Canada's Four Corners Envelope Conservation

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Project Introduction

Severe deterioration of the Federally Recognized Canada's Four Corners Building's loadbearing masonry walls had it on the brink of collapse when Public Services and Procurement Canada decided to undertake a rehabilitation and restoration project. Reestablishing the beauty of its Second Empire style would contribute to the revitalization of the Sparks Street Pedestrian Mall located one block from Parliament Hill. John G. Cooke & Associates helped realize their vision as structural engineers.

Project description, technical excellence & innovation

Built between 1870-1871 in the Second Empire style, the Canada's Four Corners Building was originally a rental property owned by the Montreal Telegraph Company until 1954. The building evolved into a mixed retail and office complex and now houses professionals responsible for the Centre Block of Parliament Restoration and Modernization Project.

The original building consisted of a rusticated masonry ground floor and was three storeys tall, with the 3rd floor topped by a wood-framed mansard roof with dormers. In the late 1910s, the building was heavily modified, removing the rusticated ground floor masonry to accommodate five storefront windows with steel framing to support the masonry above, and the southeast corner was cut back to create a more appealing entrance. Over the years, the roof was changed several times; notably in the 1960s when the roof was transformed by stick framing a vertical mansard roof clad in copper. Delayed maintenance combined with these significant changes resulted in a building seemingly nearing the end of its useful life. A previous repair campaign was abandoned when it was discovered that the masonry was in worse condition than expected, and temporary overhead protection was installed. In 2015, our team of heritage specialists were engaged to undertake a project to rehabilitate the building envelope.

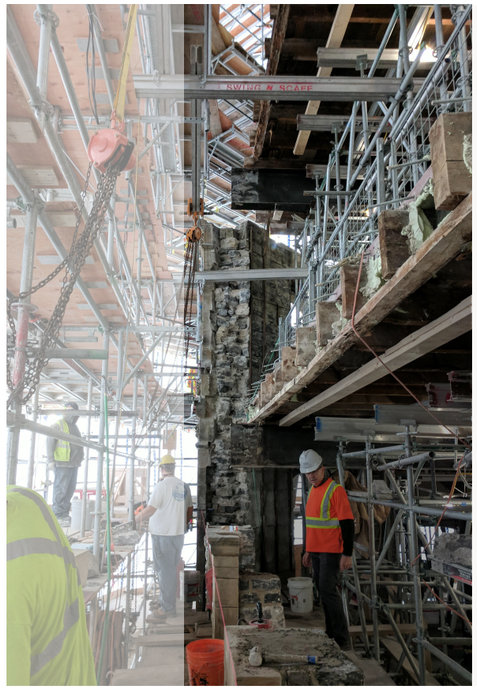
While investigating the East Façade masonry, a void was found in the wall that suggested it had separated into two distinct wythes, the cross-section of the wall supporting the floors and roof was reduced by more than half. The building was immediately evacuated to protect its occupants. The East Wall was dismantled to the second floor and rebuilt using traditional techniques.

In light of conditions observed at the East Wall, the south wall was carefully reviewed. Upper areas of the wall were found to be in good condition but there was deterioration observed at the mid-levels, so an unconventional approach to dismantle a complete storey of the masonry wall at the middle of its height was undertaken. With some conservation work of the 3rd storey, the wall was stable to be undermined and work to dismantle and rebuild the wall was completed successfully.

Throughout the project, a diversity of in-house specializations was used to pair experts in Preservation Engineering with Temporary Shoring Designers to ensure all temporary works were carefully designed to provide a solution on-site that offered the least impact heritage fabric of the building.

▲ Existing Building – Early 1900's

▲ Existing Precondition – 2014



Environmental Benefits

At a location of such prominence, the small 3-1/2 storey building is not the most effective contributor to density in the downtown core; however, restoration of existing building inventory is a very sustainable approach. The environmental impacts of reusing a structure that has performed well over its lifetime are far smaller than demolishing it and constructing an entirely new building.

Sustainable design strategies were achieved throughout the project, these include:

- Salvaging existing stones/brick for reuse elsewhere on the project.
- When determining design solutions, always looking at the existing building structures with an eye to upgrade them – not replace them.
- A minimal intervention approach to structural design is also the most sustainable design approach, as the least amount of new materials are introduced to the project.
- Shoring design was incorporated into the permanent building structure where feasible. This eliminates the need for single-use equipment.
- The new materials that were used were all as similar and compatible with the existing building materials as possible. These existing materials had already proven their durability and longevity, and so by using compatible new materials, it ensures the building functions well for the next century.

Outstanding engineering achievements completed within this project

- Support of the loadbearing masonry above the 3rd floor at the south wall while sequentially dismantling and rebuilding the piers and cornice stones below;
- Sequencing to ensure highest priority needs are met while maintaining the integrity of the global structural system;
- Within the major tasks, sequencing the activities to accommodate adjacent excavation and as-found deteriorated conditions;
- Immediate response to unstable conditions discovered to provide instantaneous shoring design and implementation;
- Assessing the capacity of the existing elements to maximize their retention;
- New roof structure design to be integrated into the flat portion roof of the building that was not removed while allowing for future adaptability.

▲ Condition of Wall During Dismantle

Project Scope – South Wall

Legend:

- Area of consolidation
- Work already in contract
- Rebuild Piers

Exterior Masonry – South Wall:

- Through wall dismantle of masonry below the 2ND floor arches;
- Extensive shoring to support the wall above;
- Sequential dismantle and rebuild;
- Grouted anchors for top of 2nd floor and 3rd floor masonry;
- Interior rake and repoint and limited dismantle and rebuild;
- Roof parapet dismantle and rebuild

Meeting Client's Needs

The project intent was to stabilize and conserve the loadbearing exterior walls and restore the sloped mansard roof.

To achieve the client's objectives, we:

- Strategic investigative openings to reveal hidden conditions while considering the risks associated with making assumptions about the state of building based on limited information;
- Navigate the challenges associated with correcting flaws in the original construction or subsequent building alterations while maintaining elements which have become character elements in their own right;
- Evaluate approaches that are sympathetic to the heritage elements and giving them value to the structural system;
- Evaluate options to ensure work is carried out with a minimum intervention approach to the Heritage Property and its elements with respect to time, money and resources;
- Detailing work and interventions to limit the areas that become vulnerable to rapid deterioration under periods or reduced maintenance.

Social and/or Economic Benefits

The repurposing of a heritage building adds to the richness of the streetscape. In a politically sensitive area of the City, rejuvenating a part of this key intersection can renew interest in the City of Ottawa's history and bring awareness to the social value of rehabilitating the existing inventory of buildings. This approach is becoming a beacon for sustainable approaches. In this project, we were able to salvage existing stones and bricks to be reused within the building rather than discarding them and replacing them with new.

At a time when traditional means of construction are being lost, projects like this encourage traditional methods and stimulate the industry with opportunities for traditionally trained tradespeople. By continuing these traditions, we can realize compassionate conservation of our Built Heritage for the enjoyment of future generations.

Temporary overhead protection had cloaked the ground floor retail space for years, surely diverting would-be shoppers along the central pedestrian mall in such tourist dense location. This project has allowed unobstructed views of the ground floor space and large retail windows to attract passers-by on their way to Parliament Hill.

▲ Dismantle at Windows

▲ Existing Roof Structure Evolution

◄ New Roof Structure

▲ East Façade Rebuilding – In Progress