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THE PROJECT

The $195 million design-build-finance-maintain (DBFM) Disraeli Bridges carry more than 42,000 daily commuters, who use the Disraeli Freeway corridor to travel between the northeast quadrant of Winnipeg and the downtown core.

The project included the construction of approximately two kilometers of a major urban arterial roadway, replacement of an eleven-span overpass across the Canadian Pacific main line and a nine-span bridge over the Red River, as well as the addition of a pedestrian bridge.

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ELIMINATING COMMUTER IMPACT WITH PHASED CONSTRUCTION

The original DBFM request for proposals specified a complete corridor closure for 16 months. The shortlisted proponents were asked to provide a traffic management plan for the construction phase.

PCL’s plan called for phased construction of the new bridges to eliminate any shutdown or change to existing traffic service during business hours. The new bridges were built one half at a time, allowing traffic to shift to the new bridge and preserving the required number of available lanes at all times. By choosing a geometric alignment of the corridor, the team was able to minimize the property acquisition required and to accommodate future expansion.

“PCL demonstrated sound and effective leadership in leading the design-build team on this challenging and complex plan to reconstruct a major arterial route with minimal disruption to traffic. Their attention to quality, schedule, and meeting project needs was exceptional.”

Brad Neirinck
Bridge Planning and Operations Engineer
City of Winnipeg

PHOTO: The new span easily accommodates both pedestrian and vehicular traffic along this critical route.
CONSTRUCTION INNOVATION RESOLVES RISING WATER LEVELS

The city of Winnipeg is centered at the confluence of the Assiniboine and Red Rivers. The Red River Valley watershed extends for more than 100,000 square kilometers, and is, for the most part, collected by these two rivers. Consequently, in Winnipeg, river crossings are undertaken in the winter when the watershed is frozen because in the spring the Red River can rise up to eight meters higher than winter ice levels.

Originally, the team planned to construct the bridge piers and erect the steel superstructure from temporary rock berm work platforms in the river. However, unseasonably mild winter temperatures caused the river to rise four meters higher than normal. A revised construction plan incorporated the use of a floating work platform instead of rock berms, and the project team adopted a precast concrete form system to build the piers. This innovative solution eliminated the negative impact of fluctuating water levels on construction, and allowed the project team to meet the City’s project needs without compromising quality or the schedule.
The Enbridge Ajax Gas Processing Plant in Wheeler, Texas, is a cryogenic natural gas processing plant with a capacity of 150 million cubic feet per day. The new plant is designed to extract natural gas liquids and produce pipeline-quality natural gas from wellhead-quality natural gas streams.

PCL Industrial Construction Co. (PICCo) installed all structural steel, equipment, piping, and electrical work, including switchgear and transformers, and more than 16,000 linear feet of cable tray and 280,000 linear feet of cable and wire.
FLEXIBILITY IN LABOR SOURCING

When local craft workers are unavailable, PICCo has the ability to draw on a seasoned team of tradespeople who can travel to remote, rural projects. This flexible approach aligned with Enbridge’s desire to realize savings on labor costs and effectively staff their project, regardless of location.

The cost to mobilize various subcontractors is traditionally higher for a rural project than for an urban one. After careful consideration, PICCo decided to hire one subcontractor to perform insulation, scaffolding, painting, and fireproofing services, rather than multiple subcontractors. This flexible, single-source labor solution increased productivity because the subcontractor was able to assign workers to best advantage: relocating scaffold builders to help with the insulation, painters to help build scaffolding, and insulators to help with the painting.

PHOTO: Raw natural gas is chilled to -120 degrees Fahrenheit to distill impurities from the product.

MITIGATING SCHEDULE IMPACTS

After the award of the project, Enbridge made several key design changes to improve plant performance, one of the most significant being a modification to the flash gas system. These revisions increased the efficiency of the processing unit and made the installation more environmentally friendly.

Improvements to equipment and piping can create a domino effect on equipment and material procurement. Piping delivery, originally scheduled for July 2012, wasn’t completed until January 2013. In addition, some pieces of equipment did not arrive until February 2013, two months after the original project completion date. Faced with these delays, PICCo had to lay off the craft workers hired to install the pipe, to manage overhead costs and maintain overall project productivity. Throughout the project, PICCo’s field supervision team accurately tracked the scope and budget changes and reported them to Enbridge in a timely manner, enabling them to manage any increased project costs.

Despite the six-month setback in material and equipment procurement and three weeks lost to weather, PICCo recovered three months of the schedule delay and attained mechanical completion by the first week of April. This was achieved by more than 380 team members who established a pervasive safety culture, resulting in no recordable or lost-time injuries on the year-long project.

“"This was Enbridge’s first time working with PCL in this part of the country. We were impressed with the professionalism of the organization and the conduct of the project. In particular a couple of areas really stood out in my mind: a truly outstanding safety performance throughout the project and the quality and lack of rejects on the welding was impressive. A truly outstanding process was followed for planning out the work to help ensure an efficient construction process. Overall, Enbridge enjoyed working with PCL on this project.”

THE PROJECT

The new Academic Health Sciences E Wing at the University of Saskatchewan (U of S) is a stunning example of the marriage between old and new. The E Wing features two distinct sections: a three-story modern arm and a four-story collegiate arm. The complex continues the U of S’s century-old Collegiate Gothic architectural theme and incorporates contemporary finishes such as curtain wall and aluminum composite panels.

The building provides vital teaching and program spaces for the health sciences, including lecture theatres, offices, and a library for academic research. The Clinical Learning Resource Centre allows students to hone their patient-care skills in a multitude of examination rooms, three eight-bed procedure labs, and a nearby pharmacy skills lab.

LEFT PHOTO: The E Wing will boast the university’s largest lecture hall, a new health sciences library, labs, classrooms, and offices. In all, E Wing will house eight medical disciplines, facilitating collaboration between occupants.

TOP PHOTO: Exterior glazing on the office windows provides lots of natural light, just one of the many design features that contribute to the U of S seeking LEED® Gold certification for the building.
Build and Pour Strategically

A single confounding factor, the weather, could have significantly affected the project, delaying it into the winter and adding to costs. With the rain coming down, the project team, suppliers, and subtrades worked cohesively in the muck to ensure they met their deadlines. The goal was to get the tower portion of the building up and enclosed so that interior roughing-in and exterior masonry could begin. Concrete was poured on those rare days when the rain stopped. Only one pour of concrete was lost to the rain, amounting to less than 1.5% of the total.

Waste Management is Crucial to LEED

Waste management is a critical part of the LEED process, from initial demolition right through to final landscaping. Achieving LEED® Gold had been the university’s goal from the beginning. The mud that was an ever-present byproduct of the rain needed to be contained within the project site to meet the LEED prerequisite for erosion and sedimentation control.

The team diligently maintained this effort by removing excess sludge from exiting vehicles with brooms and continually monitoring and sweeping roadways to preserve the mud on-site. Ground water was cleaned before being discharged into the storm system through a combination of techniques such as inlet protection, silt fences, use of coarse aggregate, and sediment traps.

April Showers

Saskatchewan, “Land of Living Skies,” is a place not generally known for damp, dreary weather. In fact the city of Estevan—located only 275 miles from the U of S—is one of the sunniest in the country and has the clearest skies year-round. But bad weather, if allowed to do so, can cause havoc on a construction site.

In October 2009 the team demolished an existing three-story building and then began a large excavation to create the new building’s footprint. The winter had been normal and run-off not excessive; regardless, the project team installed the two permanent sump pumps and weeping tiles early on. This foresight paid off: construction began in March 2010, shortly before the rains began. Between April and September, the region received 645 millimeters of precipitation (three to four times the normal amount), breaking all previous records.

“PCL has been extremely diligent in addressing all of the small items that can have a big impact on the delivery of a project. The approach and work ethic of the team has been very professional, which has resulted in the delivery of one of the finest buildings on the University of Saskatchewan campus.”

Ron Cruikshank – Director, Planning & Development, University of Saskatchewan

Photo: Turbulent skies above E Wing are a reminder of the challenges that weather can pose for construction.
The PCL family of companies is a group of independent construction companies which carry out diverse operations in the civil infrastructure, heavy industrial, and buildings markets.

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