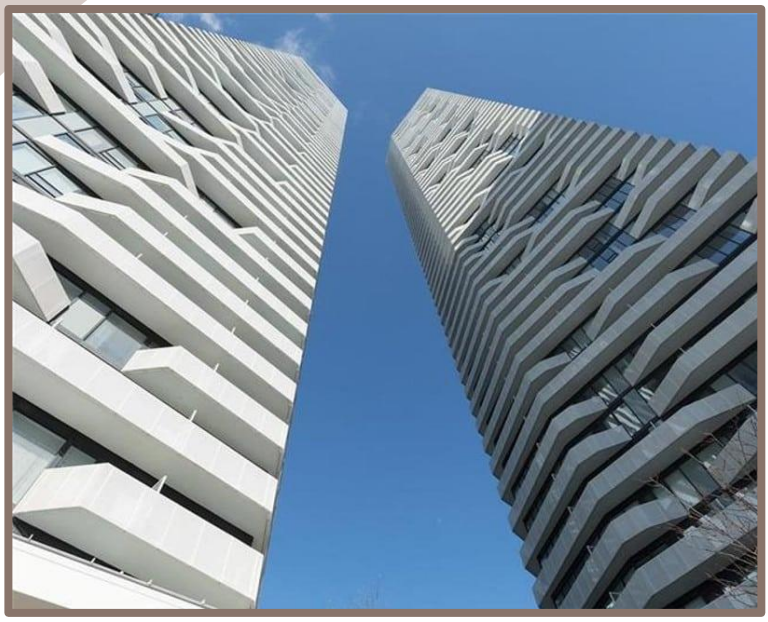
STRUCTURAL DESIGN INNOVATION

HARBOUR RESIDENCES & ONE YORK



PROJECT CREDITS

OWNER
Menkes Developments

ARCHITECT OF RECORD
Sweeny &Co Architects Inc.

HARBOUR RESISDENCES DESIGN ARCHITECT
architectsAlliance

ONE YORK DESIGN ARCHITECT
Sweeny &Co Architects Inc

ENGINEER OF RECORD
Stephenson Engineering Ltd.

GENERAL CONTRACTOR
Menkes Developments

FORMING CONTRACTOR
Hardwall Construction Ltd.

MATERIAL SUPPLIER
Innocon Inc.

ADDITIONAL PARTICIPANTS
- BASF Canada
- LIUNA Local 183
- Salit Steel

PROJECT FACTS

LOCATION Toronto, Ontario

COMPLETION December 31, 2017

PROJECT SUMMARY
Menkes Developments created an innovative mixed-use community with their Harbour Plaza Residences and One York office tower located in the South Core district of Toronto. The concept of the project was to incorporate a unique mixed-use development for residential and office space as well as a four-storey 200,000 retail podium. The whole development was created with the goal of starting a community which integrates live-work-shop-play, and more importantly minutes away from the subway (Union Station) via Toronto's PATH network.

2018 Ontario Concrete Awards

The project used more than 57,000 cubic meters of concrete for the 69- and 65-storey condominium towers. In order to ensure the speed of construction and to minimize the overall construction cost, the pumpability of the concrete was the main challenge in delivering the concrete to the top floor. Innocon Quality Control department worked tirelessly to design special concrete mixes to achieve the desired results. Almost 54% of the concrete on this project used self-consolidating concrete (SCC) to guarantee the finish, speed and ease of placing. The Innocon SCC was designed to minimize labour and increase the pumpability/workability with slumps of 220-250mm in the concrete mixes.

Moreover, 33% of the total volume of concrete was specially designed mixes for stationary pumps with strengths varying from 35 to 65 MPa. These mixes were designed in a way to reach a high bulk density under the pump pressure in order to have the pump drive the concrete up multiple stories without the concrete losing considerable slump or segregating. Standard mix designs were not capable of achieving the required results, as standard mixes would segregate under the anticipated pressure.

High-rise structures are flexible structures and are highly sensitive to vibration caused by even ordinary wind loading. If not taken into consideration, this can be problematic for serviceability and the comfort of occupants. In order to accommodate for potential vibration issues at Harbour Plaza Residences, Tuned-liquid dampers (TLDs) have been located at the top of the central tower. TLDs are passive vibration absorbers which are used to control wind-induced vibrations of tall structures.

The TLD's properties are calibrated to the Harbour Plaza Residences tower's oscillation frequency, such that the liquid sloshing action dampens the oscillation of the building. A study co-authored by one of Stephenson Engineering's engineers determined that the TLDs have improved the performance of the structure for various levels of wind loading, reducing storey acceleration and roof drift. The fact that TLDs were included in the design, reduced the vibration that would have otherwise required more concrete and rebar which would limit the sustainability of the design.

Menkes construction erected the two residential towers' typical floors in an unprecedented fashion by pouring with an aggressive three-day cycle. This three-day cycle was achieved with the use of pre-tied rebar for the vertical elements and packaged prearranged rebar for the individual bays. This innovative approach was developed in order to significantly reduce the time which would have otherwise been required to sort and place the rebar, as well as to install the electrical and mechanical elements for the horizontal concrete slabs. Menkes construction was also instrumental in replacing conventional 400 grade rebar with 500 Grade rebar. This greatly reduced the quantity and weight of steel needed, again freeing time in the cycle.

The three-day cycle was also achieved, in part, by the use of a self-climbing elevator and stair core formwork which was supplied by Doka. The self-climbing elevator alleviated the burden on the tower crane, thereby allowing it to contribute to other essential tasks. The self-climbing formwork was essential to reducing labour and increasing the production time.