Redevelopment of Maple Leaf Gardens

Canadian Consulting Engineering Awards 2013

Submitted to:
Canadian Consulting Engineer

Submitted by:
exp Services Inc.

April 18, 2013

Confirmation
Receipt

Christina Cruz

From: entryForm@bizinfogroup.ca
Sent: Tuesday, April 16, 2013 4:07 PM
To: Christina Cruz
Subject: CCE Entry Form -- Redevelopment of Maple Leaf Gardens-- DO NOT REPLY

Project Name:	Redevelopment of Maple Leaf Gardens
Project Location:	60 Carlton Street, Toronto, Ontario
Completed By:	0 2012
Category:	A. Buildings
Entering Firm Name:	exp Services Inc.
Firm Address:	220 Commerce Valley Drive West, Suite 500, Markham, Ontario L3T 0A8
Project Role:	Structural Design and Project Administration
Member of the (ACEC)?:	Yes
Contact 1 Name:	Christina Cruz
Contact 1 Tel:	905.695.3217 x3722
Contact 1 Email:	christina.cruz@exp.com
Contact 2 Name:	Paul Sandford
Contact 2 Tel:	905.695.3217 x3728
Contact 2 Email:	paul.sandford@exp.com
Contact 3 Name:	Paul Sandford
Contact 3 Tel:	905.695.3217 x3728
Contact 3 Email:	paul.sandford@exp.com
P.Eng:	Yes

Summary:

Built in 1931 and declared a Heritage Building in 1991, Maple Leaf Gardens stood empty and unused for 12 years after the Leafs moved. In a unique partnership, the Gardens was redeveloped into a Loblaw store and Ryerson's Athletic Centre. Exp solved the complex Structural Engineering challenges of creating a new multi-storey building within the existing arena. The architectural heritage of this iconic building was preserved, and made accessible once again for Canadians to enjoy.

Innovation:

The redevelopment of Canada's landmark Maple Leaf Gardens was more than just a cosmetic renovation to an existing building. It was a complex redevelopment project with many engineering challenges requiring innovative solutions. Figuratively, constructing the new structure was similar to building a ship in a bottle. The exception, being that the bottle already contained a ship that had to be dismantled piece by piece without breaking the bottle. As the original interior structure was demolished the stability of the structure and the exterior walls were maintained by installing temporary steel bracing within the original concrete frames at the east and west sides of the building. At the north and south ends of the building, large box trusses, 10 feet deep and 26 feet wide spanning 202 feet were installed between the existing buttresses at the corners of the building. With the new parking level being 13' below ground level at the south side and up to 21' below ground level at the north side, significant portions of the exterior foundation walls required underpinning with a combination of traditional underpinning and mini-piles. At the corner buttresses which support the entire weight of the domed roof, caisson walls were installed adjacent to footings to laterally support the soil under them, while the surrounding area was

excavated down to the parking level. Throughout the demolition and construction, the existing structure and exterior walls were remotely monitored around the clock for any movement through the use of an OSMOS system. Alarms were sounded and work stopped if movements exceeded a pre-determined safe threshold. The new construction within the building is a combination of cast-in-place concrete and structural steel. The majority of the building is concrete with both flat slab and beam and slab systems used. The slab below the rink is extremely critical because of the flatness requirements for the rink slab. Structural steel framing was used in the long span areas of the building. Because of limited access into the building and the long reaches required for steel erection, much of the upper steel was erected early in the construction. As the new interior structure was completed and connected to the original exterior, temporary bracing and the last remnants of the original interior were removed. Final removal of construction equipment was through a temporary opening in the roof of the Gardens.

Complexity:

No single aspect of this project can be highlighted without understanding the complexity of the design and the risks inherent in preserving a heritage building. Afterall, complexity leads to innovation. Constructing a multi-use parking, retail and athletic centre is in itself not uncommon, but to do it inside a heritage building with limited access for materials and equipment while preserving the historic brick façade and domed roof, this requires detailed engineering and planning to ensure that the structure is safe and stable during all phases of demolition and construction. A major driver in the design, demolition and construction was access into the building. For much of the construction, the only access in and out of the building was a new opening 18 feet wide and 15 feet high at the north side onto Wood Street where a new loading dock would eventually be constructed. The sequence of construction and the methods of construction were dictated by this door. As construction moved from south to north, upper floors to the south were completed before lower floors to the north were started. The design of these floors was modified during construction to suit the sequence of construction. New floors were often temporarily shored to allow construction equipment into the site. A temporary roof opening was created to allow mechanical equipment into the building and to retrieve construction equipment that was no longer required.

Social & Economic Benefits:

In the twelve years that Maple Leaf Gardens stood empty, the area around Carlton and Church Streets became stagnant. Local restaurants that had once thrived when the Leafs were playing at the Gardens, had closed their doors. With the exception for Ryerson University nearby, there had been little new construction activity. With the opening of Loblaws and the Mattamy Athletic Centre (Official name of Ryerson's Athletic Centre) the corner of Carlton and Church Streets, is once again filled with excitement. The Loblaws store has proved so successful that it is open from 7:00 a.m. to 11:00 p.m. every day. It has created jobs for the community and a place to gather as with The Mattamy Athletic Centre. It is not just of great benefit to Ryerson Students, but to the local community as well. Recently, the Mattamy Centre was the venue for the Ontario Liberal Leadership Convention. Through its adaptive reuse, Canadians can once again experience the ambience and history of Maple Leaf Gardens.

Environmental:

The Redevelopment of Maple Leaf Gardens is the very definition of adapted reuse. Unlike other historic arenas in Boston, Detroit and Chicago that were completely demolished, the existing heritage structure was preserved and the Gardens lives on.

Client Needs:

The Redevelopment of Maple Leaf Gardens was an ambitious partnership between two unlikely organizations with different agendas, but a common goal. Loblaws was determined to have a downtown presence for their retail store and Ryerson was in need of an Athletic Centre for their sports teams, primarily their hockey, basketball and volleyball teams. Loblaws required a store at ground level with adequate parking. They also required a loading dock for just-in-time delivery. Ryerson needed an arena with seating for at least 2500 people close to their campus. They also needed a gymnasium and training facilities. Both partners required their building as quickly as possible. Demolition started in January 2010 a few weeks after the first start-up meeting although the final design was still just a concept. As the design was developed, construction drawings were issued to the contractors on a floor by floor basis. Construction strategies were developed to enable demolition, excavation and construction to proceed simultaneously. Loblaws and the Level 2 retail were able to open in November 2011 and Ryerson opened September 2012. Exp was able to meet these goals by close collaboration with the Owners, Architects, Contractors, City of Toronto and other subconsultants.

Entry Consent Forms

Project Owner 1: LOBLAW

CANADIAN CONSULTING engineer

ASSOCIATION OF CONSULTING ENGINEERING COMPANIES | CANADA
ASSOCIATION DES FIRMES D'INGÉNIEURS-CONSEILS | CANADA

ENTRY CONSENT FORM
CANADIAN CONSULTING ENGINEERING AWARDS 2013

INSTRUCTIONS

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I (We) confirm that this entry complies with the contest rules and that the information submitted is accurate.

I (We) also agree to accept as final the decision of the panel of jurors.

Name Paul Sandford

Position Chief Engineer

Company exp Services Inc.

Address 220 Commerce Valley Drive West, Suite 500

City Markham Province Ontario Postal Code L3T 0A8

Tel. 905 695 3217 E-mail paul.sandford@exp.com

Signed [signature] Date April 9, 2013

2. TO BE COMPLETED BY PROJECT OWNER

I (We) agree with and support the entry of the above project into this awards program, and the release for publication of the information supplied.

Name Onofrio Marcello

Position VP of Construction

Company or Organization Loblaw Properties Limited

Address 1 President's Choice Circle

City Brampton Province Ontario Postal Code L6Y 5S5

Tel. 905 459 2500 E-mail Onofrio.Marcello@loblaw.ca

Signed [signature] Date April 9/2013

CANADIAN CONSULTING engineer

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ASSOCIATION DES FIRMES D'INGÉNIEURS-CONSEILS | CANADA

ENTRY CONSENT FORM (continued)
Canadian Consulting Engineering Awards 2013

3. TO BE COMPLETED BY ENTERING FIRM'S CLIENT (If not the same as the Project Owner)

I (We) agree with and support the entry of the above project into this awards program, and the release for publication of the information supplied.

Name John Chow

Position Principal

Company or Organization Turner Fleischer Architects Inc.

Address 67 Lesmill Road

City Toronto Province Ontario Postal Code M3B 2T8

Tel. 416 425 2222 E-mail chow@tfai.com

Signed _____ Date _____

4. TO BE COMPLETED BY ENTERING FIRM, PROJECT OWNER, ENTERING FIRM'S CLIENT

PERMISSION TO PUBLISH THE PROJECT ON CCE'S WEBSITE

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Signed	Signed	Signed

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Send Project Entry Binders to:
Bronwen Parsons, Editor, Canadian Consulting Engineer,
80 Valleybrook Drive
Toronto, Ontario, M3B 2S9
Tel. 416 510-5119, bparsons@ccemag.com
Fax 416 510-5134

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Project Owner 2: RYERSON

CANADIAN CONSULTING engineer

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Position Chief Engineer

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City Markham Province Ontario Postal Code L3T 0A8

Tel. 905 695 3217 E-mail paul.sandford@exp.com

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Name Manuel Ravinsky

Position ASSOCIATE DIRECTOR, CAPITAL PROJECTS AND REAL ESTATE

Company or Organization Ryerson University

Address 350 Victoria Street

City Toronto Province Ontario Postal Code M5B 2K3

Tel. 416 979 5000 E-mail ravinsky@ryerson.ca

Signed [signature] Date 9 APR /13

CANADIAN CONSULTING engineer

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Tel. _____ E-mail _____

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Project Client 1: TFA

CANADIAN CONSULTING engineer

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Tel. 905 695 3217 E-mail paul.sandford@exp.com

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Name Onofrio Marcello

Position

Company or Organization Loblaw Properties Limited

Address 1 President's Choice Circle

City Brampton Province Ontario Postal Code L6Y 5S5

Tel. 905 459 2500 E-mail Onofrio.Marcello@loblaw.ca

Signed Date

CANADIAN CONSULTING engineer

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Project Client 2: BBB

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City Markham Province Ontario Postal Code L3T 0A8

Tel. 905 695 3217 E-mail paul.sandford@exp.com

Signed [signature] Date April 9, 2013

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Name Manuel Ravinsky

Position

Company or Organization Ryerson University

Address 350 Victoria Street

City Toronto Province Ontario Postal Code M5B 2K3

Tel. 416 979 5000 E-mail ravinsky@ryerson.ca

Signed Date

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Name Lawrence Lippold

Position Project Director

Company or Organization BBB Architects

Address 14 Duncan Street, 4th Floor

City Toronto Province Ontario Postal Code M5H 3G8

Tel. 416 591 8999 E-mail llippold@bbb.ca

Signed [signature] Date APRIL 12, 2013

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Project
Information
(10 pages)

Redevelopment of Maple Leaf Gardens

Canadian Consulting Engineering Awards 2013

Submitted by **exp** | 04.18.13

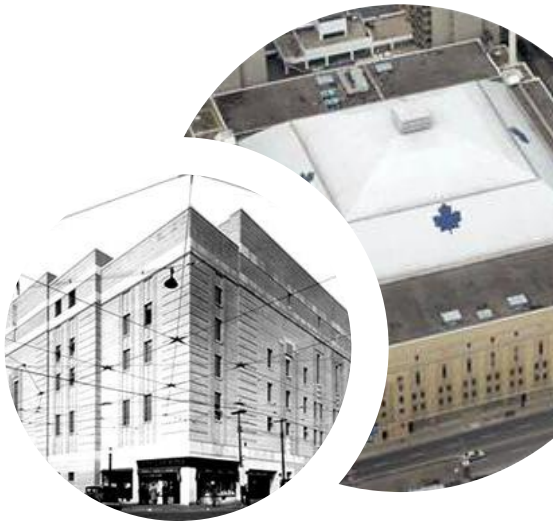
Project Summary

Built in 1931 and declared a Heritage Building in 1991, Maple Leaf Gardens stood empty and unused for 12 years after the Leafs moved. In a unique partnership, the Gardens was redeveloped into a Loblaws store and Ryerson's Athletic Centre. Exp solved the complex Structural Engineering challenges of creating a new multi-storey building within the existing arena. The architectural heritage of this iconic building was preserved, and made accessible once again for Canadians to enjoy.

exp Team Leaders

- Paul Sandford, P.Eng.
- Weimin Liang, P.Eng.
- Gordon Ho, P.Eng.
- Anthony Di Stefano, P.Eng.
- Andy Kaminker, P.Eng.
- Allan Parker, P.Eng.
- Godfrey Ng, P.Eng.

Project Highlights



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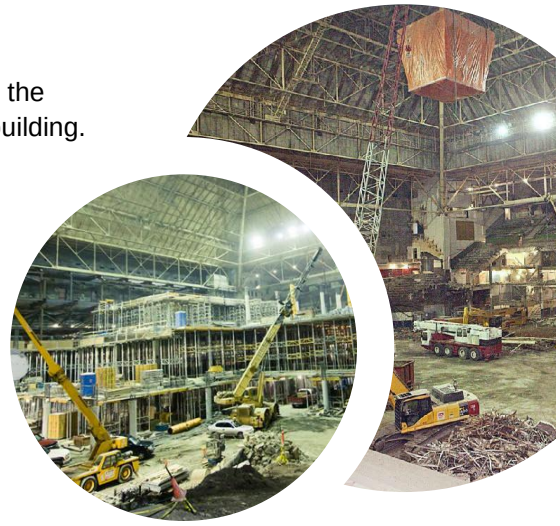

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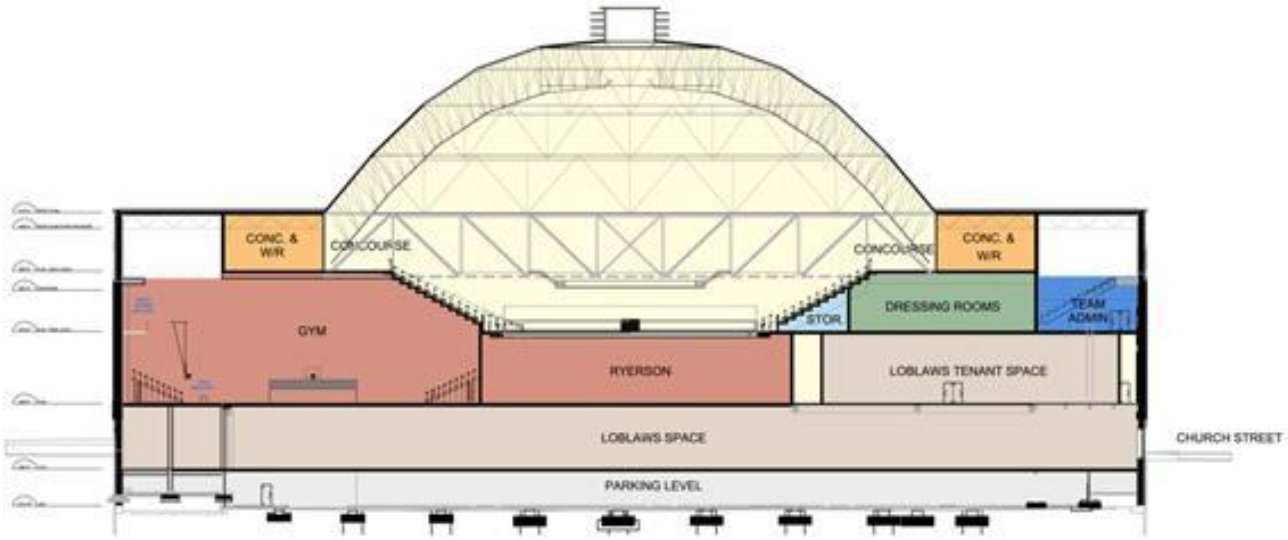
Project Photos

1. **Maple Leaf Gardens – 1931**

2. **Maple Leaf Gardens – Rendering**

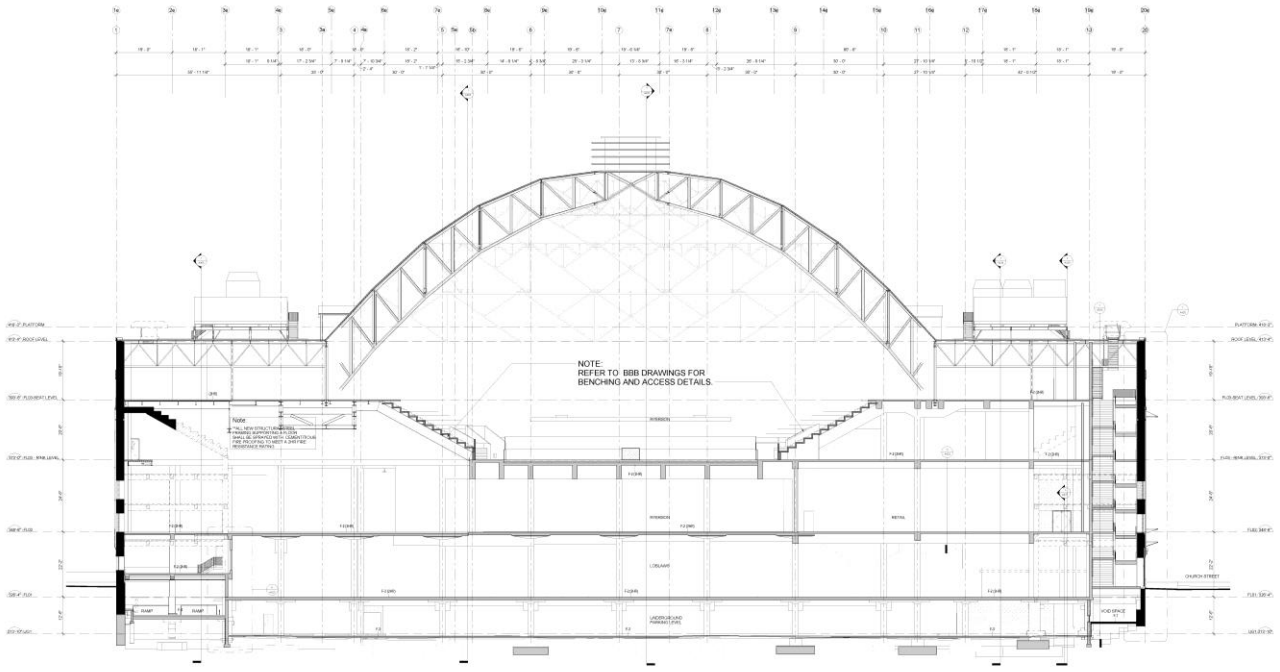
3. **Maple Leaf Gardens – 2012**



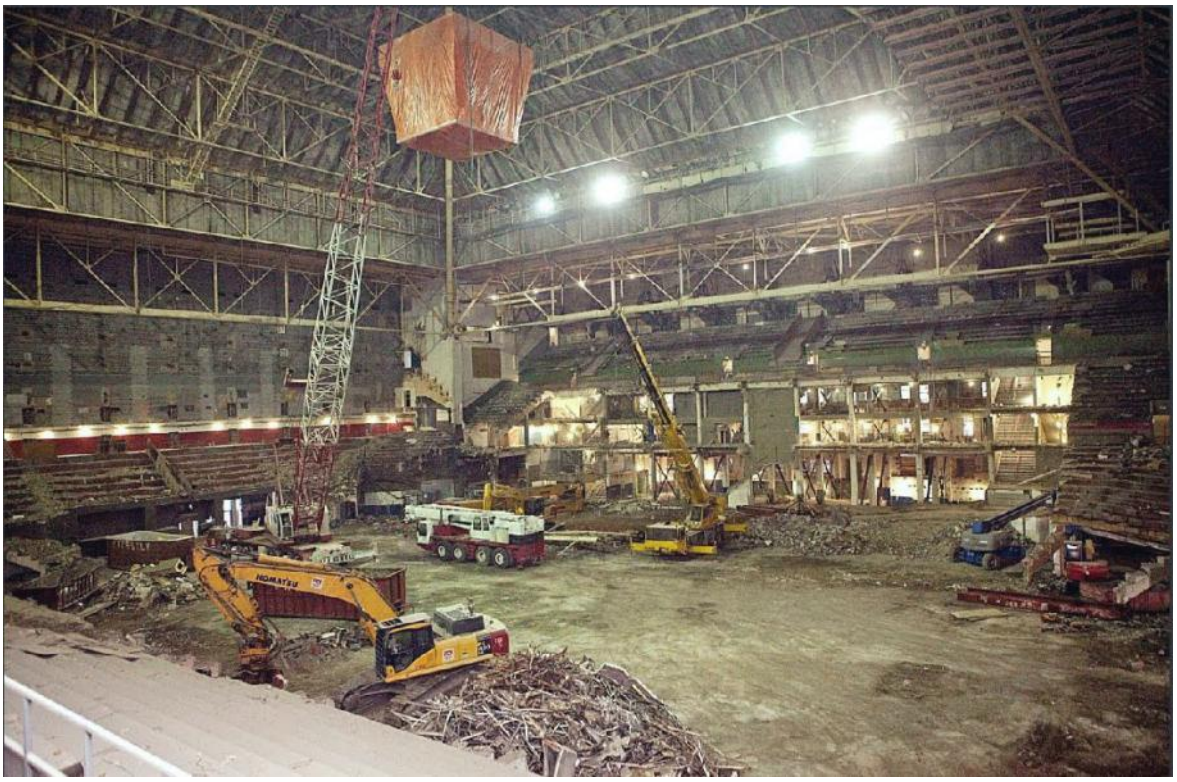
4. Building Section

Four new Levels were constructed within the original structure:

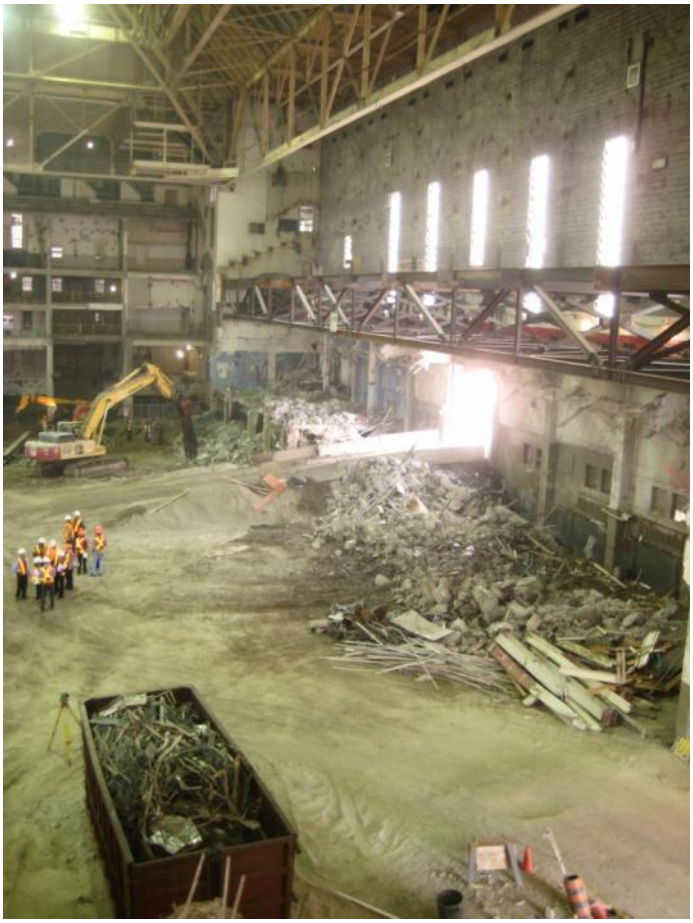
- Parking Level, 13 feet below Carlton Street,
- Level 1 at Carlton Street Level for Loblaws,
- Level 2 for mixed retail, Ryerson Gymnasium and workout areas,
- Level 3 the New Rink Level
- Level 4 the Concourse Level for the rink and for mechanical rooms.



5. Building Sections – Structural

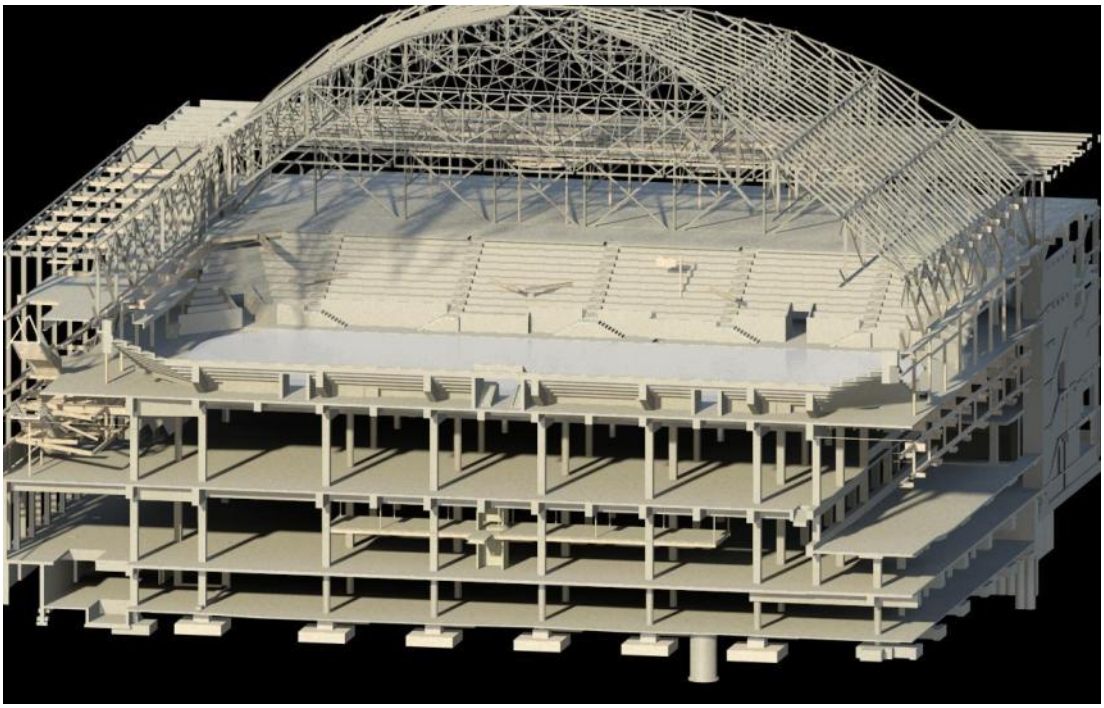


6. Demolition
The original seating bowl was removed except for a portion of the concrete frames that were required to support the exterior walls.



7. Box Truss
At the north and south ends, box trusses were erected piece by piece to provide stability to the exterior walls. The truss at the south end was entirely removed to make way for the Ryerson Main Entrance. The truss at the north end was only partially removed as it now supports the exterior wall where three columns were removed for the new loading dock entrance.

8. Temporary Bracing
Original concrete frames were temporarily braced to support the exterior walls until new interior structure was constructed. The final demolition of the original concrete frames could not take place until new structure was in place and connected to the walls.

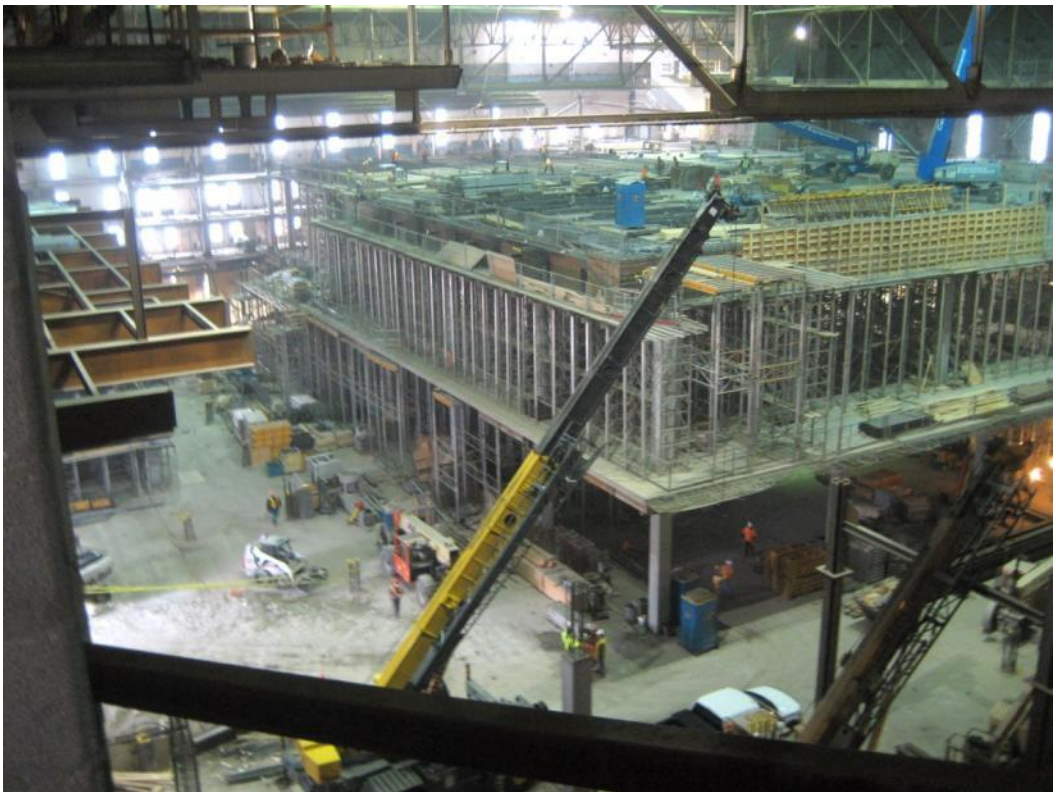


9. Revit Model
The new interior structure was integrated with the original building.

10. Caisson Wall
Caisson wall was constructed around corner buttress to allow excavation for lower level below footing level. The dome roof is supported on buttresses at 4 corners of the building

11. Mini-Piles
Along the west wall, the ramp from street level down 13 feet to parking required underpinning of the original wall footings with mini-piles.

12. West Side Shoring
The new Parking Level was below the existing foundations on the west side of the building but the concrete frames could not be demolished as they provided stability to the exterior walls. The frames had to be temporarily shored as new footings and columns were constructed. The new column on the left has been constructed but the column on the right is temporarily hanging.



13. Interior Core Construction
As the work on the exterior walls was proceeding, the interior core structure was being built simultaneously. The cranes are at the Parking Level.

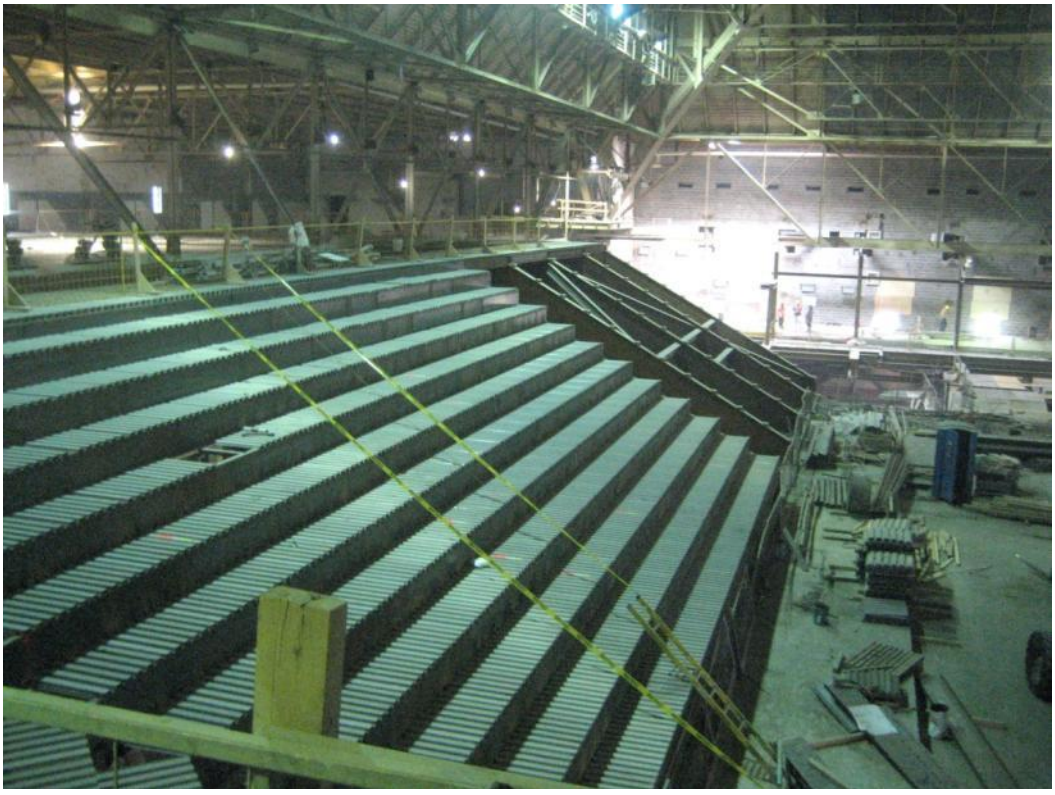
14. Three Gym Trusses
To support the long spans over the gymnasium, three large trusses 138 feet long were required. Because of the crane requirements, the trusses were installed early in the project as was structural steel at the upper levels in what can be termed a “top down” approach.

15. Concourse Steel above Gym
Steel work was erected above the concrete frames that were still required for lateral support of the exterior walls.

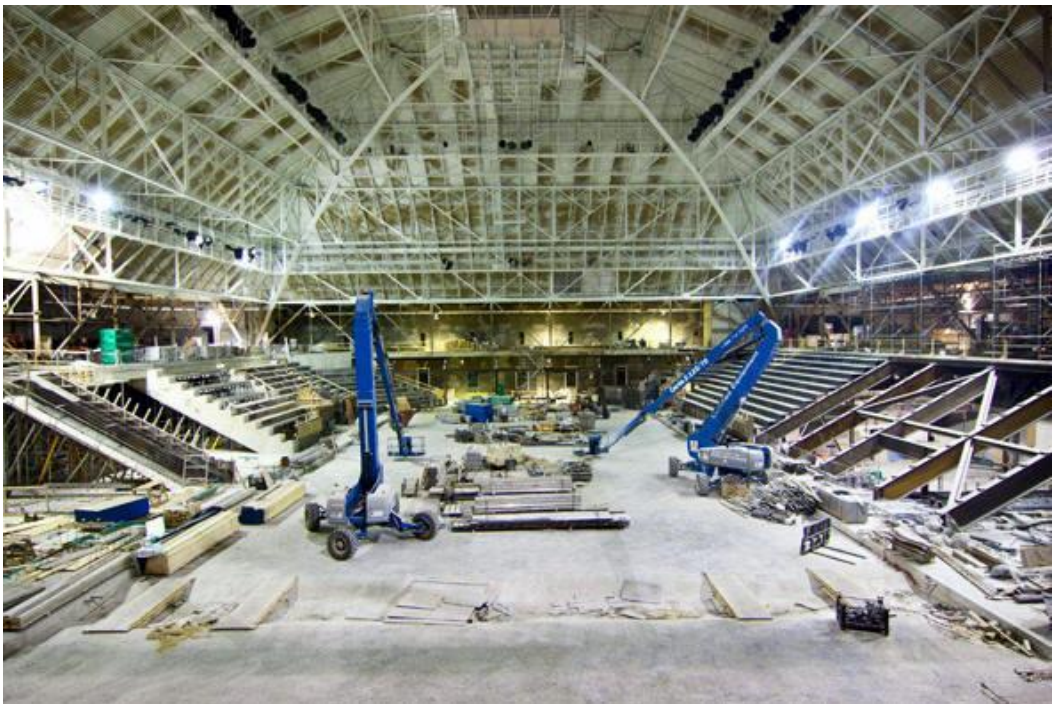
16. Gym West Wall

The west wall of the gymnasium is free standing from Level 2 up to Concourse Level. Pairs of steel columns were inserted through the concrete floors to support both the walls and the Concourse Level above. Once the steel framing was in place at the Concourse Level, the concrete frames could be demolished. The steel platform is a viewing platform at Level 3 looking over the gymnasium at Level 2. At this stage of construction Level 2 has not been constructed, the cranes are at Parking Level.

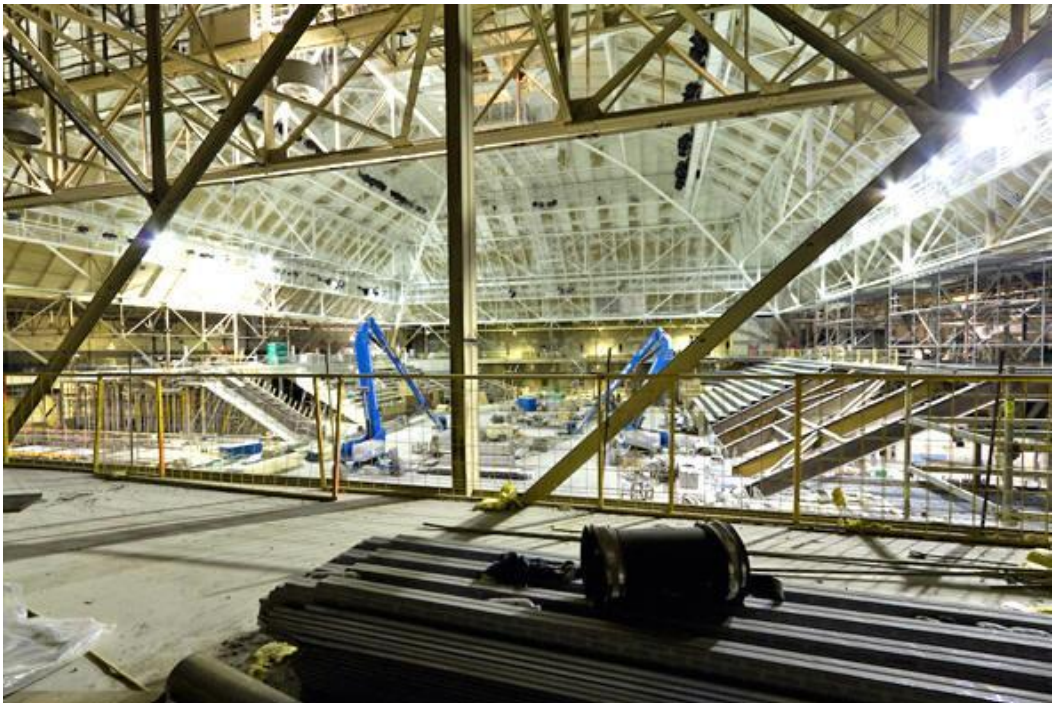
17. Gymnasium Shell
Bleacher seats and Concourse for the rink are directly above the gymnasium.



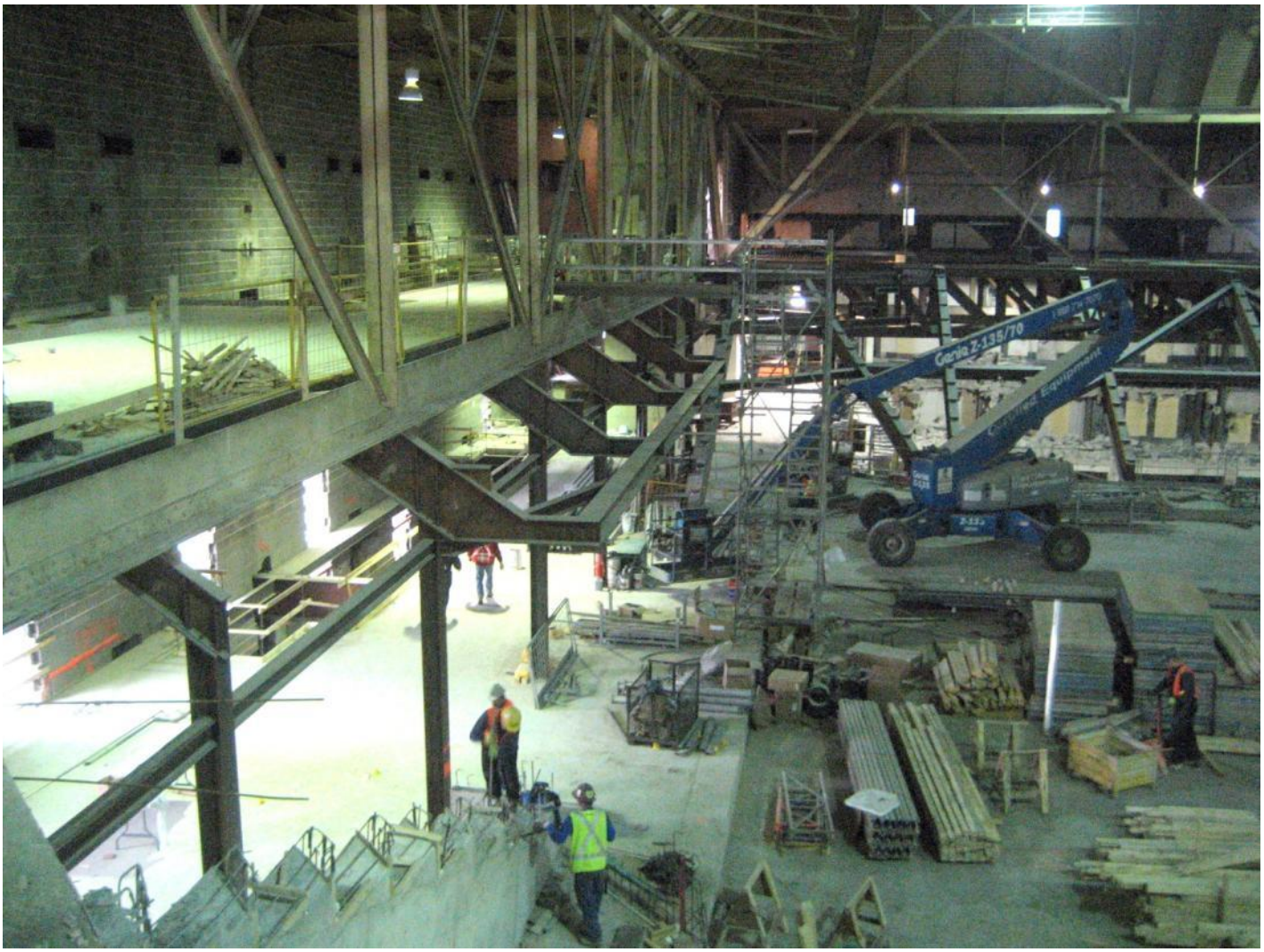
18. Rink Bleachers
The framing over the gymnasium is structural steel because of the long spans. The remainder of the bowl is cast-in-place concrete.



18. Rink Seating Bowl
The rink slab is constructed within a 12 inch deep depression in the structural slab.

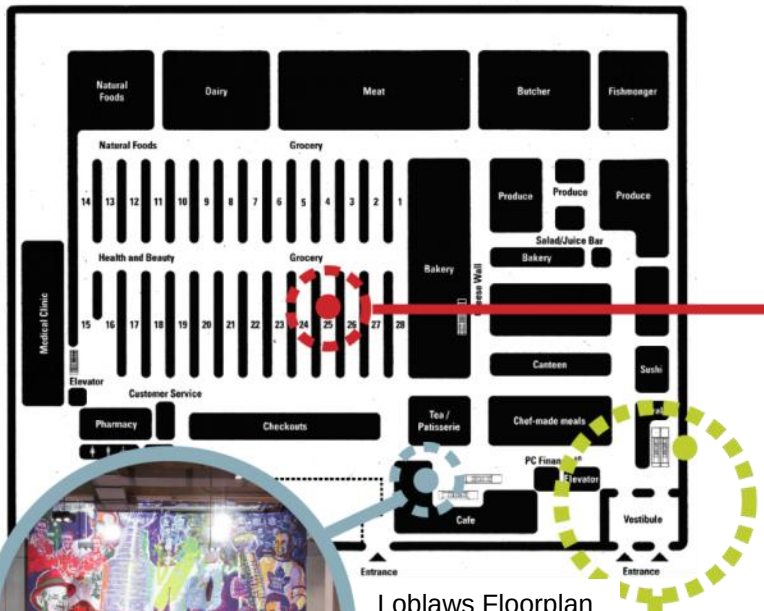


20. View from North Concourse
Structural steel for the Concourse Level was erected early in the construction schedule to allow crane access. Although the floors pass through the original roof trusses, the new floors are independent of the trusses to allow the trusses to float freely on their bearings as originally designed in 1931.

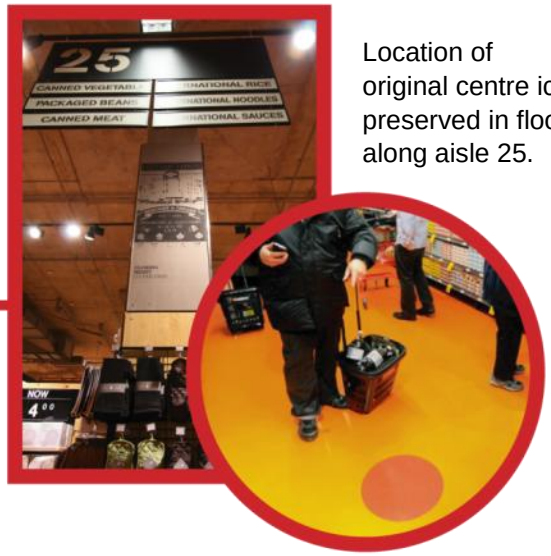


21. End Blues

At both ends of the rink, seating reminiscent of the “End Blues”, cantilevers out from the Concourse Level.



Loblaws Floorplan

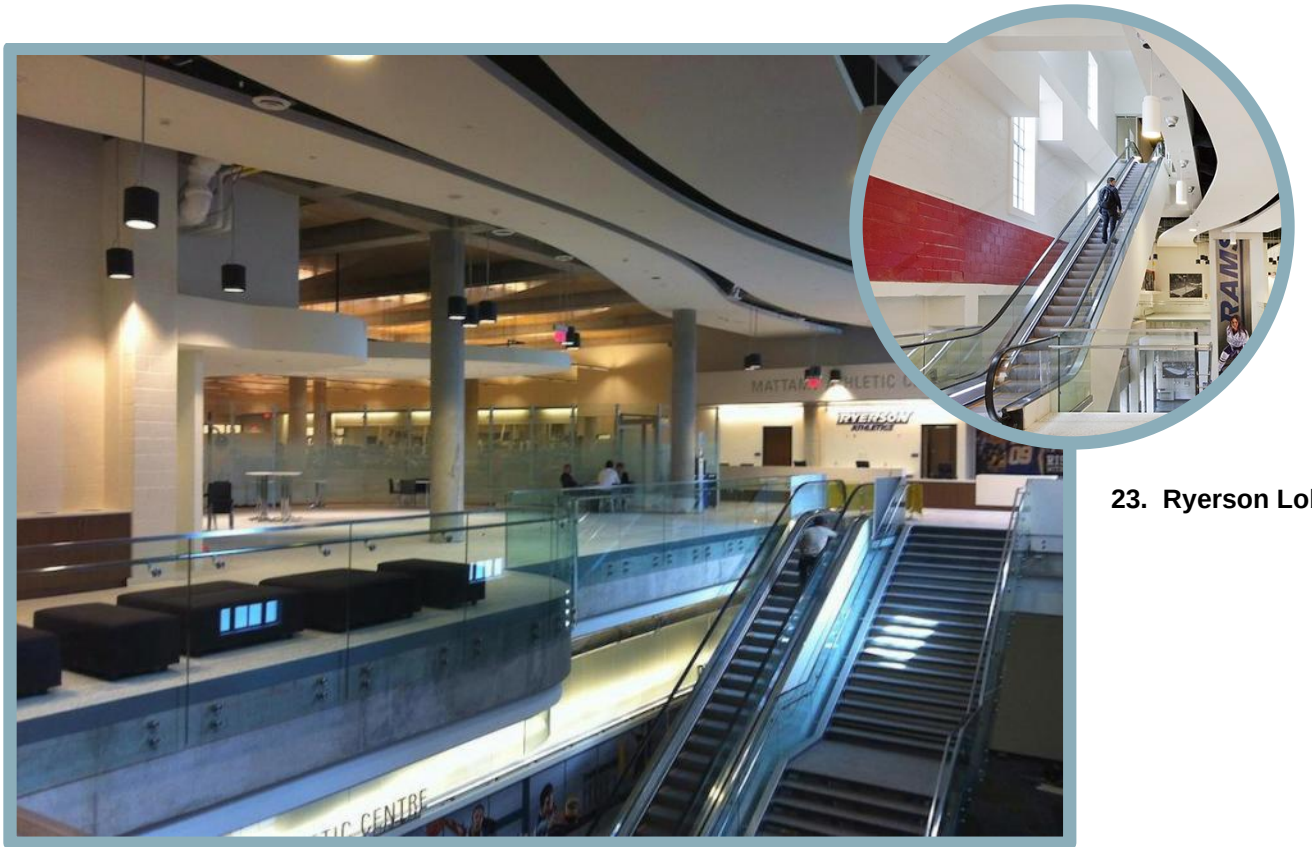


Location of original centre ice preserved in floor along aisle 25.

Maple Leafs mural from Gardens has been reproduced.

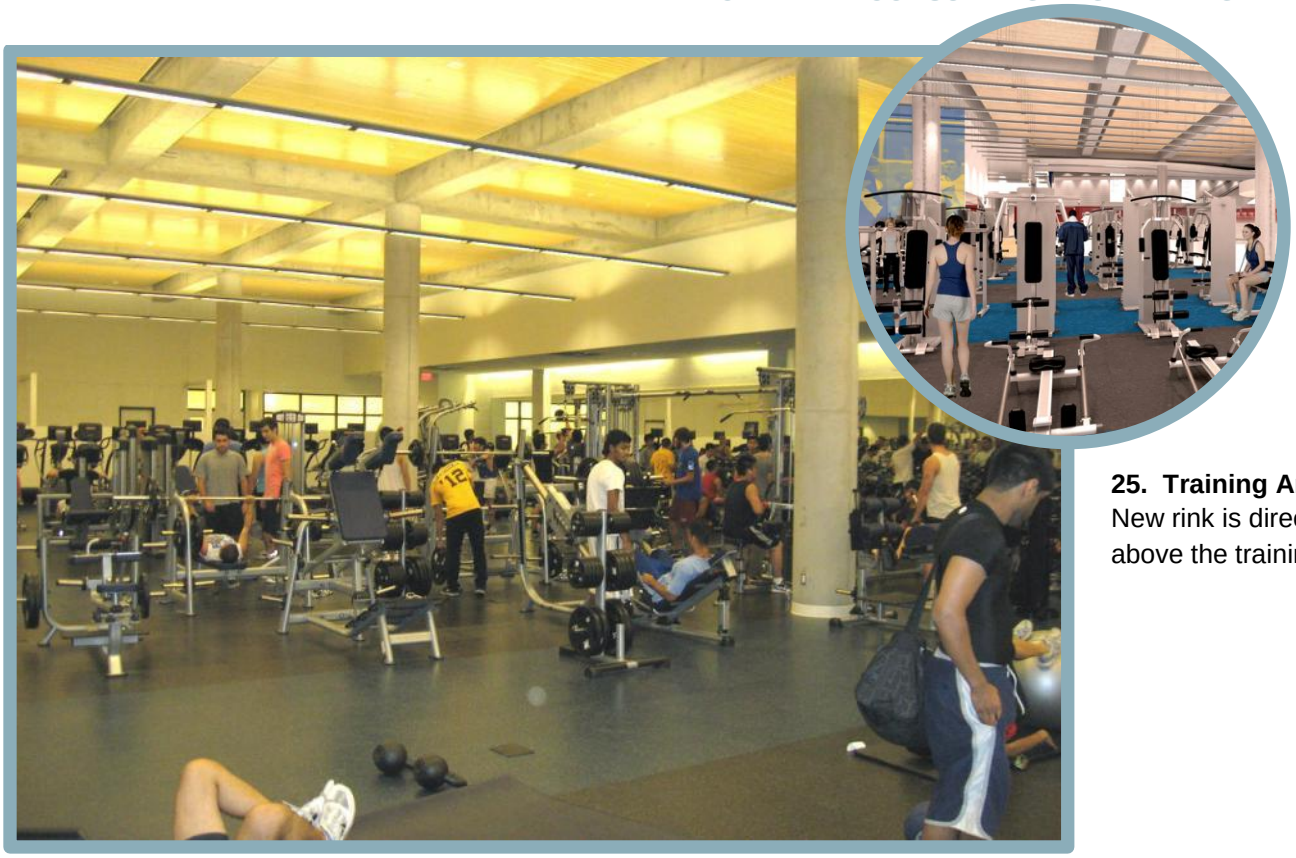
Maple Leaf Sculpture made from original seats is suspended from steel columns that brace the exterior wall.

22. Loblaws' Entrance
Original exterior masonry wall remains exposed and storefront windows have been reinstated along Church Street. Original light fixtures have been refurbished.



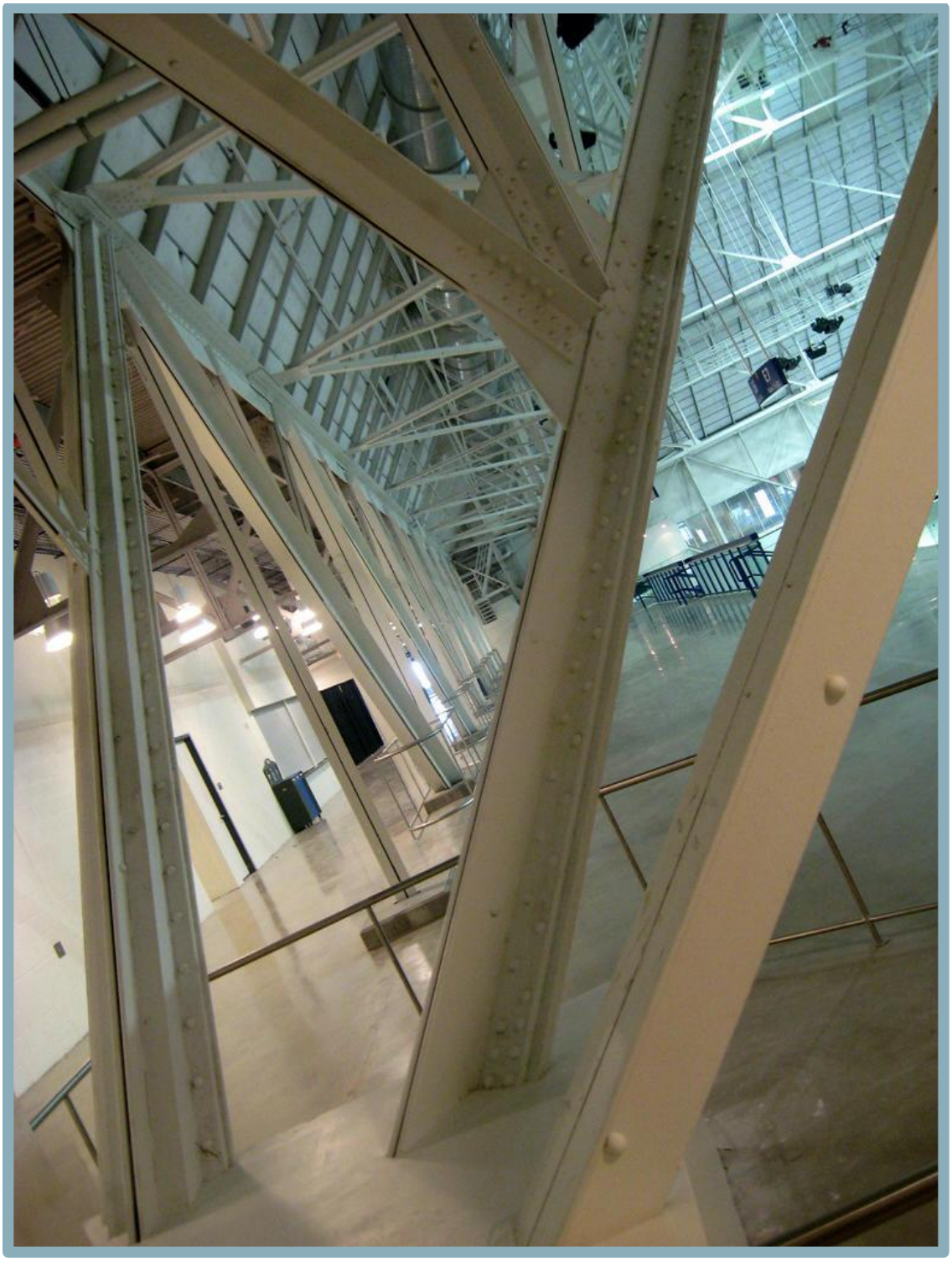
23. Ryerson Lobby

24. Ryerson Gymnasium



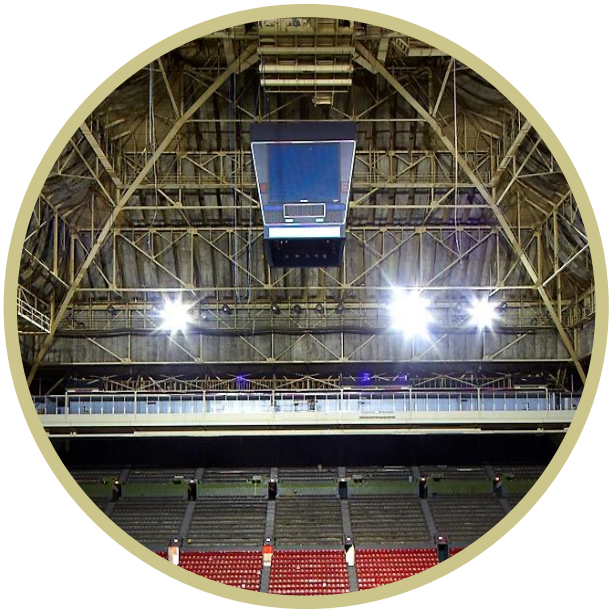
25. Training Area
New rink is directly above the training area

26. Rink
The top of the original roof dome is still 98 feet above ice level.



27. Concourse
The Concourse Level weaves through the original roof trusses but is not attached to the trusses.

28. Ryerson's New Arena – The Mattamy Athletic Centre



29. Original Roof Dome

30. Final Roof Dome