Source: Mott MacDonald

BUILT ENVIRONMENT CASE STUDY: CANADA

Milton District Hospital Expansion

Location
Milton, Ontario, Canada

Owner
Halton Healthcare

Private Partner
Plenary Health Milton LP (Plenary Group (Canada) Ltd, PCL Constructors Canada Inc.)

PPP Model
Design-build-finance-maintenance (DBFM)

Operating Term
30 years

Contract Value
CAD 512 million/USD 380 million[1]

Asset Class
Built Environment (Healthcare Facility/Hospital)

Awards

- 2018 Silver Infrastructure Awarded by the Canadian Council for Public Private Partnerships for its value for money, design, technological innovation and the role the hospital is expected to play in empowering medical excellence

The project by Halton Healthcare/Infrastructure Ontario was to expand the Milton District Hospital to keep pace with the unprecedent growth of Milton, Ontario, one of the fastest growing municipalities in North America. The hospital opened to the public in the fall of 2017. Infrastructure Ontario is the provincial procurement agency in Ontario, and Halton Healthcare is a multi-site healthcare organisation that operates three community hospitals, with the Milton District Hospital Expansion being their second PPP (P3) facility procured with the design-build-finance-maintain (DBFM) model.

1 Assumed conversion rate of CAD/USD = 1.35 as at May 15, 2019.

- The Milton District Hospital redevelopment project was intended to increase services most in demand including emergency, surgical, critical care, maternal newborn and diagnostic imaging. The project also includes increasing the overall capacity from 63 to 129 inpatient beds, with 80% single-patient rooms.
- The construction took place on a brownfield site and fully functional hospital site without disruption to essential and life-saving clinical services.
- Substantial Completion was reached on time and Final Completion was achieved seven months after Substantial Completion.
- The Private Partner is responsible for the provision of Facilities Management and Lifecycle Replacement for the duration of the 30-year operating period.
- The Project achieved the LEED New Construction (NC) Gold certification, a globally recognised sustainable accomplishment. The project has exceeded the contractual requirement of LEED NC Silver certification.

Output Specifications Development Approach Used

- The design and construction specifications are consistent with Infrastructure Ontario standard specifications. They were tailored for the project by drawing on lessons learned from previous healthcare projects.
- The Private Partner is required to work collaboratively with the Owner – during both construction and operations – to ensure seamless integration of infrastructure and systems. The output specifications clarify the delineation of responsibility for maintenance and lifecycle of the existing systems and the interfaces to the new systems.
- The IT, access control and security systems for the new facility also require full integration and interoperability between all three of the Owner's hospitals, which was translated into prescriptive requirements in the output specifications.
- **Lean design:** The project is intended to apply "lean" thinking and methods to maximise customer value while minimising waste. The overarching principle is to enhance clinical workflow, promote the efficient use of staff resources and improve the patient experience. As such, the design for the facility must demonstrate travel distance efficiency, separation of flows, line of sight, standardisation and process mapping.
- **Evidence-Based design (EBD) parameters:** Defined by the Centre for Health Design, EBD is the process of basing decisions about the built environment on credible research to achieve the best possible outcomes. The Private Partner must demonstrate the quality of their design for the facility through EBD parameters of natural light, view of nature and surroundings of the hospital (including requirements such "*generously proportioned exterior windows that allows the patient an obstructed view of the exterior landscape when viewed from a reclining position in the patient bed*"), patient control of indoor environment (including ability for occupants to make "*local temperature adjustment" by adjusting "room set point within limits set in temperature range field*"), patient and staff access to landscaped areas, intuitive wayfinding, quality of interior design, organisation and fit-out of patient and family accommodations.
- **OASIS standards:** The Ministry of Health and Long Term Care of Ontario is committed to its OASIS standards, which must be a founding principle of planning in all areas of the building and in all key operational processes in the province of Ontario. OASIS stands for: **O**perational efficiency, **A**ccessibility, **S**afety and security, **I**nfection prevention and control, **S**ustainability of the healthcare system.

Alignment to QI Focus Areas		Mechanisms used to achieve QI alignment	Market Comparison Analysis
Sustainability and longevity of an infrastructure asset Ability of the asset to address the needs and meet the expectations of end users	**Sustainability and longevity** of the asset is mandated through the development and implementation of a maintenance program during a 30-year operating period, whereby the Private Partner must maintain the site and the facility per the service standards identified in the output specifications, maximising reliance on industry-recognised standards. An independent inspector is also appointed by both parties to assess the condition of the facility prior to handback at the end of the term and to confirm compliance with the Expiry Transition Requirements. Key documents that the Private Partner must develop to ensure longevity of the infrastructure include the Preventive Maintenance Schedules (one year and five year), the Five-Year Maintenance Plan, and the Lifecycle Replacement Schedule. The Private Partner must also report on the activities undertaken in relation to the stated plans. **Expiry Transition Procedure:** The Project Agreement includes an Expiry Transition Procedure for an Independent Inspector to carry out inspections of the facility. The Independent Inspector will perform an inspection of the facility and produce a Facility Condition Report not less than seven years prior to the end of the operating term and provide an update annually thereafter. A final Facility Condition Report will be delivered within 30 Business Days after the end of the operating term. The key aspects of the Facility Condition Report include: • Assessing the Private Partner's business case related to capital replacement; • Identifying "*any works required to ensure the Facility will meet the Expiry Transition Requirements, which are defined as each element of the Facility being:* – *in good operating order (and capable of performing in accordance with the performance specifications; and* – *in a condition where such element of the Facility will have a reasonable likelihood of completing its operating order*". • Specifying the Independent Inspector's estimate of the costs that would be required to perform the Expiry Transition Works. **Reliance on industry-recognised standards:** For all disciplines, the output specifications include a section on Legislation, Codes, Standards and Authorities. The design, construction, commissioning and maintenance must be compliant with industry standards, such as the CSA Group standards (previously Canadian Standards Association). Some examples are provided below: • CSA Standard Z32, Electrical Safety and Essential Electrical Systems in Healthcare Facilities; • CSA Standard Z8000, Canadian Health Care Facilities; • CSA Standard Z8001-13, Commissioning of Health Care Facilities; • IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems; and • IEEE Standard 1346, Recommended Practice for Evaluation Electric Power System Compatibility with Electronic Process Equipment. **The ability of the asset to continue to meet the end user expectations** is measured throughout the operating period, through the availability mechanism that measures compliance with functional requirements, as well as satisfaction surveys and the Owner's ability to address significant or persistent non-performance of the Private Partner. Prescriptive requirements have been developed where required to ensure that the key priorities of the end users, including the Owner, are met. Examples of this include: • **Customer satisfaction surveys** during the operating period to assess satisfaction with the services delivered by the Private Partner. The results of the Service Satisfaction Survey shall be provided to the Owner within 30 days following the completion of the Service Satisfaction Survey. The results shall include analysis of the results. The Private Partner must develop and implement an action plan if the ratings show poor or decreasing customer satisfaction.	**Expiry Transition Procedure:** In its Facility Condition Report, the Independent Inspector will estimate the costs that would be required to perform the Expiry Transition Works. If the costs estimated by the Independent Inspector are greater than the Private Partner's costs allocated to lifecycle works pursuant to the financial model, the difference shall be apportioned equally over the Payment Periods from the date of the Facility Condition Report to the end of the operating term. The Owner may deduct these amounts from each Monthly Service Payment and pay into a separate escrow bank account (upon escrow terms acceptable to the parties). As an alternative, the Private Partner may provide a bond or letter of credit in favour of the Owner. If the final Facility Condition Report identifies any Expiry Transition Works, the Owner may withdraw from the escrow account or call upon the letter of credit an amount equivalent to the cost of the Expiry Transition Works and return any remaining security to the Private Partner. Provided the funds in the Escrow Account and/or the Expiry Transition security are adequate to meet the Private Partner's obligations, the Private Partner will have no further liability. **Measurable performance requirement:** Use of measureable Service Failures, which have associated failure points and deductions for each failure, which promote compliance with the Scheduled Maintenance Plan each month: • *100% of all regulatory testing and maintenance completed in accordance with the Scheduled Maintenance Plan: 1 Minor Service Failure per month for non-compliance;* • *Minimum of 85% of all other Scheduled Maintenance completed within the planned month and any deferred Scheduled Maintenance completed within the following month along with associated CMMS records.* **Customer satisfaction surveys:** Failure to meet baseline ratings or a decrease in ratings is linked to Performance Indicators (Quality Failures), with associated Failure Points and Deductions. Below is an example of a performance indicator associated with customer satisfaction: % satisfaction score on the customer satisfaction survey no more than 5% lower than previous customer satisfaction score of the Baseline Survey, whichever is higher (per service). **Performance Action Plan (PAP):** The Private Partner may be penalised if it fails to submit a Performance Action Plan or if it fails to implement the Performance Action Plan. The following penalties have been developed to incentivise the Private Partner's behaviour: • *Where a complete PAP is not submitted within 5 Business Days ("Initial PAP due date"), a PAP Deduction of $1,000 applies as of the Initial PAP due date;* • *For each subsequent week following the due date ("Subsequent PAP due date"), where the PAP is not submitted, a PAP Deduction of $1,000 applies as of the Subsequent PAP due date; and* • *Where the key activities listed in the PAP (8-9 activities per PAP) are not implemented according to the milestone dates included in the PAP, a PAP Deduction of $500 per milestone date that is not achieved is applicable.*	Across asset classes in developed markets, it is common to have an independent party involved in the asset condition reviews leading up to handback. It is also common to commence these inspections years ahead of the end of term to allow the Private Partner to improve the asset condition if it does not meet the required standard. The Availability Failure regime is considered to be a relatively standard approach across social infrastructure projects. Although the terminology may be different, and there are nuances in the application, the principle that the Private Partner shall have a defined time period to respond to and rectify a failure prior to incurring financial deductions is a typical approach. The response and rectification periods are classified based on the relative priority of the area. Recent Infrastructure Ontario healthcare projects include a new type of availability failure called a 'System Failure'. The System Failure responds to the increasing reliance on communication and information systems to effectively operate a hospital. It also reflects the impact of an outage, where multiple areas and rooms may be affected.

Alignment to QI Focus Areas		Mechanisms used to achieve QI alignment	Market Comparison Analysis
	• **Performance Action Plan:** The Owner can request the development of a Performance Action Plan if it observes a significant or consistent non-performance of any services by the Private Partner during the operating period. • **Use parameters:** In the availability-based IO model, failure to achieve the use parameters may result in Availability Failures, whereby any of the following criteria are not compliant: – the "Accessibility Condition", – the "Safety Condition", or – the "Use Condition". • **Intentional prescriptive requirements in the Output specifications:** – **Smart Hospital Technology:** The Owner operates three healthcare facilities and requires the integration of ICT and security systems between all facilities. Interoperability between all three of the Owner's hospitals and homogeneity of ICAT systems, such as nurse call, patient wandering, infant abduction, duress, CCTV/security, real-time location and bed management systems, are key features of the Milton Hospital's Smart Hospital technology[2]. The technology allowing over 20 disparate systems to talk to each other intelligently is the Enterprise Service Bus (ESB), which captures all the alerts and alarms generated by these systems and shuttles them to the right destinations as defined by staff. – **Spaces designed for the unique prisoner population:** The project includes spaces designed to care for the hospital's unique prisoner population. The Town of Milton is home to two large correctional facilities, and prisoners from these facilities are frequent patients of the hospital. The facility's design includes a separate and discrete entrance, as well as a secure holding area in the lower level for prisoners attending hospital for outpatient services such as diagnostic tests. Two secure treatment rooms located inside the Emergency Department are available for prisoners requiring emergency care. These spaces were planned with inputs from Correction Services staff so that care could be taken to meet their unique needs while respecting the dignity and confidentiality of the prisoners.	**Availability Failures:** The Private Partner may be subject to deductions from its monthly service payments if an event is not rectified within the relevant Rectification Time and which causes a Functional Part to be Unavailable – this is the definition of an Availability Failure, which is a key aspect of the Infrastructure Ontario model. In addition to financial deductions, the Private Partner is subject to Failure Points, which may be awarded in respect of the Private Partner's Service. If the Private Partner accrues Failure Points in excess of pre-defined thresholds, then the following step-in rights are triggered: • Warning Notices • Monitoring Notices • Owner Remedial Rights • Private Partner Events of Default However, the Private Partner may be relieved from Failure Points and Deductions if it can do any of the following: • Temporary Repairs: "*[…] if the Temporary Repair is effected within the specified Rectification Time and the Permanent Repair is effected by no later than the Permanent Repair Deadline, no Service Failure or Availability Failure will occur, and no Deduction may be made, in respect of the Event*". • Temporary Alternative Accommodation: "*if Halton Healthcare accepts the Private Partner's offer of Temporary Alternative Accommodation, no further Deductions shall be made or Failure Points awarded in respect of a Functional Part vacated by Halton Healthcare while the Temporary Alternative Accommodation replacing that Functional Part if being used by Halton Healthcare*"	
Ability of the asset to withstand natural and other disasters, including climate change	The output specifications require a building to be developed that can respond to extreme weather conditions. The output specifications detail the physical requirements to accommodate the Owner's response to a large-scale disaster. • **Building testing and commissioning:** Through a comprehensive commissioning process, the Private Partner must demonstrate that the facility can withstand extreme weather conditions. These include wind uplift testing, flood testing and thermographic surveys of the roof to ensure acceptable level of tightness after exterior envelope has been completed. • **Accommodation for large scale disasters:** The Ontario Ministry of Health and Long-Term Care has implemented a program to equip all hospital sites that offer emergency/urgent care with a standardised package of chemical, biological and nuclear exposure supplies and equipment. In order to meet these requirements, the Private Partner is required to meet a number of criteria to satisfy accessibility criteria of the tent. For example, the Private Partner must provide 200 square feet of storage space for the Owner's chemical, biological and nuclear exposure tent. The door shall be able to be connected to one of the doors of the ambulance garage.	**Condition precedent to Service Commencement** Building testing and commissioning is condition-precedent to achieving Substantial Completion. An individual licensed and authorised by the Association of Professional Engineers of the Province of Ontario shall undertake the role of "Commissioning Authority" as specified in the CSA standard Z320-11 [Building Commissioning Standard and Check Sheets]. This standard specifies commissioning requirements for newly installed building systems.	Across asset classes in developed markets, it is common to have independent parties validating compliance with the output specifications, in particular during construction and commissioning. Third parties, such as the Commissioning Authority/Agent or the Independent Tester/ Certifier (which are typically selected through a competitive process and jointly funded by the Owner and the Private Partner to provide independent oversight and monitoring of construction progress and quality), are safeguards to monitor compliance with the output specifications.

2 Smart Hospital technology supports efficient work flows and creates a safer environment for care, by using and integrating state-of-the-art technologies.

Alignment to QI Focus Areas		Mechanisms used to achieve QI alignment	Market Comparison Analysis
Health and safety considerations during both construction and operation of the asset	Patient safety is paramount in the output specifications for the Milton District Hospital. As such, the Private Partner must provide a complete security management system. In addition, all security systems have UPS and emergency generator power to support the operation of the system in the event of a power loss. Healthcare organisations are expected to provide safe and reliable services to their patients. Mechanical and electrical systems constitute the operational infrastructure that permits safe patient care. As such, planning appropriate response and recovery activities for a failure of the facility's mechanical and electrical systems is essential to satisfy this expectation. **Reliable utilities with N+1[3] redundancy:** The output specifications include provisions for selected equipment, devices or systems to be provided in sufficient quantity and capacity such that should the largest unit fail, the design load of the system served will still be met. Some of the most important systems that require redundancy include heating and steam systems, cooling plant main equipment, exhaust high efficiency particulate air (HEPA) filters for air-borne precaution room exhaust ductwork, and mechanical systems that support the medical gas systems (i.e. medical gas room ventilation fans). In addition, computer room air conditioning (CRAC) units must be provided in sufficient quantity to provide a redundancy level of 2*N units, where the number of CRAC units required to service the room cooling load is n. **Elevators:** Similarly, the functionality and availability of elevators are key to ensure the health and safety of building occupants. The Private Partner is required to measure, record and report on elevators' availability. Given the nature of the facility and potential poor health conditions of patients, in the event of a mechanical failure during the operating period, elevator occupants must be released from the elevator as soon as practicable and in any event within 45 minutes.	**Key Performance Indicator (KPI)** The provision of reliable utilities to the facility is a KPI of the Private Partner's performance, and in the event that there is a disruption from the Utility Company, backup systems shall function as intended. In the event the Private Partner fails to comply with this key performance indicator, material financial penalties will be applied to its monthly service payments. **Elevator Availability Failures:** Should the Private Partner fail to rectify an Elevator Availability event within the applicable time period, and the event is impacting the Owner's ability to use the elevator in question, the Private Partner will be subject to a deduction from its monthly service payment. The amount of the deduction is based on the number of elevators that remained operational. The output specifications also include a performance indicator whereby in no case will scheduled maintenance be allowed to take more than one elevator out of service at a time.	Redundancy requirements for key mechanical and electrical equipment are common for healthcare facilities in developed markets, and the Private Partner is often exposed to hefty penalties in the event of outages. Similarly, elevators are of critical importance in the healthcare sector, and elevator availability mechanisms are often incorporated in the contractual structure to incentivise a quick response to unavailability events.
Job creation, capacity building and transfer of knowledge and expertise	Knowledge transfer from the Private Partner to the Owner occurs at three stages during the project: • during commissioning and prior to operations; • as part of the Services provided by the Private Partner; and • prior to handback at the end of term. The training and transfer of knowledge applies to both the general facility users, as well as the Owner's staff that will be operating the equipment and systems designed and constructed by the Private Partner. • **General orientation and training support:** As such, the Private Partner must develop and implement, in collaboration with the Owner, a service orientation program for relevant Owner staff which they will conduct initially and then when the Owner changes key staff at the facility. Similarly, the Help Desk Services also include ad-hoc training as may be required to ensure the Owner's occupants are aware of procedural updates. • **Specialised training:** The Private Partner must provide specialised training to the Owner's staff to facilitate the appropriate operation of the facility. As it relates to the operation of security systems, the Private Partner provides a plan and procedures for training and subsequent re-training of Halton Healthcare staff on the security and surveillance system. The Private Partner will provide the Owner's employees with appropriate cleaning services training and guidance on the techniques and products to use in the care of all surfaces and fixtures.	**Review procedure:** Training, and orientation materials and Policies and Procedures are subject to Owner review. **Performance Indicators:** There are performance indicators associated with the provision of training and orientation to the Owner's staff. Failure to comply with the performance indicators is subject to deductions from the monthly service payments during the operating period. Similarly, failure of the Private Partner to comply with Policies and Procedures is subject to deductions from the monthly service payments.	Across asset classes in developed markets it is common practice for the Owner to be given the opportunity to review, provide comments, and request changes to the operational policies, procedures, training and orientation material, to ensure the interfaces between both parties are managed. Annual reviews of these documents are also standard to incorporate any lessons learned or updates. Additionally, it is common practice for the Private Partner to provide training to the Owner staff on the operation of equipment prior to Service Commencement, as part of the commissioning process.

3 N+1 redundancy is a technical term that means there is one independent back-up to run the system.

Alignment to QI Focus Areas		Mechanisms used to achieve QI alignment	Market Comparison Analysis
	• **Operational policies and procedures:** Prior to the start of the operating term, the Private Partner was required to develop policies and procedures including manuals intended to guide the on-going operations and maintenance activities of the Facility. The policies and procedures were developed in collaboration with the Owner. The output specifications set out the process to develop project-specific policies and procedures 18 months prior to the start of the operating term, with time for the parties to identify and develop specific interface requirements and ensure that expectations of end users are taken into consideration in the day-to-day management of the facility. By starting their development so early in the project, the output specifications introduce an opportunity for proactive coordination between the facility owner and the Private Partner in the development of Policies and Procedures. The policies and procedures are to be updated annually during the operating term, giving an opportunity for the parties to assess whether the needs of end users are appropriately addressed, build on lessons learned, and make any changes where required. The policies and procedures address, for example, "communication procedures", "operational issues resolution", and the management of all services performed by the Private Partner.		
Environmental impacts	Environmental objectives are core priorities of the Infrastructure Ontario PPP model for healthcare facilities, and a robust incentivisation mechanism has been implemented to ensure the objectives are met. • **Third party certification (Leadership in Energy and Environmental Design (LEED) New Construction (NC) certification[4]):** The output specifications require the Private Partner to achieve the LEED NC Silver rating certification at a minimum. Targeting LEED certification addresses climate and site-specific design issues that help it to achieve a sustainable and resilient design, while built-in adaptability allows for future flexibility. • **Energy target:** During competitive procurement in the Infrastructure Ontario model, all proponents have to demonstrate, by way of a Forecast Energy Model, that their facility shall have an annual energy intensity no greater than 2.0 GJ/m^2/year (= the mandatory energy target), including End User Loads and Secondary Facility Loads. The Forecast Energy Model is used solely for comparisons of the proponents' predicted building energy performance. – In parallel, all proponents (at bid stage) are also required to submit an Aggregate Energy Model, which is used to measure the Annual Energy Target for the facility. The Annual Energy Target subsequently becomes the first year Annual Energy Target for the facility. Variations to the Aggregate Energy Target are calculated each year if changes are implemented that change facility load or energy usage, and changes to inputs of the energy model, such as weather data or equipment rations, are updated each year. • **Environmental Management System:** The Private Partner must develop an environmental management system manual for the operating period, with environmental objectives and targets. The environmental operating procedures must comply with ISO 14001:2004 guidelines[5]. The Private Partner must also provide the Owner with environmental objectives and targets on an annual basis, which are reported on.	**LEED NC certification:** there is an onerous CAD 2 million penalty in the form of liquidated damages to the Owner if the Private Partner fails to achieve the LEED NC silver certification within 24 months after the Substantial Completion Date. **Energy Painshare/Gainshare:** In the Infrastructure Ontario model, the energy unit pricing is a risk borne by the Owner, however, the energy consumption risk is shared using a painshare/gainshare mechanism. On this basis, actual energy consumption is measured annually against the energy target for that year: • Consumption between 95% and 105% of target = Private Partner risk (no painshare or gainshare) • Consumption between below 95% of target = gainshare, with a split of the savings between the Owner and the Private Partner; • Consumption exceeds 105% = the Owner will deduct all additional energy costs from Private Partner's monthly service payments If the Private Partner is subject to an adjustment, then the Private Partner will submit a detailed remediation plan to the Owner to explain how it will reduce the energy consumption for the subsequent year. **Environmental Management System (EMS):** There are specific performance indicators associated with compliance with the Environmental Management System manual and compliance with ISO 14001:2004 guidelines. As such, the Private Partner is subject to material penalties if it fails to: • perform Services in accordance with the Environmental Management System on an ongoing basis in a careful and environmentally responsible fashion to minimise effects on health and the environment; • maintain appropriate records and audit processes; or • develop and implement environmental operating procedures in the EMS manual that comply with ISO 14001:2004 guidelines.	Third party certification is a common approach to promote energy efficiency and building sustainability. The available certifications vary by location. A good practice approach is to define the credits that the Private Partner must achieve in the output specification, so the certification aligns with the Owner's objectives. ENVISION[6] is a newer certification process for civil infrastructure projects and is increasingly being considered by Owners in North America. Alternatively, Owners (or governments) may have their own green building standard. For example, the Hong Kong Organic Recovery Centre was required to comply with the government's 'Green Building Performance Framework set out in the Development Bureau Technical Circular (Works) No 2/2015'. The use of energy targets and consumption painshare/gainshare is common across markets and sectors but is not standard (for example it is not used in Turkey, where the requirement is limited to monitoring consumption).

4 LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system in the world. LEED provides a framework to create healthy, highly efficient and cost-saving green buildings. https://www.cagbc.org/

5 ISO 14001:2004 [Environmental Management Systems], by the International Organization for Standardization, specifies requirements for an environment management system to enable an organisation to implement policy and objectives which take into account legal requirements and other requirements to which the organisation subscribes, and information about significant environmental aspects. It does not state itself environmental performance criteria.

6 ENVISION is a standard for sustainable infrastructure and incentives higher performance goals, beyond minimum requirements https://sustainableinfrastructure.org/