

SAHC 2020 Abstract: Seismic Rehabilitation of Senate Building of Canada by Lisa Nicol, P.Eng., CAHP

Ottawa's landmark Union Station was constructed between 1902 and 1912 to house Ottawa's central railway station. Located in the Ottawa downtown core, it's situated a short distance from Parliament Hill and across the street from the iconic Fairmont Chateau Laurier Hotel. In the early 1960s, the train tracks and train sheds were removed and replaced with Colonel By Drive parkway. The building sat vacant for quite some time, until it was revived when it underwent renovations in the early 1970s. A south addition was added with a unique geodetic canopy structure. The former Union Station had officially been adapted into the Government Conference Centre, which it remained until this rehabilitation project 2014-2018, which transformed the building into the temporary house of the Senate of Canada. The building was not accessible to the public when it was a Conference Centre.

The client's objective for this rehabilitation was to increase useable floor space. A seismic upgrade of the existing heritage building was also required, along with the design of a new east addition. Existing floor plates required upgrading based on new user requirements. High Heritage areas of the building had to be maintained in their original integrity and worked into the design upgrade.

Creative solutions were demanded to bring this existing heritage masonry building up to current seismic codes, without the structure taking any more room within the floor spaces. Maximizing the space was absolutely critical. As well as, ensuring the new building materials were compatible with the existing heritage building materials.

Solutions were first and foremost a minimal intervention approach; invasive solutions were a last resort. The focus was on reinforcing existing building elements, to minimize the space required for new structural elements. A few examples of these structural solutions, used to achieve the client's main objectives, were:

- 1) excavation/underpinning was undertaken to increase usable floor space in basement.
- 2) A seismic upgrade of the existing building was complete, integrating the existing stone and brick masonry walls as lateral resisting elements to meet current code requirements. Using the masonry walls as shearwalls instead of using them as simply gravity walls, allowed for cost effective space savings. This involved a full masonry restoration program to ensure the masonry walls were in good condition structurally.
- 3) A hybrid model was created in ETABS. Existing masonry walls were input as shear walls; new concrete shear walls were introduced where new stairwells or elevator shafts were created. Concrete shear walls were ideal for consistency of stiffness of materials. The model was invaluable during construction because once the finishes were removed in the building, a lot of existing conditions required quick design adjustments to ensure the schedule was maintained.

The repurposing of this existing heritage building adds to the richness of the streetscape and history of the City of Ottawa. Sustainable design strategies were achieved through the project. This building is now open to the public again for the first time in 55 years!