles and responsibilities

Plenary Health Vaughan LP was incorporated as a special purpose vehicle (SPV) to enter into the project agreement with Mackenzie Health. Plenary Health's financing team members include Plenary Americas as sole developer, majority (80 per cent) equity sponsor and financial advisor; and PCL Investments Canada Inc. as minority (20 per cent) equity sponsor together with TDSI, ATB and TD Bank as underwriters/lenders.

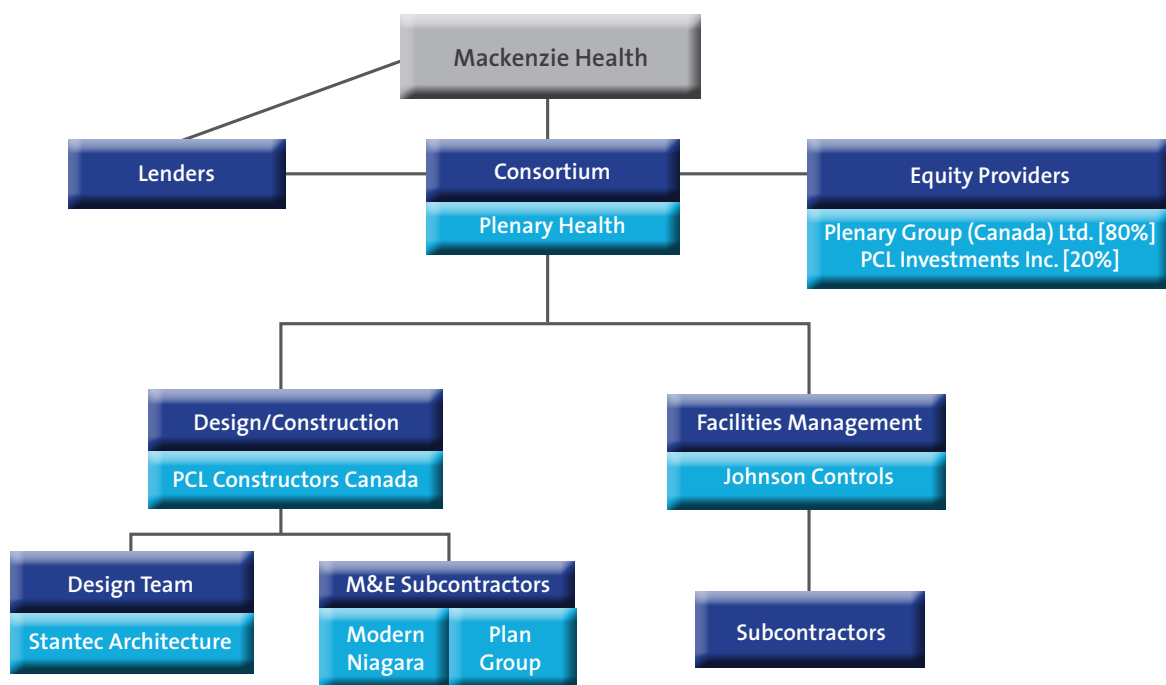
To provide the strongest partnership approach possible for this critical social infrastructure, Plenary Health brought together a first-class team of partners with extensive experience working together on various health-care projects across Ontario and Canada. The Plenary Health consortium is comprised of Plenary Americas (Plenary), PCL Constructors Canada Inc. (PCL) and Johnson Controls Canada LP (JCI). Together with its consortium members (PCL and JCI), Plenary was able to bring lessons learned from similar projects and best-in-class partners with the skills and proven experience

to effectively deliver under the DBFM delivery model and meet Mackenzie Health's vision for Cortellucci Vaughan Hospital.

The construction contract (Design-Build Agreement) was executed entirely by the design-builder, PCL. The maintenance and operations contract (Facilities Maintenance and Services Agreement) is being performed by the service provider, JCI. In addition to their contractual relationship with Plenary Health, the construction contractor and service provider have both entered an interface agreement (Facilities Coordination Agreement) to integrate all parties and ensure the private sector interest and decisions will be based on the interests of the project as a whole. This structure helps with timely decision making, early identification of critical issues and a smooth transition between construction and operations.

The relationship between lenders and Plenary Health were established through the execution of financing documents such as the Common Terms agreement, bond purchase agreement, general security agreement, and other supplementary security documents. A direct agreement between the lenders and Mackenzie Health, and separate direct agreements between the lenders and PCL and JCI, provides further protection to the public sector and lending bodies in the event Plenary Health fails to comply with its contractual obligations.

Figure 1: Partnership structure



Financial Arrangements

The total cost of the contract between Mackenzie Health and Plenary Health is \$1 billion NPV with private financing for the project as follows:

- Long-term bond: \$278 million
- Short-term credit facility: \$150 million
- Equity: \$33 million

Milestone payments were made by the province both during construction and at the achievement of substantial completion:

- Construction period payments: \$237 million
- Substantial completion payment: 234 million

In addition to a fully underwritten bond solution, Plenary Health implemented two additional value-generating tactics to reduce the overall funding costs, essentially providing “more hospital” to Mackenzie Health at a lower net present value (NPV). These tactics were:

1. 100 per cent of the short-term debt structured as a delayed drawn floating coupon (with swaps) credit facility from Alberta Treasury Branches and TD Bank. Given prevailing rates and terms with two bank funders, Plenary and PCL Investments chose a floating short-term solution, providing efficiency to the financing through the structurally delayed tranche.
2. The implementation of monthly long-term bond payments and equity distributions over the life of the concession after substantial completion. By aligning the payments and distributions with the timing of the monthly service payments, Plenary and PCL Investments were able to reduce the overall cost of the project through a reduction in carrying costs as compared to the more typical semi-annual payment/distribution frequencies.

Lenders

The project financing structure is the result of a highly competitive process involving several reputable global financial institutions. The resulting financing structure is comprised of two debt tranches (short-term and long-term) and equity.

Short-term debt

The short-term senior credit facility of \$150 million was provided by Alberta Treasury Branches and TD Bank. The credit facility was drawn into the project as needed, which occurred between months 24 and 44 of the construction period. The delayed draw flexibility had few associated cost premiums and enabled efficient draw timing towards the back end of construction.

Long-term debt

The long-term fully amortizing bonds in the amount of \$278 million were underwritten by TD Securities Inc. (TDSI), and proceeds were immediately available at financial close. At the end of the construction period, the outstanding principal was fully amortized over the concession period, saving a six-month tail.

Equity

The equity commitment of \$33 million is provided by two partners in the following proportions:

- Plenary Americas – 80 per cent
- PCL Investments Canada Inc. – 20 per cent

Financing innovations

Plenary and TDSI introduced long-term monthly payments/distributions in contrast to the more typical semi-annual frequency, which reduced project costs by millions of dollars for Mackenzie Health. Similarly, the substantial completion payment enabled a short-term debt volume that invited innovation for short-term debt. As a result, Plenary and PCL Investments utilized a delayed draw fixed rate credit facility allowing for optimization of timing to take full advantage of the attractive pricing.

Payments

Construction period payments

This was the first project to include Infrastructure Ontario’s newly created Construction Period Payments (CPPs).²⁶ These payments begin once private capital invested in the project exceeds 50 per cent of the total funding requirement during the construction period. Plenary Health received CPPs between months 29 and 45 that were used to cover construction period costs. This source of funds, combined with the substantial completion payment, covered 60 per cent of the total funding requirement for the project.

26 CPPs were added to help lower the overall financing cost of the project, without compromising overall risk transfer. CPPs were sized to ensure there was still an adequate level of private sector capital in the project to main risk transfer. (Interview with Infrastructure Ontario in April 2022).

Substantial completion payment

Plenary Health also received a lump sum payment from Mackenzie Health at substantial completion in the amount of \$234 million. Mackenzie Health's substantial completion payment was used to repay the credit facility and cover other costs incurred in the final month of the construction period.

This payment is followed by monthly service payments over a 30-year period for building maintenance, life cycle repair and renewal and project financing. If Plenary Health does not meet the performance requirements established in the project agreement, it will face financial deductions.

Availability stream

Annual service payments from Mackenzie Health are projected to total \$27.5 million with a portion indexed to prevailing inflation rates.

Revenue sharing

There is no revenue sharing in the project agreement.

Responsibilities and Risk Allocation

Using a P3 procurement model provided the Government of Ontario with a greater opportunity to ensure risks were allocated to the partner best equipped to manage them. This reduced the costs attributed to risk and improved VfM of the project. Risks transferred to Plenary Health added value through private sector design and innovation.

The project agreement includes detailed risk allocation provisions over the construction period and the 30-year maintenance term. A summary is presented in Table XX.



Risk Allocation

The project agreement signed between IO, Mackenzie Health and Plenary Health defines the obligations and risks of all parties involved. Key highlights include:

Contract Price Certainty: A \$1-billion NPV fixed-price contract to design, build, finance and maintain Cortellucci Vaughan Hospital. Any extra costs incurred as a result of a schedule overrun caused by Plenary Health are not paid for by the Government of Ontario.

- **Scheduling, Project Completion and Delays:** The schedule could be modified in limited circumstances, in accordance with the terms of the project agreement. Plenary Health was obligated to mitigate impact on the project schedule as much as possible. A sizeable payment was agreed to be made by the province at substantial completion, providing further incentive for Plenary Health to complete construction on time.
- **Site Conditions and Contamination:** Plenary Health was responsible for maintaining and managing, and where required, remediating any contamination at the site. This included contamination disclosed from site condition reports or that was readily apparent/discoverable from site inspections, or that was caused by Plenary Health or any of its parties.
- **Construction Financing:** Plenary Health was required to finance the construction of the project.
- **Commission/Facility Readiness and Ongoing Maintenance/ Life cycle:** Plenary Health must meet the performance requirements as outlined in the project agreement for the maintenance and life cycle renewal of the hospital. Plenary Health will face deductions to their monthly payments if they do not meet the performance obligations during the 30-year maintenance term.
- **Asset Hand Back:** Upon expiry of the 30-year maintenance term, Plenary Health must hand back the infrastructure to the Province of Ontario in good working order within specific prescribed standards. Financial penalties can be levied if the asset condition does not meet the prescribed requirements.

Table 1: Allocation of key responsibilities and risks

Risks and Responsibilities	Mackenzie Health	Plenary Health	Shared
Permits & Approvals			
Project approvals	■		
Construction permits		■	
Site Condition/ Environmental			
Geotechnical		■	
Contamination caused by Plenary Health		■	
Utility Connection		■	
Environmental condition of site	■		
Design and Construction Work Period			
MH/Ministry initiated scope changes/delay	■		
Design & construction cost overruns (excl. supervening events)		■	
Weather (excl. supervening events)		■	
Construction delays (excl. supervening events)		■	
Traffic and safety management		■	
Design errors and omissions		■	
Resource/labour availability (excl. supervening events)		■	
Deficiencies and latent defects		■	
Force majeure			■
Change in law			■
Operational			
Ministry initiated scope changes	■		
O&M cost overruns		■	
Service delivery		■	
Force majeure			■
Change in law			■
Life cycle			
Life cycle cost overruns		■	
Meeting hand back requirements		■	
Latent defects in existing infrastructure	N/A (Greenfield Construction)		

Benefits

Cost Savings/Value-for-Money

Infrastructure Ontario completed a Value-for-Money (VfM) assessment for the project in 2016, comparing the estimated total risk-adjusted project costs of delivering the project using two different delivery models: the design-bid-build model traditionally used by public sector entities, and the P3 model, which for this project was a design-build-finance-maintain (DBFM) model.

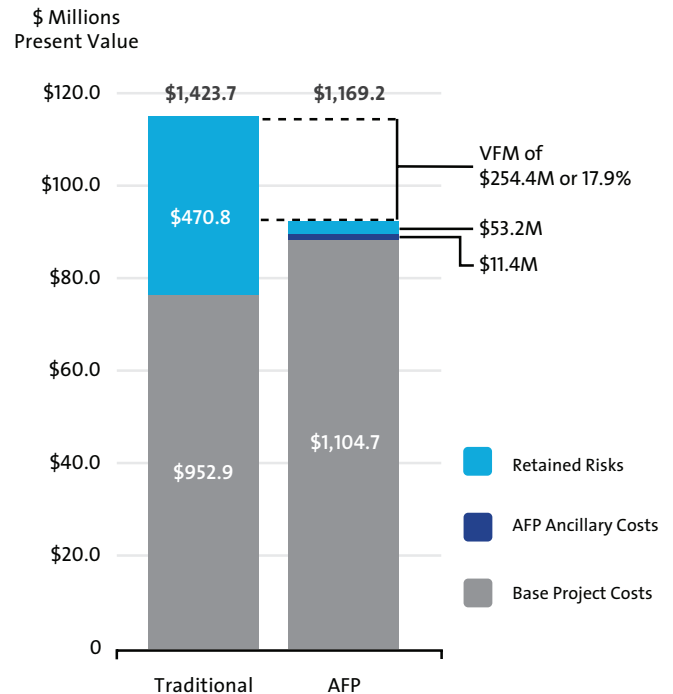
The DBFM model involves the private sector consortium accepting responsibility for the design, construction, financing, regular maintenance and rehabilitation of the asset over the contract term to meet pre-defined performance specifications. The public sector retains ownership of the assets. Key benefits of a DBFM model include significant risk transfer to the private sector over the life of the project agreement, greater cost and schedule certainty, greater potential for design and construction efficiencies and innovation and higher maintenance quality encouraged through performance-based service payments over the 30-year term. IO commonly uses this model when appropriate for hospitals, justice facilities such as courthouses, and transportation projects.

The VfM assessment completed for Cortellucci Vaughan Hospital indicated an estimated cost savings of \$254.4 million or 17.9 per cent (in present value terms) by using the P3 approach when compared to traditional delivery.²⁷



²⁷ The VfM assessment methodology is outlined in Assessing Value-for-Money – An Updated Guide to Infrastructure Ontario's Methodology, which can be found at www.infrastructureontario.ca

Figure 2: Value-for-Money (VfM)



Community socio-economic benefits

Cortellucci Vaughan Hospital is a state-of-the-art facility, designed through the eyes of the patient, connected to nature and enabled by smart technology to meet the needs of the fast-growing community of Vaughan and western York Region.

This project is a significant economic opportunity for local suppliers and contractors. At the peak of construction, there were more than 900 workers on site daily.

As of April 2022, Mackenzie Health employs 4,599 staff, 658 physicians and 350 volunteers across its two hospital sites and network of community-based locations.

Mackenzie Health continues to engage with members of the community through annual telephone town halls, online surveys and through regular communication channels including social media, website and monthly newsletters to ensure services and care meet the needs of the community.

Communications

Between the partners

During the construction phase

During the construction phase, official dialogue between partners was facilitated through a formal board structure. This body, called the Works Committee, was composed of representatives from each of the relevant parties, and was officially tasked with promoting cooperative and effective communication with respect to matters related to design, construction and commissioning.

In addition to the Works Committee, there was also a joint communications committee composed of communications representatives from Mackenzie Health, IO, Plenary and PCL that met monthly to:

- Track communications opportunities and deliverables
- Update team members on the progress of the project
- Highlight issues
- Plan for immediate/future priorities
- Identify project milestones

During the operations phase

During the operations phase, official dialogue between parties is facilitated through the Facilities Management Committee. Matters the Capitalize Facilities Management Committee is responsible for overseeing include:

- Transition from existing facilities to the new facility
- Joint reviews of Plenary Health services and output specifications
- Recommendations of the utilities management subcommittee
- Changes to service quality plans
- Performance issues
- Development and modification of performance standards for the hospital facilities management services
- Interface issues between the Plenary Health services and the hospital facilities management services
- Special matters referred to the committee by Mackenzie Health, Plenary Health or IO
- Other issues pertaining to the project operations

In addition, a joint communications committee made up of representatives from Mackenzie Health and Plenary Health meet as needed to address any communications issues or opportunities.

With the public

During design and construction

Community consultation and engagement was an integral part of the hospital's planning process. Throughout the design and construction phase, more than 4,000 people from the community participated in open public and group consultation sessions, focus groups and online consultation opportunities.

As part of its community engagement efforts, Mackenzie Health regularly provided presentations to the councils and residents of City of Vaughan, Town of Richmond Hill, Township of King and the Regional Municipality of York, to keep them apprised of Cortellucci Vaughan Hospital's interior and exterior design and its Smart Hospital Vision.

Prior to opening as a pandemic resource

Prior to opening exclusively to support the provincial pandemic response in February 2021, Mackenzie Health engaged with thousands of residents across western York Region in a telephone town hall to educate the community about the services that would be offered when the hospital initially opened. Significant proactive media outreach also resulted in multiple feature stories in mainstream newspapers and television news programs that provided further opportunities to raise public awareness.

Prior to opening as a full-service hospital

To ensure residents were aware of how services would be distributed among Mackenzie Health's two hospitals and community-based locations, it further expanded its outreach activities in the lead up to opening as a full-service community hospital in June 2021. This included an information card directly mailed to almost 170,000 households, op-eds, advertisements and public service announcements in local newspapers and radio stations, significant media outreach and engagement with government and community partners.

Dispute resolution

The parties agree to attempt to resolve all disputes through amicable negotiations. If a dispute cannot be resolved at this level, the project agreement includes a formal dispute resolution procedure.

The dispute resolution procedure is as follows:

1. **Notice:** Either party (Mackenzie Health or Plenary Health) delivers a written notice of dispute to the applicable counterparty, to initiate the formal dispute resolution procedure.
2. **Amicable Resolution by Party Representatives:** Party representatives will promptly disclose all relevant facts, information and documentation (except such documentation that is subject to legal privilege) relevant to the dispute. The representatives, with this information available, will make all reasonable bona fide efforts to resolve the dispute.
3. **Amicable Resolution by Senior Officers:** If the dispute cannot be resolved, it is escalated to senior officers from each party.
4. **Independent Certifier (Relevant to Construction Only):** If the dispute cannot be resolved, and the dispute falls within the purview of the independent certifier (IC) (disputes within IC purview are predefined in the project agreement), the dispute will be put to the IC for determination. Note that with the exception of the IC's decision to issue (or not issue) the substantial completion certificate, the IC's decision is not binding on all parties.
5. **Expert Determination:** If the dispute cannot be resolved, and it is within the purview of an expert determination (ED) (disputes within ED purview are predefined in the project agreement), the parties will either agree to an impartial expert, or request the Ontario Superior Court of Justice appoint one. The expert will then determine the appropriate process for timely and cost-effective resolution of the dispute, render their decision, and provide a summary of reasons for the decision. This decision will be binding unless arbitrated or litigated per further steps below.
6. **Adjudication:** If the dispute has not been resolved through the means listed above, and is not within the ED purview, either party can refer the dispute to an adjudicator. The parties will

either agree to an impartial adjudicator or request the Ontario Superior Court of Justice appoint one. The adjudicator shall resolve the dispute in accordance with the United Kingdom Construction Industry Council's Model Adjudication Procedure: Fourth Edition. The adjudicator's decision will be binding unless arbitrated or litigated per further steps below.

Arbitration or Litigation: If the dispute has not been resolved through the means listed above and meets specific criteria described by the project agreement, either party may require litigation or request to resolve by arbitration. Arbitration will be done in accordance with the Arbitration Act, 1991 and other specific requirements of the project agreement. Litigation shall be resolved solely by the Ontario Superior Court of Justice.

Performance Monitoring

As with most IO-procured P3 projects, there are performance-based financial deductions during the operating period with associated failure points. Failure points are awarded for every quality failure, service failure, system failure and availability failure that occurs during the operational term. The number of failure points allocated to each category of event is standard for P3 projects in Ontario.

Lessons Learned

Alignment of leadership teams

Due to the pandemic, and at the request of the Government of Ontario, the hospital pivoted its opening plans to provide relief and overflow support to the province's overstressed health-care system. Critical to this pivot was the alignment of the leadership team (from Mackenzie Health, Plenary, JCI and PCL) and their collective desire to speak openly and frankly, and to support each other in finding solutions to issues as they arose. This culture and mindset were adopted early in the project and continues, setting the foundation for a collaborative relationship going forward.

Service provider involvement in design and construction

Plenary Health sees immense value, both from a cost and functionality standpoint, in the immediate involvement of the service provider in the design and construction process. JCI, as the service provider, was represented at design meetings where its input contributed to a lean and efficient building design with respect to both construction and facility management (FM) considerations. This involvement and input continued throughout the construction phase. The experience has proven that active involvement of the service provider helps to streamline review processes and transition coordination in the leadup to substantial completion.

On Cortellucci Vaughan Hospital, the service provider's involvement in construction and design was particularly efficient as the consortium partners had extensive experience working together on various health-care facilities across Ontario and Canada. So, in addition to providing valuable input as design and construction issues arose, the service provider was able to proactively raise FM concerns based on lessons learned from previous projects with this team.



Opening day patient transfer.

Concluding Comments

Every project has a vision and its own unique challenges and solutions, but Cortellucci Vaughan Hospital stands out as a unique testament to the power of collaboration and resilience.

From design development, to topping off and commissioning, the project team hit important milestones and achieved substantial completion on this anticipated project in August 2020, right in the middle of the COVID-19 pandemic.

As Mackenzie Health prepared to open the doors to Cortellucci Vaughan Hospital, it was asked to adjust its plans to temporarily transition the hospital into a systemwide resource supporting Ontario's COVID-19 response. The hospital opened on February 7, 2021, providing up to 185 beds (35 critical care beds and 150 general medicine beds) dedicated exclusively to supporting the province's pandemic response.

Once the province started to see a decline in COVID-19 cases in hospitals, along with the ramp-up in the rollout of vaccines, Mackenzie Health and the province decided it was time to open Cortellucci Vaughan Hospital as originally planned.

On June 6, 2021, the facility opened as a full-service community hospital, including emergency and modern surgical services, advanced diagnostic imaging capabilities, intensive care beds, birthing, pediatrics and mental health services, as well as the York Region District Stroke Centre.

Mackenzie Health and Plenary Health leadership teams continue to build the groundwork for a successful long-term partnership — the cornerstone of any exceptional P3 project.

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Appendix: CCPPP's National Award Case Studies 1998-2021

Defence

Communications Security Establishment Canada Long-Term Accommodation Project (2011)

Education

Quad at York University, Ontario (2018)
Saskatchewan Joint Use School Projects (2015)
Alberta School Alternative Procurement – Phase 1 (ASAP I), Alberta (2010)
O'Connell Drive Elementary School, Nova Scotia (1998)

Energy

Energy Services Acquisition Program (ESAP)/Energy Service Modernization (ESM) Project, Ottawa-Gatineau (2020)
Fort McMurray West 500-kV Transmission Project, Alberta (2018)
John Hart Generating Station Replacement Project, B.C. (2014)
Britannia Landfill Gas to Electricity Project, Ontario (2005)
Vancouver Landfill Gas Cogeneration Project, B.C. (2003)
Bruce Nuclear Power Facility, Ontario (2000)
Waterloo Landfill Gas Power Project, Ontario (2000)

Government Services

Archives of Ontario – Offsite Archival Storage (2006)
Cook Chill Food Production Centre, Ontario (2005)
DriveTest: Ontario Driver Examination Services (2004)
Transforming the Delivery of Ontario's Social Assistance System (2003)
Emergency Service Mobile Communications in Ontario (2000)
Electronic Child Health Network, Toronto, Ontario (1999)
Teranet, Ontario (1998)

Health

Cortellucci Vaughan Hospital, Ontario (2021)
New Oakville Trafalgar Memorial Hospital, Ontario (2016)
Humber River Hospital, Ontario (2015)
BC Cancer Agency Centre for the North and Fort St. John Hospital & Residential Care Project, B.C. (2012)
Centre Hospitalier de l'Université de Montréal Project (2012)
Glen Campus – McGill University Health Centre, Quebec (2010)
Women's College Hospital Redevelopment Project, Ontario (2010)
Royal Jubilee Hospital Patient Care Centre, B.C. (2009)
VIHA Residential Care and Assisted Living Capacity Initiative, B.C. (2007)
Abbotsford Regional Hospital and Cancer Centre, B.C. (2008, 2005)
Facility Management for the Royal Ottawa Health Care Group, Ontario (2000)
Devonshire Care Centre, Alberta (2000)
Shaikh Khalifa Medical Centre, United Arab Emirates (2000)

IT Infrastructure

Connecting Small Schools in Newfoundland (2003)

Justice & Corrections

Forensic Services and Coroner's Complex, Ontario (2016)
Okanagan Correctional Centre, British Columbia (2015)
Elgin County Courthouse, Ontario (2014)
Ontario Provincial Police Modernization Project (2013)
Surrey Pretrial Services Centre Expansion, B.C. (2011)
Durham Consolidated Courthouse, Ontario (2007)
Central North Correctional Centre, Ontario (2002)
Five Corners Project, B.C. (2002)

Real Estate

Aurora College Family Student Housing, Northwest Territories (1999)
Legislative Chamber, Offices and Housing, Nunavut (1999)

Recreation & Culture

L'Adresse symphonique, Quebec (2011)
SHOAL Centre: Seniors Recreation Centre, B.C. (2004)
John Labatt Centre, London, Ontario (2002)
Skyreach Place, B.C. (2000)

Social Housing

Single Room Occupancy Renewal Initiative Project, B.C. (2013)

Transportation

L.F. Wade International Airport Redevelopment Project, Bermuda (2021)
Valley Line West LRT, Alberta (2021)
Waterloo LRT ION Stage 1, Ontario (2020)
Regina Bypass, Saskatchewan (2020)
Gordie Howe International Bridge Project (2019)
Tłı̨chǫ All-Season Road Project
North Commuter Parkway & Traffic Bridge Replacement, Sask. (2018)
Iqaluit International Airport, Nunavut (2017)
Southwest Calgary Ring Road, Alberta (2016)
Disraeli Freeway and Bridges Project, Winnipeg, Manitoba (2012)
Canada Line, B.C. (2009)
Confederation Bridge, PEI (2009)
Highway 407 ETR, Ontario (2008 & 1999)
Autoroute 30, Montreal, Quebec (2008)
Northwest Anthony Henday Drive, Alberta (2008)
William R. Bennett Bridge, B.C. (2008)
Autoroute 25, Montreal, Quebec (2007)
Kicking Horse Canyon Project – Phase 2, B.C. (2007)
Golden Ears Bridge, B.C. (2006)
Anthony Henday Drive Southeast Leg Ring Road, Alberta (2005)
Sea-to-Sky Highway Improvement Project, B.C. (2005)
Sierra Yoyo Desan Resource Road, B.C. (2004)
Fredericton-Moncton Highway Project, New Brunswick (2003)
Belledune Port Authority, New Brunswick (2000)
Retendering Alberta's Highway Maintenance Contracts (2000)
Cobequid Pass Toll Highway, Nova Scotia (1998)

Water, Wastewater & Biosolids

Calgary Composting Facility, Alberta (2017)
City of Saint John Safe Clean Drinking Water Project, New Brunswick (2017)
Regina Wastewater Treatment Plant Upgrade Project, Saskatchewan (2014)
Biosolids Management Facility, Sudbury, Ontario (2013)
Britannia Mine Water Treatment Plant, B.C. (2006)
Goderich Water and Sewer Services, Ontario (2000)
Port Hardy Treatment Project, B.C. (2000)

These case studies can be obtained through CCPPP's website at www.pppcouncil.ca

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