

ARCHITECTURAL MERIT

QUEEN RICHMOND CENTRE WEST



PROJECT CREDITS

OWNER

Allied Properties REIT

ARCHITECT OF RECORD

Sweeny & Co Architects Inc.

ENGINEER OF RECORD

Stephenson Engineering Ltd.

GENERAL CONTRACTOR

Eastern Construction Company Limited

FORMING CONTRACTOR

Alliance Forming Ltd.

MATERIAL SUPPLIER

St Marys CBM

ADDITIONAL PARTICIPANTS

- Aluma Systems
- BASF Canada Inc.
- Carpenters Local 27
- Ecovert
- Gilbert Steel Limited
- Ironworkers Local 721
- LIUNA Local 506
- United Floor Ltd.

PROJECT FACTS

LOCATION Toronto, Ontario

COMPLETION August 2015

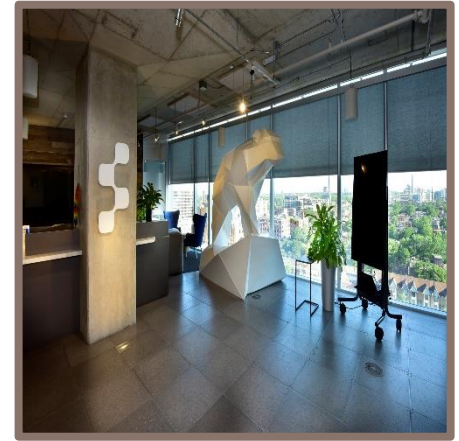
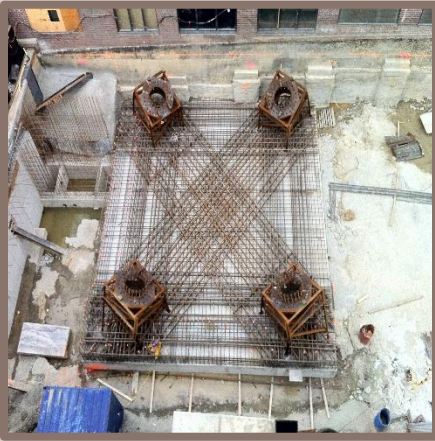
COST \$88,000,000

PROJECT SIZE 300,000 s.f.

QUICK PROJECT SUMMARY

The project involves the adaptive re-use of two 5 floor historic buildings in Toronto's downtown Entertainment district and construction of a new 11 floor, 250,000 square foot, concrete, office tower above the existing buildings.





Queen Richmond Centre West, developed by Allied Properties REIT and built by Eastern Construction, offers a brilliant example of adaptive re-use through its integration of two existing heritage buildings into the construction of a new 17-storey office building. The new office tower springs from a tabletop that spans above both buildings (70-feet above street level) and is perched atop three architecturally-exposed structural steel delta frames comprised of 40-inch diameter concrete-filled steel pipes and 35,000-pound cast steel nodes. The innovative delta frames create a soaring open-air atrium that sets this development apart from any other, with the cast steel nodes, allowing each of the delta frame's legs to effortlessly curve while subtly merging with its neighbouring legs at a point 35-feet in the air.

The project team utilized BIM, 3-dimensional solid modelling, numerical stress analysis, computational fluid dynamics, and casting solidification modeling, in addition to state-of-the-art rapid prototyping, CNC-tooling production, 5-axis machining, and laser scanning technologies in the design, engineering, and production of the cast steel nodes and construction of the overall commercial development.

Concrete is an important architectural feature as well as being prominent structurally. This modern office facility has exposed concrete ceilings and columns, with mechanical, power and communication systems contained within a raised steel floor.

This concrete design is important in creating an energy efficient building that will achieve LEED Gold certification. Keeping the mechanical systems under the raised flooring results in a lower flow of air and less energy use. The area under the floor is pressurized. The office area is not pressurized, resulting in a quiet, more comfortable working environment.

Concrete ceilings are exposed, with only light fixtures and sprinklers visible. This creates an unobstructed, pleasing appearance. It also allows for efficient lighting with fixtures that reflect and disperse light up to the concrete ceiling surface. Automated perimeter "light shelves", reflect exterior sunlight into the work space, and allow dimming of the lighting system with resulting energy savings. The total area of exposed concrete ceiling totals 285,000 square feet. Quality features of the ceilings include tapered drops at column locations, vertical piping hidden in pockets within concrete columns, consistent formwork joint layout, consistent colour and texture of concrete finish.

Concrete is also an important architectural feature in the ground level atrium. The 12,000 square foot atrium, with an 80-foot-high wood ceiling, has an exposed aggregate, ground and polished, concrete floor.

The architectural features described above would not be possible without the structural contributions of concrete at this project. A total of 17,750 cubic meters of concrete was poured.



The 7th floor structural steel "table top" provides the base for the concrete tower. The table top is supported by 2 concrete elevator cores, one concrete stair core, new concrete floors and columns in a heritage 5 floor building (replacing the original wood structure) and 3 structural steel, concrete filled "delta frames".

Each of the 4 lower legs of each delta frame is supported by caissons which are bound together by large, heavily reinforced concrete bases. Each delta frame base held 350 cubic meters of concrete, poured monolithically, with Mass Concrete procedures required. Mix designs and pouring and curing procedures needed to be in place to keep the internal concrete temperature below 70 degrees Celsius and to minimize the differential temperature between surface and core. The mix design was 35 MPa at 56 days, Class C-1, pumpable, with admixtures to extend the heat of hydration time. Due to summer heat conditions, nitrogen cooling was used at the concrete plant to keep concrete temperature below 10 degrees Celsius when leaving the plant. Temperature probes in the footings confirmed a maximum core temperature of 53 degrees Celsius and a maximum differential between core and surface of 10 degrees Celsius.

Cold weather concrete mix designs, tarped enclosure and temporary heating of the 80-foot-high Atrium allowed a successful pour of the concrete on steel deck at the 7th floor during February and March of 2014.

After the curing of the 7th floor and prior to the forming of the 8th floor, each of the 2-metre diameter, 80 feet high steel legs of the delta frames had to be filled with concrete from the base of the legs. A 45 MPa, flowable, pumpable, low shrinkage concrete mix was used.

In summary, concrete was a principle construction element in a design solution which allowed preservation and adaptive reuse of two heritage buildings and intensification of the site with the addition of new office space. The result is a distinctive, cost effective, energy efficient building. The impressive, publicly accessible, Atrium and the appearance of the office tower "floating" above the heritage buildings adds new life to this location west of the downtown core.

