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Canadian Consulting Engineering Awards 2016

111 Carlton Building Renew

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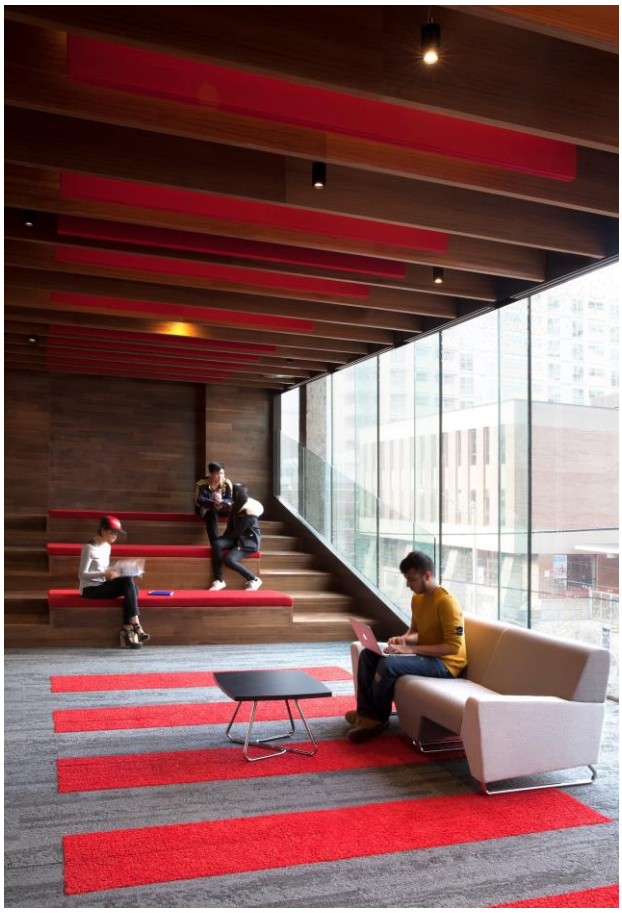
1.0 Project Summary

In anticipation of the fall semester at several downtown post-secondary institutes, Knightstone Capital Management set their sights on an ambitious building renewal project to convert an existing 22-storey hotel into a modern purpose-built student residence. RJC's comprehensive assessment allowed us to design and deliver a rehabilitation program that met a high level of precision design and scheduling coordination standards. This resulted in technically challenging project elements being completed simultaneously, on time, and within budget.

Mid Construction



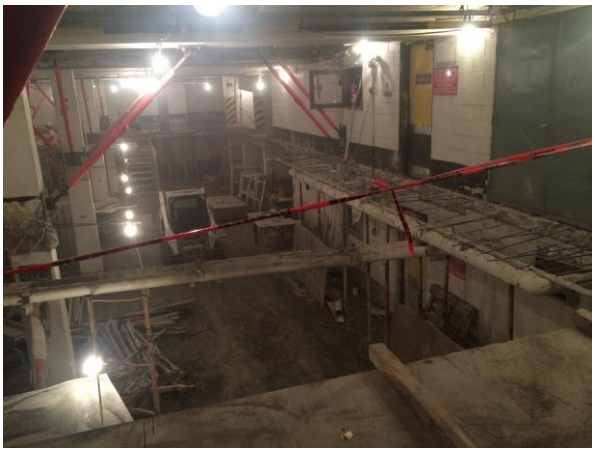
Post Construction

2.0 Project Highlights

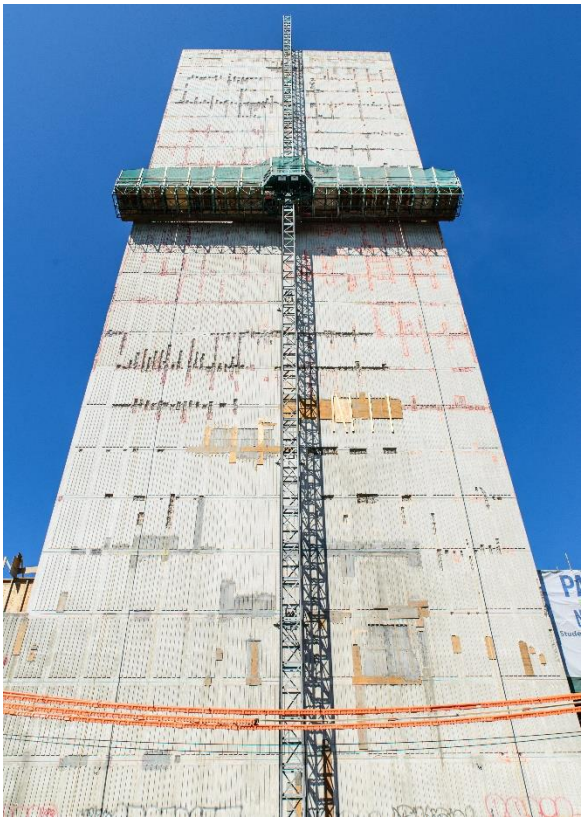
To complete the conversion, the project included significant structural rehabilitation and modifications, along with the replacement of waterproofing systems throughout the building.

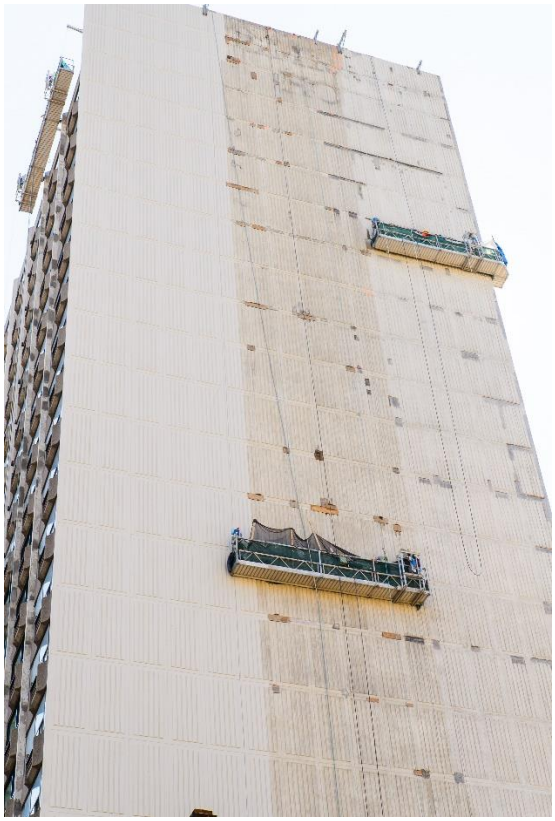
The primary areas of structural rehabilitation included:

- The underground parking structure, which included the wholesale demolition and reconstruction of the upper parking level structural slab.
- The entrance/exit ramp down to the underground parking, which included the removal of the existing concrete topping and ineffective waterproofing system and replacement with a new hot rubberized waterproofing and asphalt paving system complete with a new embedded electrical snow melting cables.
- The podium deck around the perimeter of the ground floor of the building (i.e. the basement roof slab), which included the removal of an existing concrete topping, extensive structural slab restoration and the installation of a new waterproofing system and architectural concrete topping.



- The building's main east and west exterior walls and shear wall ends, which included extensive concrete repairs requiring a mast lift to undertake the installation of a new protective coating on all concrete elements.



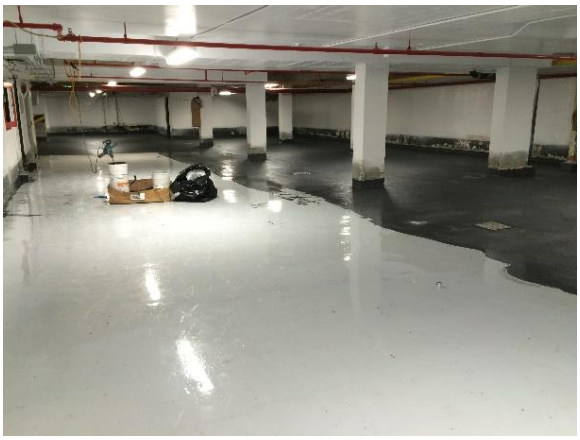


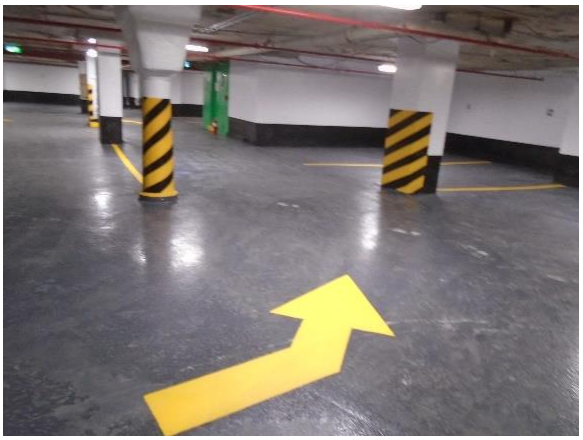
In addition to the rehabilitation of the base building structure, several major structural modifications and upgrades to the base building were also completed:

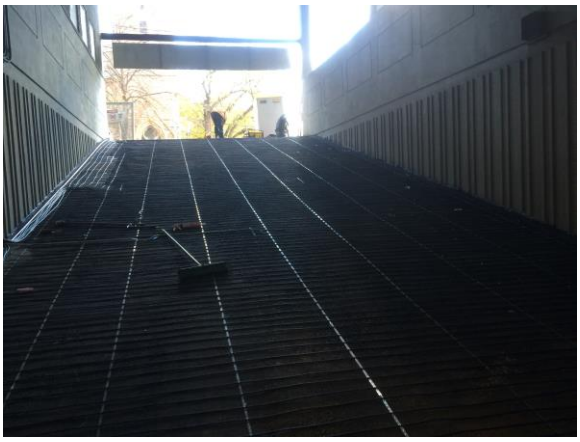
- The infilling of a pool on the lower roof,
- The introduction of new openings in various walls and floors throughout the building.

Waterproofing replacement including the installation a new waterproofing system for:

- The surface of the upper parking level slab and interconnecting ramps.
- On the surface of the entrance/exit ramp complete with a new electric snow melting system.
- On the surface of the podium deck slab, including a new concrete topping driving surface.
- The replacement of the roofing system on the upper main roof.







All of the work noted above took place concurrently with a complete interior retrofit of the building, which involved the full replacement of interior finishes, mechanical and electrical systems, life safety systems, and other architectural improvements.

The show piece of the renewal project, a 125 foot long by 40 foot tall glass box façade located on the north side building entrance, was installed in conjunction with the rehabilitation of the exterior walls. Adding to the complexity, a quick serve coffee and donut chain remained open and fully operational at ground level of the building throughout the entire duration of the project. They benefited greatly from the influx of Contractors on site.

QUESTION 1: INNOVATION

Delivering on our Client's expectations, the objective was to repurpose and reuse this existing building stock while at the same time setting a new standard for student housing in downtown Toronto. RJC's application of creative thinking included repairs to conserve, protect and extend the service life of the original structure in a manner that preserved the architectural appearance of the façade. In addition to undertaking numerous simultaneous projects, extensive repairs to the underground parking structure, which required a complete replacement of the upper level parking slab, was completed in half the time that is typical through innovative phasing and demolition and reconstruction techniques.

To save time on construction, RJC worked with the restoration contractor to develop a technology coined "track construction", which allowed for the installation of form work and reinforcing steel placement in lock step with the demolition and removals activities. Normally for this type of work, one process is completed en masse before moving on to the next process; however, given the tight schedule limitations, this technology afforded the contractor the opportunity to complete multiple processes or tasks at the same time. When one section of slab was removed, formwork would immediately follow. Demolition would then progress to the next section in a manner somewhat similar to slip form technology. As form work is completed, steel placement would follow in the area already formed and this process was continued until the entire slab was ready for concrete placement. Completing the slab replacement in this manner required increased levels of coordination and communication to ensure all processes ran smoothly. We estimate that this process reduced the overall construction schedule by at least nine weeks or in 25% of the overall construction schedule.

QUESTION 2: COMPLEXITY

The most extraordinary aspect of this project was the amount of work to be completed simultaneously and within a heavily compressed timeframe all relying on the completion of preceding activities. All the while, complex and detailed schedules were achieved regarding completing the window replacement, structural concrete repairs, wall coating, roofing and the installation of a new glass façade.

Our first example of the complexity of this project is the shoring and bracing required to remove the suspending structural parking slab. Prior to removing the parking slab, shoring and bracing was installed in order to maintain the structural integrity of the building and to account for the heavy loading on the adjacent major road ways. This shoring required an innovative engineered solution that respected the special conditions noted above and the nature of the busy and multifaceted job site.

A significant element of the complexity of the project was integrating various exterior building envelope and structural aspects of the projects together. The execution of our engineering design required complex schedules that blended installation and delivery dates as well as workforce availability while keeping safety as the top priority. Ensuring these processes were closely co-ordinated was also key to their installation and to the long-term performance and durability of the renewal.

QUESTION 3: SOCIAL/ECONOMICAL BENEFITS:

The Best Western Primrose Hotel originally built in 1970 was showing its age. The choice to not demolish, but rather to repurpose provides several social and economic benefits. First, no demolition means the diversion of waste materials to landfills and reduced construction disruption to the area. Furthermore, breathing new life into a prominent building gives promise to the areas beautification and to the entire neighbourhood's property value. Finally, by selecting an existing building, which is located closely to three major post-secondary schools, the project has created additional student housing in an area that has historically been under stocked. Centrally located on a major arterial intersection, the building now has ample bike parking, and as well, retains the existing value of being in close proximity to public transportation and walking distance to a broad variety of amenities. Previously a dark and uninviting "brutalist design" concrete box, the building has been transformed by the removal of the existing precast concrete panels and introduction of a glass façade which now allows for sunlight to flow through the floor slabs creating a natural environment. This exposure to daylight provides the social and emotional benefits to students who now live in an environment unlike many other places in the city.

QUESTION 4: ENVIRONMENTAL BENEFITS

Taking direction from our in-house Sustainable Design Framework, we work collaboratively with the entire design team, reviewing each design strategy and evaluating its potential. The first-principles based framework contains six guiding design strategies which cross all third-party green building rating systems. The greatest environmental benefit provided through 111 Carlton renewal is restoring and preserving the existing base building compared to demolition and construction of a new building. The environmental impact means significant reduction in landfill waste. By repairing the existing base building structure, over 90% of the concrete used to construct a new building would not be needed. Concrete production is the one the major sources of greenhouse gas production on any project. Decreasing the amount of concrete used, reduces the carbon footprint on this project. Adapting the building to a student residence changes the buildings use and function resulting in its longer life span. New windows, roof and HVAC replacements further reduced the carbon footprint and greenhouse gas emissions.

QUESTION 5: MEETING CLIENT'S NEEDS

The decision to take an existing building and convert it to student housing was a new business adventure for our client. An important part of their decision was based upon a pre-purchase assessment completed by RJC, which gave them detailed information about the extent of repairs and modifications required and preliminary budgets. The timeframe between property acquisition and student occupancy meant sequencing multiple projects to meet the very tight schedule. Working with very specific budgets used to determine the validity of the business decision to proceed, also meant absolutely adhering to the predetermined costs. Meeting the client's needs, RJC worked through all unforeseen challenges and completed multiple projects at the same time, including meeting major milestones in time to permit other critical work to progress. Most importantly, true to our promise, taking the opportunity to provide creative solutions with practical results throughout the various projects, RJC was able to deliver the added benefit to the client of being under budget.