Aerial view shows progress on crane work during renovation of BMO Field. *Photo courtesy of PCL Constructors Canada Inc.*

Mammoet Canada Eastern uses two Demag crawlers to install a canopy at Toronto's BMO Field. *Photo courtesy of Canam-Heavy*

Camera captures wide-angle view of tandem lift of roof canopy during renovation to Toronto's BMO Field.
Photo courtesy of PCL Constructors Canada Inc.

Crawler works on BMO Field renovation with Toronto city skyline as a backdrop. *Photo courtesy of PCL Constructors Canada Inc.*

Toronto stadium renovation requires heavy machinery

Pair of lattice-boom crawlers from Mammoet lifts BMO Field canopies into place

SAUL CHERNOS

While Toronto FC won its North American Soccer League opening match May 7 to launch the team's newly renovated home at BMO Field, it was cranes that carried the weight of the stadium's transformation.

Renovations to the multi-purpose facility, originally built in 2007, were designed to accommodate pro sports and help drive the city's growing business and tourism sectors. The stadium will also become the new home of Toronto's Canadian Football League team and host the CFL's Grey Cup this fall.

"The two-year renovation of BMO Field is an important investment in our teams, our fans and the entire city of Toronto," said Larry Tanenbaum, chairman of Maple Leaf Sports and Entertainment, the stadium operator.

"This project not only gives Toronto FC one of the best stadiums in Major League Soccer but it also provides a world-class home for one of our city's sports treasures, the Toronto Argonauts. This facility will continue to boost Toronto's reputation as one of the premier sports and entertainment markets in the world and will play an important role in our championship aspirations."

$150 million project adds 8,000+ seats

The two-year, $150-million project was completed in phases in order to allow summer-season soccer and other sports events to continue.

From September 2014 to May 2015, crews added more than 8,000 seats, increasing capacity to 30,000, along with private suites, concession stands, a second deck in the east grandstands and a high-definition video board in the north end.

The second phase, which began last September, saw the installation of new football locker rooms and new lighting and sound systems, along with changes to accommodate a CFL field.

While there were many facets to the project, the installation of a massive roof structure, including separate canopies covering the east, west and south grandstands, called for particularly heavy lifting.

Mammoet Canada Eastern supplied two lattice-boom cranes to lift the canopies.

Demags perform tandem lift

A Terex Demag CC2800, a 600-tonne crawler, handled the east side, and a Terex Demag CC2400, a 400-tonne crawler, worked the west side. Crews then used both cranes to tandem lift the 490 U.S. ton south canopy into place.

The tandem lift was an especially challenging job. Crews assembled all canopies on site, but the south one was enormous — 115 metres long, 21 metres wide and 23 metres high. The two lattice-boom crawlers lifted and literally crawled it to where it could be incorporated into the overall roof structure.

The east and west roof canopies were also built on-site but raised in 100-by-40-foot sections.

Crews relied on detailed engineering plans to conduct all three canopy lifts without incident.

BMO Stadium capacity is now 30,000 after renovation added more than 8,000 seats. *Photo courtesy of PCL Constructors Canada Inc.*

First, four enormous "super columns" were engineered in each corner of the stadium to carry the colossal load of the roof trusses that cover the east, west, and south stands. The columns were then plugged into the bedrock underneath using a system of micro piles drilled seven meters below ground, with three enormous legs connected at various levels to support the load of the roof trusses.

What made things especially difficult for the cranes was that they had to remain outside the stadium to protect the playing fields.

This made sense given that the CC2400, brought in from the Netherlands specifically for the job, required more than 100 tractor trailers to transport it to the stadium site. The CC2800 is no small potatoes either.

"The challenge was navigating the cranes around the existing stadium into position," said Mammoet Canada Eastern's Jeremy Asher.

Steeve Boivin of Canam-Heavy, which oversaw the fabrication and erection of 3,600 tons of structural steel and other components, said the cranes stood right next to the sections of the building they were working on.

"The west side was a little bit more complicated due to the fact that we had an existing building on the other side, so the space between the two buildings was pretty narrow," Boivin said.

Sennebogen and Liebherr machines also called in

The various restrictions drove the decision to procure the two lattice-boom crawlers. "It was almost the biggest crane we were able to use with the dimension that we had," Boivin says.

While lifting the east and west canopies, the two lattice-boom crawlers enjoyed support — a 200-tonne Sennebogen 5500 assisted the CC2800, while a 300-tonne Liebherr LR1300 crawler worked with the CC2400.

Neil Barrows of PCL Constructors Canada, which oversaw the project, concurred that careful engineering and collaboration between all partners and workers — including PCL, Canam-Heavy, Entuitive as the consulting engineer, and Mammoet — were keys to ensuring the successful on-time achievement of the roof structure.

"The challenge was navigating the cranes around the existing stadium into position."
~ Jeremy Asher, Mammoet Canada Eastern

"The communication, planning and foresight on this project speaks volumes to the achievement of getting this complete for Toronto FC's home opener on May 7," Barrows said. "The importance of quality control and safety was top of mind, all the way down to the junior technical guys looking at the bearing pressure on soil and the existing conditions underneath the roadway where we were proposing to do the lifts."

While the canopies were the big deal, there were other big lifts, including 12 temporary shoring towers — six on the east side and six on the west — to support the 15 roof panels. Once the roof sections were fully installed and all trusses bolted, the towers were dismantled and taken away.

Weather poses challenges

Cranes were also used to hoist 3,600 tons of roof components, including girders and structural steel fabricated by Canam Group Inc., the parent company of Canam-Heavy, at its plant in Saint-Gédéon-de-Beauce, Qué.

While tight space restrictions and complicated heavy lifting dominated engineering discussions, weather also

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played a factor in planning.

"We tracked somewhere around 30 days that we lost for high winds, which is not out of the ordinary," Barrows said. "The big cranes were obviously a key component to getting the roof completed. The operators persevered, but when you're lifting roof panels that are 40 feet by over 100 feet they act like a pretty big sail up there in the breeze."

With the job completed, Mammoet Canada Eastern finds itself with the CC2400 the company brought in from the Netherlands. Ironically, the company had the larger CC2800 on hand, but its fleet lacked an available CC2400 at the time one was needed to navigate the tight spaces.

Stadium is the home pitch of Toronto's North American Soccer League club. *Photo courtesy of PCL Constructors Canada Inc.*

Stadium ready for Grey Cup

"It was the right crane — the right tool for the right job," Mammoet's Asher said.

"We have a massive global fleet of cranes that we draw from depending on where the work is and what's required," Asher added. "We're trying to find more work for it here. But if not it will go to Holland."

With the work done, and the Toronto FC into another playing season, the remaining action will be on the sports front. Scheduled events include the CFL's 104th annual Grey Cup championship in November, followed by an annual outdoor regular-season National Hockey League game known as the Centennial Classic in which the Detroit Red Wings play the Toronto Maple Leafs on New Year's Day.

BMO Field is owned by the City of Toronto, operated by MLSE, and named after its major corporate sponsor, which recently secured 10-year naming rights.

CHC

NEWS

Crane de-rating protocols under scrutiny in Ontario

Ministry of Labour spokesperson says potential for a serious incident has increased

JEFFREY CARTER

Ontario's Ministry of Labour is cracking down on the improper de-rating of cranes in the province.

"There is no change to the existing legislation, but the MOL has observed a general misunderstanding within the industry with respect to the requirements for de-rating of cranes, and acceptable practices for de-rating," ministry spokesperson Janice Deline said.

"MOL inspectors have recently observed newer cranes being de-rated to a much lower capacity in order to make use of operators with zero- to eight-ton training rather than employing an Ontario College of Trades licensed journeyman crane operator."

Deline said the ministry was approached by members of the construction industry who were concerned that de-rated cranes were being used unsafely by under-trained operators. It was found that some cranes were not physically altered – a requirement for de-rated cranes – to reduce their capability other than having a new load chart installed.

Mobile cranes are often de-rated in order to enable their use by a less qualified operator, ministry says. *File photo*

"We have heard directly from our field staff that the use of de-rated cranes has increased substantially and that the potential for a serious incident has increased in recent years," Deline said.

"In the past, it was very rare to see cranes de-rated, and it was limited to older cranes that might otherwise have been retired, in order to extend their useful life. In recent years, it has become more common for high capacity cranes to be de-rated to less than eight tons apparently for the sole reason of using a less qualified crane operator, which we believe is purely carried out as a cost-saving measure.

> **"In the past, it was very rare to see cranes de-rated, and it was limited to older cranes that might otherwise have been retired, in order to extend their useful life. In recent years, it has become more common for high capacity cranes to be de-rated to less than eight tons apparently for the sole reason of using a less qualified crane operator, which we believe is purely carried out as a cost-saving measure."**
>
> ***~ Janice Deline, Ontario Ministry of Labour***

"While we believe physical alterations of a crane can be safely made to extend the working life at a reduced capacity, it has become common for users of cranes to attempt to de-rate cranes electronically for single jobs, or short term use. The MOL wants to send a message that his practice of using unqualified operators for cranes that are called de-rated but have not been physically altered to reduce their capacity is unacceptable."

Under Ontario's Occupational Health and Safety Act, the operation of a mobile crane capability of lifting more than 16,000 pounds, or eight tons, can only be carried out by an operator with a certificate of qualification issued under the Ontario College of Trades and Apprenticeship Act. If a crane is de-rated to operate under 16,000 pounds, all that's needed by the operator is written proof of training or that the operator is being instructed and accompanied by a person with written proof of training.

De-rated cranes in Ontario must be accompanied with documentation of their new load capacity provided by the manufacturer or a professional engineer. In addition, the original load-rating chart must be removed and a new chart installed corresponding to the reduced rated capacity.

Finally, de-rated cranes must be physically altered so that their operators cannot return them to their original capacity in relationship to both weight and reach.

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