BUILDING A VISION FOR THE FUTURE:
THE CANADIAN MUSEUM FOR HUMAN RIGHTS

MINING FOR SOLUTIONS:
EXPANDING AGRIUM’S VANSCOY POTASH MINE

GLACIER SKYWALK:
A PEEK THROUGH THE LOOKING GLASS AT SUNWAPTA VALLEY
THE PROJECT

The Canadian Museum for Human Rights (CMHR) is the first museum in the world dedicated solely to the evolution, celebration, and future of human rights. The museum, designed by internationally renowned architect Antoine Predock, treats visitors to an immersive, interactive experience intended to encourage reflection and dialogue and, it is hoped, change. The uniqueness of the building’s mandate is reflected in its architecture: sloped segmented walls, large vertical expanses, and a glazed façade and tower form a deceptively simple yet incredibly complex structure.

PHOTO: A visitor pauses in the Hall of Hope to take in the Canadian Journeys gallery at the museum.

COVER PHOTO: The Canadian Museum for Human Rights (CMHR) is the first museum in the world dedicated solely to the evolution, celebration, and future of human rights. The glass “cloud” surrounding the building’s southwest face is made of 1,300 individual pieces of glass.
VIRTUAL CONSTRUCTION FINE-TUNES ESTIMATING

The unusual form of the building meant that the structure and the architectural components could not be fully conceived through two-dimensional drawings, making the project extremely difficult to bid on and build using standard methods. To help resolve these issues, the team developed a fully integrated 3-D model of the building comprising information from 40 different companies located in Canada, the US, and Germany. This model allowed them to see and interact with the architecture and thereby mitigate potential issues.

As the complex geometry evolved, the team continually adjusted the details to ensure the model was technically and aesthetically correct and current. The increased potential for bidder risk would normally translate into higher project costs, but the real-time 3-D model allowed the team to identify accurate as-built-caliber quantities for particular trade scopes, resulting in competitive pricing.

“This was a very complex build, and PCL’s ability to carve out solutions as challenges presented themselves was a critical factor in ensuring a final product that Canadians can be proud of.”

Susanne Robertson—chief financial officer, Canadian Museum for Human Rights
BUILDING FROM THE TOP DOWN

One of the many striking architectural features of the museum included is the Hall of Hope. A series of individually illuminated, alabaster-clad ramps crisscross the hall, taking visitors from gallery to gallery and eventually to the Tower of Hope, a 328-foot-high glass structure with an observation deck that overlooks the Winnipeg horizon.

In most cases a building is built from the bottom up. The Hall of Hope, however, was built from the top down, allowing the team to start work at the apex of the space on a large skylight and on the topmost of the ramps. A forest of tube-and-clamp scaffolding 170 feet high filled the hall, and workers dismantled it as they went. Tube-and-clamp scaffold is less conventional than standard frame scaffolding, but the material is highly configurable and can be adapted to almost any height and shape. Every piece must be stick built, and it all requires extensive inspection and engineering to put in place.

The team also reengineered the main floor so it would support the weight of the scaffold. Building from the top down requires much foresight and planning; before you start to disassemble the topmost scaffolding and thus lose access to the upper reaches, what you have finished working on must be perfect in every detail.

And the details were perfect on opening day—the museum wowed and inspired and will continue to provide visitors an opportunity to learn from the past, and create change for our future.
MINING FOR SOLUTIONS: EXPANDING AGRIUM’S VANSCOY POTASH MINE

THE PROJECT

Used primarily as a fertilizer, potash is a high-value mineral that exceeds 58 million tonnes in production per year worldwide—approximately 18 million of which comes from Canadian sources.

The Agrium potash mine in Vanscoy, Saskatchewan, is a major contributor to the potash industry in Canada, and with the implementation of Project VAULT (VAnscoy ULTimate Expansion), the mine will have the capacity to make an even greater contribution.

The joint venture between PCL and SNC-Lavalin involved the expansion of the existing mine from a production capacity of two million tonnes per year to three million tonnes. This 50 percent projected increase will see the mine reach its ultimate capacity—and ensure the efficient extraction of potash for years to come.
When planning the expansion of an existing mine, the approach is often to increase the size and capacity of the old systems and equipment, and to work in and around existing infrastructure. This did not make sense at Vanscoy, where salt corrosion from years of potash extraction meant that it would be very challenging to modify and upgrade the old facilities to make way for the new equipment without disrupting production operations.

A working mine is a profitable mine, so the team put forward a solution that allowed for the new structure to be built next to the existing one and then the two tied together in the final stages of the project. This enabled Agrium to remain operational and continue to mine potash throughout the three-year-plus construction schedule.

This solution was mirrored throughout the project, as alternative design approaches were proposed at each new phase that would minimize disruption to the plant. As an example, the existing main raw-ore feed conveyor was scheduled to be revamped and its capacity increased. Instead of replacing the existing structure, the team recommended a new conveyor be installed alongside the old, which resulted in increased efficiency and fewer disruptions to mine activity.

Also challenging was the sheer number of people it took to realize Agrium’s vision. With approximately 4,000 individuals required to complete this project, the group had their work cut out for them.

PCL is a family of companies made up of a number of operating districts. Seven of those districts were engaged on this project, each having its own craft and staff resources. Access to these diverse regional resources, and to previously established relationships with craft personnel from across Canada, enabled the team to successfully attract and mobilize large numbers of people to the site at Vanscoy. The team also developed recruitment strategies to utilize labor from other markets when there were gaps in the availability of locally and regionally sourced labor.

A complex schedule provided the framework for this massive team to work day and night, seven days a week, bringing Project VAULT to fruition with minimal disruption to existing operational facilities and successful commissioning and start-up efforts for Agrium.

PHOTO: Construction in progress on the Agrium VAULT project. More than 730,000 cubic yards of earth was removed—enough to fill 224 olympic-sized swimming pools—and more than 20,000 tons of steel was used in the mine expansion.
PHOTO: Visitors to the curved, cable-supported, glass-floored walkway of the Glacier Skywalk in Jasper National Park are treated to unobstructed views of the Sunwapta Valley, including the path of the Columbia Icefield and the stages of environmental change that are taking place in the wake of the glacier’s retreat.

THE PROJECT

Close to two million visitors a year flock to Jasper National Park, one of Canada’s largest national parks and a UNESCO World Heritage Site, to enjoy the breathtaking mountain vistas. Brewster Travel Canada, a leading travel and tourism provider, had a vision to give those visitors a more adrenaline-filled and interactive experience. The result is the Glacier Skywalk, a cliff-edge experience that extends along the Sunwapta Valley, where visitors can learn about glaciology, geology, and the unique ecosystem of the Columbia Icefields while enjoying unparalleled views.

The low-impact ecotourism structure integrates seamlessly with the natural landscape that surrounds this magnificent area. The new kiosk building and six interactive displays are set up along a 400-meter split pathway along the mountainside. Visitors can take in the scenery while standing on a cantilevered, steel-and-glass floored observation platform that extends 35 meters from the cliff wall and 280 meters above the Sunwapta Valley.

GLACIER SKYWALK: A PEEK THROUGH THE LOOKING GLASS AT SUNWAPTA VALLEY

Visit http://tiny.cc/glacierskywalk to watch a video on the making of the Glacier Skywalk. The video tells the story of the Skywalk, how it was integrated into the mountain, the project challenges and outcomes, and the final product.
WORKING WITH MOTHER NATURE

Building anything in a national park is a rarity. Working in the park and directly on a mountain face posed significant environmental and logistical challenges. The area is home to mountain goats and bighorn sheep, as well as to a number of native alpine plant species, so it was critical that construction had a minimal impact on the surrounding ecology.

Adjustments were made to standard practices to accommodate the strict environmental and wildlife requirements for building in this protected area. Construction on the Glacier Skywalk had to ensure negligible impact to goats and sheep during their rutting and kidding seasons. A wildlife monitoring program tracked the animals during the course of the build, and workers were trained in the use of non-harmful deterrents to move an animal out of an area. Noise restrictions were placed on certain activities, areas were cordoned off to protect native plants, and daily environmental site reviews monitored erosion. Skilled operators performed selective blasting procedures when excavating footing pockets where the structure attaches to the cliff face, and a netting system installed on the vertical face captured debris.

PHOTO: Executing the complex design, which included blasting rock and securing the Skywalk to the mountain face, had to be performed under strict environmental and wildlife regulations that ensured minimal impact on the surrounding ecology.

TRANSFORMING A ROCK INTO A HARD PLACE

Even a mountain can be unstable. While blasting and excavating one of the footing pockets, the team encountered a large crack in the rock at the bottom of the north footing. This compromised the integrity of the underlying rock that was set to be the future foundation of the Glacier Skywalk. This complication had the potential to prevent the project from proceeding.

The challenge was to find a design solution to manage the fracture in the rock, and an installation method that was feasible on a precarious cliffside. After reviewing several scenarios, the team chose to use steel casings driven into place safely, and the project to continue on course, resulting in the timely delivery of the award-winning Glacier Skywalk.

PHOTO: The Glacier Skywalk began as an ambitious vision and a challenging project that would not have come to fruition without the expertise of PCL Construction and our other development partners, Sturgess Architecture and RJC Engineering. Because of their ongoing commitment to this project, we were able to provide an outstanding experience to the hundreds of thousands of visitors who came out to explore Jasper National Park and the Canadian Rockies this summer.

David McKenna – president, Brewster Travel Canada
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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