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## BRIDGEPOINT HOSPITAL A P3 Beauty

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BY BRONWEN PARSONS

# BRIDGEPOINT

**A NEW LONG-TERM ACUTE CARE HOSPITAL IN TORONTO SHINES AS AN EXAMPLE BOTH OF BEAUTIFUL DESIGN AND OF HOW TEAMS COLLABORATE IN THE P3 PROCESS.**

**O**n Toronto's winding Don Valley expressway, south of the Bloor Street Viaduct, sits a large and imposing new building on the left. The 10-storey block, split horizontally mid way, sits high above the road and dominates the landscape. Bridgepoint Healthcare doesn't look like a typical hospital. This is one beautiful building. It's hard to imagine that behind the stylish grey and glass patterned exterior are 460 rooms housing patients who have long-term and complex disabilities.

Inside, the 680,000-sq.ft. new hospital is full of light. A large open lobby leads past an open kitchen and cafe. There are lounges and dining rooms, an auditorium, and a therapy pool. High on the roof is a garden and terrace, where patients and visitors can feel the fresh air and enjoy expansive views across the city.

From the time the master plan for the long-term acute care hospital was written in 2006, the hospital was conceived as a "campus of wellness," one intended "to change the world for people living with chronic disease."

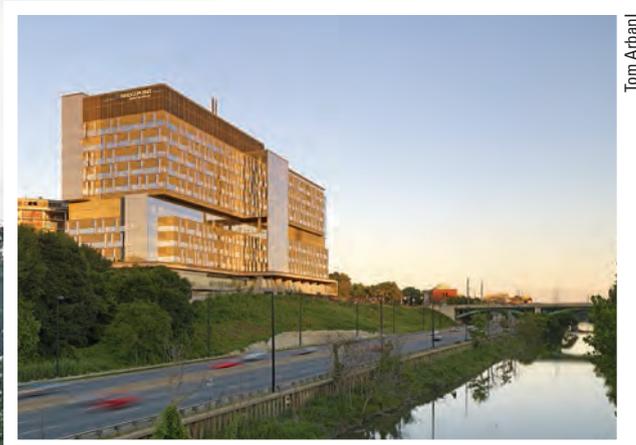
John Pascoa, an associate principal at Smith and Andersen, who worked on the building says they were mindful that many of the patients will be in the hospital for the long haul and so the design intent was always "to make their lives better."

Located between the highway on one side, and the intersection of Broadview Avenue and Gerrard Street East on the other, the hospital occupies a tight urban site with a long history. Beside it is Riverdale Hospital, which Bridgepoint has replaced and which is being demolished. Riverdale's modernist, semi-circular architecture was much admired, but inside the decor was dreary and depressing. Worse, patients looked out on the 1860s Don Jail whose hefty walls confined prisoners until the 1970s. You can still see the gallows inside where condemned men were dropped to their deaths. (A newer "Don Jail" built next door to the east is still operating, but is slated for closure.)

Today the historic stone jail has been converted into the administration offices for Bridgepoint Health. The central high rotunda with its skylights and intricate ironwork have



Sam Javanrouh



Tom Arbani

Left: view from west; unseen behind is the 1860s Don Jail and the former Riverdale Hospital which is being torn down; Above: view from north along Don Valley Parkway (a crowded road at most times) and Don River.

been restored, along with cells and other areas in the basement. The upper floors have been opened out into office space, "with lots of life and interaction between people," says Terry Wilk, P.Eng., one of the structural engineers.

### Stretching the conceptual design

Infrastructure Ontario and Bridgepoint Health selected the Plenary Group consortium above two other bidders to design, build, finance and maintain the complex in 2009. It opened this spring. Plenary will be paid \$622 million in today's dollars over 30 years in a contract that covers maintenance but not building operations.

As a P3, design-build project it was unusual in that the hospital and Infrastructure Ontario had their "planning, design and compliance" team develop the design concepts much further than is customary on these types of projects. The owners had an entire spectrum of specialist consultants working out the hospital's needs. These were laid out in "project specific output specifications" (PSOS) and a "design exemplar."

During the bidding process and once the contract was awarded, Plenary Group brought an entirely different quota of architects, engineers and specialist consultants to the project, and they became the architects and engineers of record. As this design-build team worked out the details of the design, they continually conferred with the owner's compliance team to ensure they met the requirements in the PSOS and design exemplar.

Leading Bridgepoint's compliance team were high-profile architects KPMB and Stantec. Stantec were also the structural, electrical, sustainability and energy designers. The Mitchell Partnership were the mechanical engineers.

On the Plenary Group design-build team, the architects were equally high profile: HDR and Diamond Schmitt. Halsall were structural and sustainability consultants. Smith and Andersen were the mechanical and electrical engineers.

### A happy collaboration

Even though there were two sets of ideas and two sets of people, they related well as the project evolved. Wilk, a

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Maris Mezulis



Left: the smart new hospital block is linked by a glass pedestrian bridge to administration offices in the 1860s Don Jail building. Right: rotunda in the Don Jail; new lighting and systems were carefully integrated with the architectural detailing; lighting was also added behind the original semi-circular glass feature in the floor.

principal with Stantec's compliance team, says: "The working relationship between ourselves and Halsall the proponent's structural engineer was a real treat. I hope that it happens in all P3 jobs, but it certainly happened on this one and I think the project benefited from it."

Wilk explains how things went: "Even as the design progressed with the winning proponent, they had to make regular submissions to us, and we had to review their documents to make sure that they remained in compliance with the project specifications."

"But," he carefully adds: "I want to be clear, we were not peer reviewers. We weren't there critiquing their designs. We were simply there to make sure that they remained in compliance throughout the process and that they were giving Bridgepoint all of the things that the hospital had contracted to have in their building."

Speaking from the design-builder side, mechanical engineer Brad Bull, P.Eng. of Smith and Andersen also found things went well: "Our relationship was very good on this project because we already had a good long-term relationship with the compliance team's mechanical engineers, The Mitchell Partnership."

He adds: "By and large we worked to the project specific output specifications, but there were a few ideas that we brought to the table. Some got accepted; some got rejected, but the compliance team were open to alternative solutions that achieved their prescriptive requirements. They set an energy target for us to hit and then it was our responsibility to go and achieve it. I would say that is the best way to go about things — set a bar and then allow the design-build engineers the flexibility within their design to hit that level. The project was very successful in that regard."

### Reconfiguring the Don Jail - structural design

Wilk says one of the most interesting aspects of the project for the compliance team's structural engineers was reconfig-

uring the historic Don Jail — one of the oldest buildings in Toronto — from a "dungeon" into a modern office space.

Loadbearing cell walls had to be removed and the interior reconstructed. The floors, some of which are stone slabs spanning between the cell walls, had to be historically preserved and converted to a diaphragm. Everything in the building had to be made to meet current codes.

There were no drawings or records of the building, so first Stantec had to take measurements and do material tests in order to create a three-dimensional computer analysis.

"We spent many a cold February day in an old eerie jail, where you hear things that probably aren't there, trying to measure up the structure under dim light," Wilk remembers.

The real challenge for Stantec was figuring out beforehand what was necessary for the conversion, so that the design-build bidding teams could have the right information to analyze and price the project. "From a structural perspective it needed a lot of conceptual and preliminary design from the compliance team," he says.

Meanwhile, "the Historical Board and our internal compliance historical consultants were looking over our shoulders all the way."

The new 10-storey tower "is a big building but it is also a pretty typical structure," says Wilk. It is a concrete flat slab structure with cantilever floor plates around the perimeter, which allows column-free views outside. Its simplicity enabled the design-builders to create an economical design.

But he says, in the bowels of the building where they had to incorporate a large open loading dock, ramps and two levels of underground parking: "the beautifully economic and regular grid pattern in the tower suddenly falls by the wayside."

Here's where the structural gymnastics came in and the collaboration between the compliance team and the design-build engineers was tested.

"When you have a compliance group and a proponent

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Tom Arban

group, sometimes they get along and sometimes they can become adversarial,” says Wilk. “But I think we developed a tremendous working relationship with Halsall. They came up with a system that turned our concept on its ear to suit their proposed layout and we worked very well together to allow their system to become compliant.” Halsall used post-tensioned concrete girders and other elements to create the long spans to transfer the loads from the column grid above onto the more open plan below.

**Glass walls and fresh air - HVAC design**

The design specifications dictated achieving two LEED points for energy (the building was designed for LEED-certification level), which means it has to be 29% more energy efficient than the National Model Energy Code for Buildings. The first two years of operation will be used to establish a benchmark for its actual operating energy.

Bull of Smith and Andersen explains that it was not easy to meet those energy targets partly because hospitals have to have high rates of ventilation, and partly because of the building envelope.

“A third of the air circulating through a hospital is out-

door air. Whereas an office building is probably going to run about half that rate, i.e. 15% to 20% as opposed to 33%,” says Bull.

Bridgepoint’s compliance team architects had prescribed the building envelope. “Mechanically that represented quite a big challenge,” says Bull, “because the proponents wanted it to be really energy efficient, but they also said, “We want to have a lot of glass because we believe that’s the solution for a patient.”

As a result, Bull explains: “We actually have far more air running through that building than what would be prescribed by a CSA standard because the envelope has so much glazing. So we had to use heat recovery solutions on the air handling systems and high efficiency chillers. Also on the boiler systems we integrated flue gas heat recovery systems to recapture any waste heat that would normally be going up the stack and to the great outdoors.”

“The outdoor air heat recovery works in reverse too,” Bull adds, “so in the cooling season it serves to pre-cool the incoming air.”

Smith and Andersen worked closely with Halsall, who were sustainability engineers for the design-build team and

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did the energy modelling. Luka Matutinovic, P.Eng. of Halsall says it was “a very iterative process; energy modellers are constantly giving feedback to the design team so that they can make certain tweaks. And obviously PCL, the contractor, was there costing everything, all the decisions. So we provided the energy impact; they provided the cost; and then the team could decide.”

“You’re always balancing four things,” says Matutinovic: “There are owners’ requirements, there are code requirements, and you’re balancing them with both the up front capital costs and the long-term costs. It’s an interplay of those things.”

### Juggling needs — electrical design

According to John Pascoa with Smith and Anderson, the electrical designers for the design-build team also had to juggle various needs. “Electrically, it’s not just a matter of putting in the main systems to keep the building running. It’s also important to give patients a feeling that the hospital is new space, it’s comfortable, that they have the flexibility of making the space their own by giving them different options.

At the same time the electrical engineers had to satisfy different members of their own Plenary team. Recalling the bidding phase, Pascoa says: “We are in the middle of our partner on the right, which is putting the project together and they need the manpower to get it built within the time schedule. And we’re also dealing with the team on the left, which has to maintain the building for 30 years at a minimum cost.” He adds, “It’s always a challenge because over 30 years technology changes quite a bit.”

**A fixture mixture and avoiding the “haunted look”**  
Pascoa says the team achieved a “really good lighting design that complements the hospital environment.”

One challenge was Bridgepoint’s specification for a multi-level light above the patient beds. It had to combine night, ambient, general and examination lighting. No such standard fixture existed, but when Bridgepoint insisted that’s what they needed, the engineers worked with a manufacturer to customize a standard fixture. By adjusting the reflectors they produced a fixture that provides a glow in the ceiling rather than a light that shines directly in the eyes of someone lying in the bed.

Throughout the hospital are energy-saving LED lighting, occupancy sensors, photocells and a centralized low-voltage control system for daylight harvesting where feasible.

The historic Don Jail “was a whole different building and a whole different challenge,” says Pascoa. In the high rotunda, for example, they incorporated big pendant light fixtures and a combination of incandescent track lighting and LED accents to play up the refined architecture. Behind the semi-circular skylight in the floor they installed metal halide lighting to enhance its effect. Otherwise the challenge was discreetly fitting the lighting and other services inside the tight ceiling space.

To find the right way to light-up the exterior of this landmark, the team did mock-ups and many trials. They had to avoid casting shadows on the rough stonework that would have created a “haunted look.” They found they needed to pull the lighting away from the edge of the building by up to 15 feet in some locations. And because LEED restricts exterior uplighting to minimize night sky pollution, it had to be under

Tom Arban



Tom Arban



Above left: nursing station. Above right: patient room; the design and systems are all intended to give patients “a feeling that the hospital is new space, it’s comfortable, that they have the flexibility of making the space their own by giving them different options.”



Above: green roof and terrace on the 10th floor.

1000 lumens. They used LED lights and played with various coloured lenses. “It was a challenge, but I think we got it right,” says Pascoa.

### Safety, security and servers

The main incoming utility power duct is capable of supporting 7 MW and comes in from one of the city’s main switching station, which is across the street. There are two life safety emergency generators and a large UPS plant that backs up systems such as nurse call, communications, fire alarm, building automation and elevators.

The security systems are interconnected and set up so that if necessary certain patients can be prevented from wandering to the wrong areas. Typically the patient’s bracelet will have a chip they can swipe at doors or in the elevator.

In order to preserve patient confidentiality, Bridgepoint needed two distinct and separate server systems: one for the building operating systems such as the HVAC systems, and another for the hospital administration and medical records. Access to the two systems had to be carefully separated, yet the systems had to be located in the same room. This way, they could use the same air-conditioning system to cool all the equipment and save energy.

The design-build team managed to fit the equipment into one tight space

by carefully arranging the server racks and reducing clutter with a raised floor system that contains all the power and communications wiring. As well as physically separating the server systems, cages provide added security.

All in all, Bridgepoint is exemplary as both a P3 project and a design.

The patients seem happy too. Riding up to the roof garden in the elevator, long-term patients were all smiles when asked about his new home. **CCE**

**Client/sponsors:** Bridgepoint Health & Infrastructure Ontario

**Owner’s planning, design & compliance team:** Stantec/KPMB (architects); Stantec (structural, electrical, sustainable design & energy); The Mitchell Partnership (mechanical); ERA (heritage); Brook VanDalen (building envelope); R.V. Andersen (civil); Golder (environmental); Aeroustics (vibration, acoustics); Randall Brown (life safety); RWDI (microclimate); PFS Studio (landscape)

**P3 design, build, finance & maintain team:** Plenary Health (proponent); HDR/Diamond Schmitt (architects); Halsall (structural & sustainability); Smith + Andersen (mechanical-electrical); PCL (construction); Leber Rubes (code); J.E. Coulter (vibration, acoustics); **Ventim Group (heritage)**; RWDI (environmental); CFMS (commissioning); MBTW/Watchorn (landscape), A.M. Candaras (site servicing)

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