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The City of Calgary has seen exponential growth over the past decade, and things don’t seem to be slowing down for the Stampede City. With more and more people and industry moving in, demands placed on infrastructure and services have never been greater.

PHOTO: The Calgary International Airport’s new runway and the Airport Trail Tunnel that runs underneath were built to respond to the demands of the growing metropolis.

COVER PHOTO: A plane takes off at sunrise from the new runway at the Calgary International Airport.
A RUNWAY WITH A DIFFERENCE

In response to an increase in airline and passenger volume, the Calgary Airport Authority moved ahead in 2011 with expansion plans that included the construction of a new 4,270-meter-long runway, associated taxiways, and underpasses. PCL, Parsons, and Dufferin (PPD) were awarded the Runway Development Project as a joint venture initiative for the Calgary Airport Authority.

Mother Nature, however, had her own plans for the progression of the runway. Calgary has notably long winters, and the city also saw two very wet springs in 2011 and 2012. Then, in June 2013, southern Alberta experienced the costliest flooding in Canada’s recorded history. Consequently, most of the main construction work for the Runway Development Project, such as concrete paving, backfilling, and gravel work, could only be completed during six months of each year, and was constrained further by the unexpected weather interruptions.

As a workaround, the team developed a schedule that enabled mass excavation to continue around the clock throughout the winter months. As a result, critical schedule items were delivered on time at no additional cost to the Calgary Airport Authority. The team also mobilized specialty equipment to thaw frozen electrical conduit so electrical cable could be pulled and electrical fixtures installed all winter long. To mitigate the unseasonably wet spring weather, the team used additional concrete paving equipment and manpower to place over 300,000 cubic meters of concrete during the few dry months of that summer.

This effort resulted in the completion of Canada’s longest runway, now welcoming flights at the Calgary International Airport (YYC).

“YYC is extremely pleased at reaching our goal on time and under budget, and very appreciative of the efforts from the PCL, Parsons, and Dufferin team to work together with all trades, program manager, and design consultants to achieve that goal.”

Sig Undheim—director, YYC Runway Development Project

PHOTO: The 4,270-meter-long runway is the equivalent of 46 football fields and is the longest in Canada. The new runway provides some breathing room for YYC, the third-busiest airport in the country with 14.3 million passengers in 2013.
PHOTO: More than 600,000 cubic meters of earth and rock was excavated (enough to fill 240 Olympic-sized swimming pools) to create the Airport Trail Tunnel, which provides a thoroughfare for Calgary’s commuters.

The City of Calgary was interested in developing an east-west connector tunnel under the planned runway area to minimize travel time for an increasingly large number of commuters and to enhance the movement of goods. The City recognized that for the 620-meter-long, cast-in-place tunnel to happen and remain affordable, it needed to be designed and built before construction of the new runway at YYC was completed. PCL, Parsons, and Dufferin (PPD) were also awarded the Airport Trail Tunnel project as a joint venture initiative for the City of Calgary.

The PPD team worked with the City and the consultant, CH2M Hill, to develop a construction plan and budget for the Airport Trail Tunnel that would meet the demanding two-and-a-half-year schedule. This aggressive schedule was precipitated by the need to complete the tunnel and backfill around it without affecting the Runway Development Project.

Excavation progressed 24 hours a day, seven days a week. The team built the cast-in-place structure in double shifts through the winter. Four sets of tunnel forms on rails allowed for quick transitions between segment pours, and tents above the formwork protected the concrete while it was poured, and as it cured through all types of weather.

With six traffic lanes and two potential light rail transit (LRT) lanes to accommodate possible future LRT C-Train expansion, the tunnel provides a means for Calgarians to keep up with the vast growth of their city.
Built in 1962, Dodger Stadium is the largest baseball park in the major leagues, and has always had arguably the best seats in the game with perfectly constructed sightlines. New owners Guggenheim Partners, led by chairman Mark Walter and owners Earvin Johnson, Todd Boehly, Bobby Patton, Peter Guber, and Dodgers President and CEO Stan Kasten saw a number of ways, however, to improve the fan experience even further.

With this recent construction, Dodger Stadium now boasts additional entrances convenient for ticket holders who arrive on foot or by public transportation. Attendees can stroll freely through concourses, in pedestrian outfield plazas, and to lounging areas that overlook the bullpens. More food options are available, including new outdoor grills, Tommy Lasorda’s Trattoria, the Think Blue BBQ, and an expansion of the popular LA Taqueria concession stand. Nor is good sportsmanship neglected; the visiting team’s clubhouse was expanded and moved closer to the visitors’ dugout and to the batting tunnel and conditioning area.
ON TRACK IN THE OFF SEASON

It’s in the nature of a baseball stadium renovation that work must be completed between seasons. The Dodgers played into the 2013 post-season and, although good news for fans of the club, this shortened the limited construction timeframe even further. But by the end of the year, the necessary permits and funding were in place, and demolition and excavation began before the New Year. With the next season’s exhibition games less than three months away, it was crucial to use time wisely before construction even began.

One of the ways the project team mitigated the compressed construction schedule was by procuring items with long lead times, such as glazing systems and structural steel, early, so they would be on-site when needed; where that proved impossible, the use of quality alternatives helped compress the schedule.

BUILDING ON FILL

Tying together the primary structure of Dodger Stadium with the pavilions in the outfield was a challenge from the start. Several elevations had to meet and coordinate with the original structure. Some of the foundations had to be built on bedrock and others on fill, yet it all had to form a cohesive whole. What’s more, the fill was uncertified. In California, it is not permitted to build on uncertified fill without putting in piles. To do so would easily have cost a month in schedule and $200,000, so the project team worked with the structural engineer to design a mat foundation—a type of structure that is set directly on grade and provides load-bearing capacity in expansive or rocky soil, or on that which water has made prone to collapse.

The team then consulted with the City of Los Angeles to have this solution approved without altering the structural foundation. This aspect of the job is hidden from view and is “not one you will ever see on a postcard of Dodger Stadium,” said Janet Marie Smith, senior vice president of Planning and Development for the LA Dodgers, “but it was crucial to the project.”

When fans arrived for the start of a new season in spring 2014, they found the timeless mid-twentieth-century building they love, renewed for a twenty-first-century experience.

“PCL helped us map out a schedule and really stuck to it. And they managed to keep us from doing a lot of inefficient things in the name of being in a hurry.”

Janet Marie Smith—senior vice president of Planning and Development for the LA Dodgers
Spanning the Thea Foss Waterway in Tacoma, Washington, the Murray Morgan vertical-lift bridge is a lifeline between downtown Tacoma and the Port of Tacoma. The people of Tacoma celebrated the bridge’s 100th birthday in February 2013—but the centennial celebration wasn’t always a foregone conclusion.

Washington State officials barred vehicles from crossing the bridge in 2007. With a sufficiency rating of 2 out of a possible 100, this was the safe choice. Shortly after, the bridge was marked for demolition—it was an unsafe relic that had suffered years of delayed maintenance and repairs. After a vigorous campaign to save the Murray Morgan Bridge (led by local preservationists, elected officials, and civic boosters), the City of Tacoma obtained the bridge from the State of Washington and set out to rehabilitate the landmark.
Due to the poor condition of the bottom chord and the way the bridge was constructed in 1912 using an existing bridge as a temporary support, replacing the bottom chord of the lift span was a major issue. The use of high-strength steel rods by the project team was an innovative approach that saved both time and money.

Tom Rutherford, PE—project manager, Public Works Engineering, City of Tacoma

A CHALLENGING PROPOSAL

The City of Tacoma had a very tight budget for this project—$57 million (a third of which was raised by the City) to rehabilitate the bridge from a sufficiency rating of 2 to 80. The project used the design-build delivery method, meaning that the proposal needed to present, within budget, firm solutions for a rehabilitation where many variables were yet unknown. With only a surveillance report, list of performance criteria, and confined budget to work from, this was a challenging proposal for the team to get right.

The proposal drew upon the experiences and lessons learned by both PCL and the designer, Hardesty & Hanover, on previous rehabilitation projects. In addition, they drafted the proposal after meticulous examination of the surveillance report the City provided, taking into account the sections in poor condition, and factoring in ways to use the sound areas to support the project and ultimately reduce costs. Finally, the proposal included a complete conceptual design. Though not a requirement, the conceptual design ensured that even minute details of the design concept were accurately communicated to the client at the outset.

Numerous parts of the Murray Morgan Bridge were in complete disrepair (hence, the sufficiency rating of only 2). Planning where to place equipment on the bridge in order to perform the rehabilitation work was a challenge owing to the poor condition of the structure. The bottom chords of the bridge trusses were especially compromised, and had become heavily corroded over the 100-year life of the bridge.

Generally, a project team will repair a bridge truss by temporarily supporting the load within the bottom chord while removing and replacing the deteriorated plies that comprise the truss chord. This is a very costly and time-consuming method of repair, but is usually considered the only option in cases of severe debilitation. To mitigate these costs, sound sections of the truss chord were used to support large-diameter, high-strength rods that serve as a new load path around the weaker portions of the truss chord. This negated the need to repair the damaged plies of the trusses and effectively doubled the capacity of the bottom chords. This work was completed with virtually no aesthetic impact and at a reduced cost to the client.

PHOTO: A member of the project team crosses over the Thea Foss Waterway on the top catwalk of the Murray Morgan Bridge.

PHOTO: The 100-year-old bridge is not just an important piece of Tacoma history; it serves to reduce response times for emergency vehicles and provides an egress by which people can efficiently exit the tide flats in the event of a crisis.
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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