ojdrovic engineering

June 21, 2016

CITY OF OTTAWA OEI File: N009-003
Building Code Services Branch
Planning and Growth Management Department
101 Centrepointe Drive, 2nd Floor
Nepean, ON K2G 5K7

Attention:
Matthew Graham, CET, CBCO
Deputy Chief Building Official
Manager, Building Inspections and Enforcement

Dear Mr. Graham,

RE: Heritage Structural Review of 352 Somerset St. W., Ottawa

Thank you very much for inviting us to review this beautiful heritage building.

On Monday, June 13th, 2016 we performed a visual inspection of the building on the South East corner of Somerset Street West and Bank Street in Ottawa.

This report is based on visual inspection and review of two reports:

- Evaluation of Existing Structure & Discussion, prepared by Capacity Engineering Limited (CEL), dated 6 June 2016; and
- Letter to CEL by Geoseismic Geotechnical Engineering (GS), dated June 06, 2016.

GENERAL

The heritage structural review of the condition of the buildings at 352 Somerset Street West in Ottawa was requested by the City of Ottawa on June 9th, 2016. The review was commissioned as a second opinion on the current condition of the building and the potential for retention of as much as possible of the heritage building structure.

The following documents were received from the City before the inspection:

- Evalauation of Existing Structure & Discussion, prepared by Capacity Engineering Limited (CEL), dated 6 June 2016; and
- Letter to CEL by Geoseismic Geotechnical Engineering (GS), dated June 06, 2016.
- Drawings S100 to S105, S200 to S201, prepared by Cleland Jardine Engineering Limited, issued for permit, dated 24-Nov-06;
- Drawings FS01 and FS02, prepared by Art Engineering Inc., Foundation Layout and Details, issued for client's review, dated August 20, 2007.

Our review included only visual, non-destructive, inspection of the buildings. Our comments relate only to the structural aspects of the buildings. Assessment of the heritage value was not a part of our mandate.

We did not perform any material sampling or test openings.

Our findings are presented below in the form of text with annotated photographs.

DESCRIPTION OF THE BUILDING STRUCTURE

The original building consisted in fact of two buildings constructed almost at the same time. The first was the building on the corner of Somerset and Bank, built in 1899, a three storey, high ceilings, representative structure with wide open storefront at the corner, Figure 1.

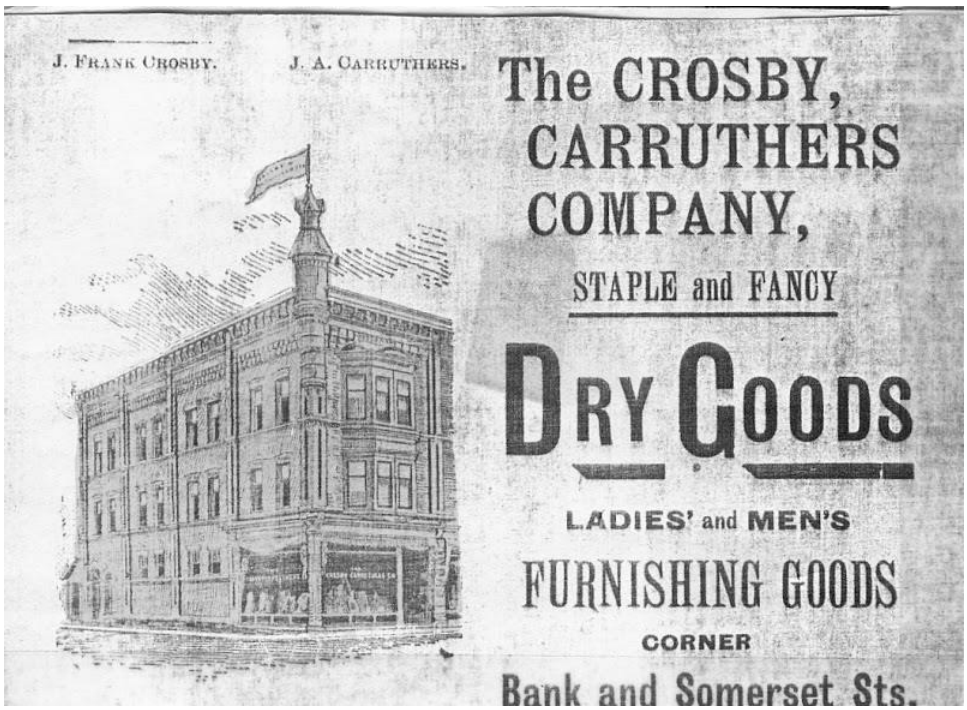

Figure 1. Original three storey building. Reproduced without permission from http://urbsite.blogspot.ca/2012/10/the-haunted-hotel-somerset-ritz.html

It appears that the second part of the building, abutting the east wall of the original building, was built right after the original building, in the early 1900's. Its floor framing was inserted into the east wall of the original building, which became a party wall. This building was a four storey, but with the lower floor heights, its roof and cornice were at the same level as the original corner building, Figure 2.

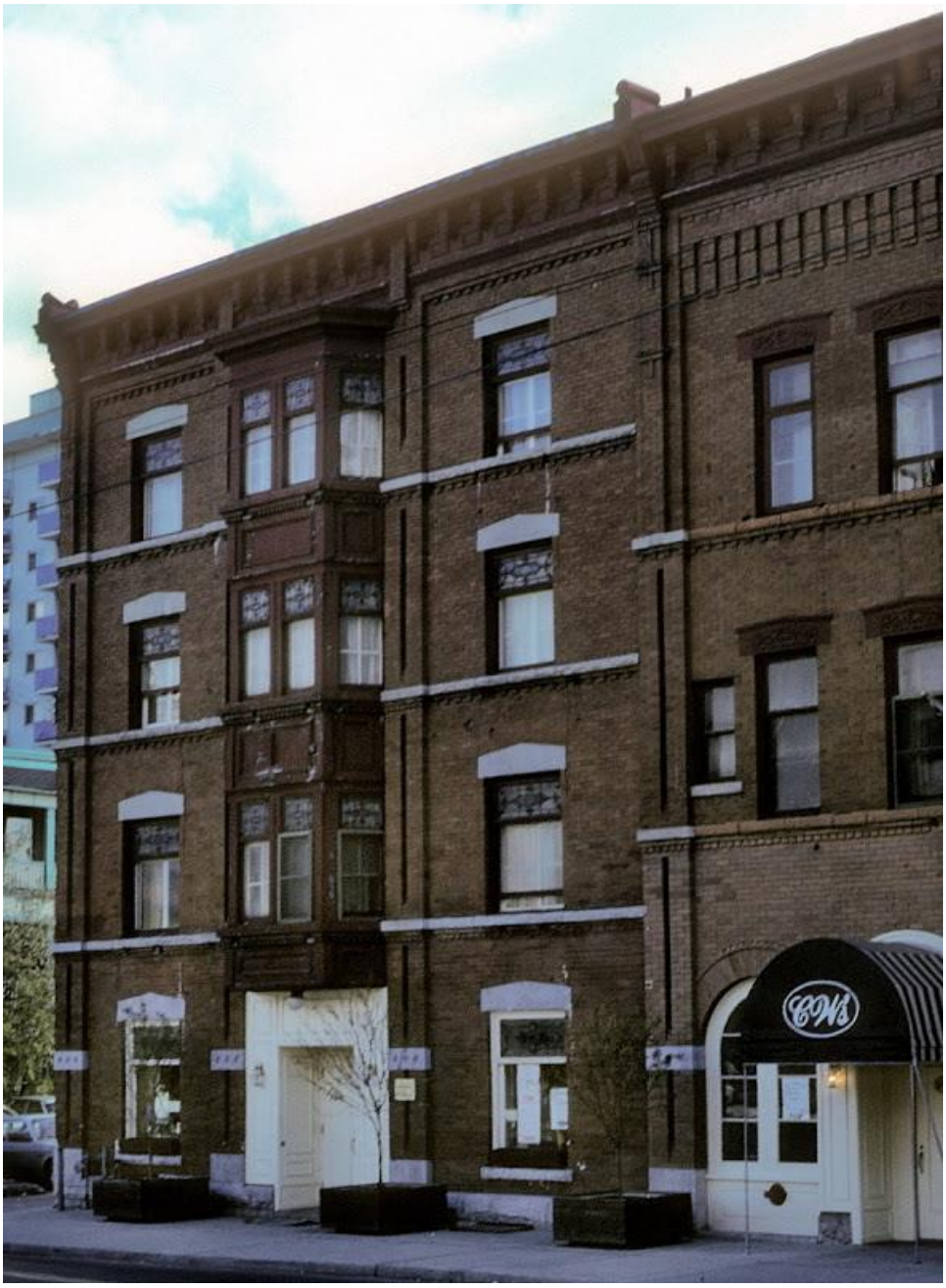

Figure 2. Four storey addition to the east. Reproduced without permission from http://urbsite.blogspot.ca/2012/10/the-haunted-hotel-somerset-ritz.html

It appears that both buildings used similar construction techniques. The foundation walls were made of rubble stone masonry, the above grade walls are clay brick masonry, the floor framing consisted of wood floor joists on iron beams and columns. Wrought iron roof trusses supported the roof of the corner building. A part of the structure collapsed during the underpinning of the foundation walls in the east part of the basement. A temporary wood stud wall provides partial protection to the remaining parts of the building from weather. We were told by the owner that during winter, a salamander heater provides heat in the basement, which then raises up throughout the building.

As a result of the partial collapse, a part of the wall along Somerset Street remained and has since been laterally supported by a steel frame installed on the street side. This wall has been exposed to the weather from both sides since the partial collapse of the structure in 2008. It represents three of the four storeys high Somerset Street façade of the 1900's addition.

The original corner building has four distinct bays along Somerset Street. The bay on the east, next to the four storey addition, is currently partially exposed to the elements as a result of the collapse. It is not laterally stabilized by the steel frame, Figure 3.

Figure 3. Current view of the part of the Somerset Street façade

DISCUSSION OF AS-FOUND CONDITION AND POTENTIAL RETENTION OF BUILDING ELEMENTS

This relatively large building requires a substantial amount of work to become code compliant and ready for use. The following list of tasks is not all inclusive, and is not ordered in any particular order.

Review and repairs to all foundations. There were several underpinning campaigns. It would be prudent to closely examine all foundations and make repairs as necessary. The east-most foundation wall towards the parking lot that remained after the partial collapse of 2008 has unfortunately reached the end of its service life, and it cannot be repaired. As it is unstable, we recommend either immediate shoring or hoarding on the side of the parking lot in order to restrict car access to approximately 4 meters away from the foundation. Parts of the exposed foundation wall along the Somerset Street appear to have also exceeded its useful life. See Figure 4. It should be noted that there is no lateral support at both the ground floor and basement levels. A short perpendicular wall in line with the original three storey building provides some lateral support for the last bay of the original building, but there is no ground floor support. A professional engineer should be retained to design necessary shoring and hoarding.

Figure 4. View of the part of the Somerset Street façade foundation wall and the partly collapsed foundation along the parking lot in the background

Three storey wall of the four storey addition. This wall has been exposed to the weather from both sides since the partial collapse of 2008. Although it does not show signs of major deterioration, it is very likely that exposure to the water and freeze-thaw cycling has damaged the wall beyond reasonable repair in situ. Closer inspection from the existing shoring tower could determine how much of the existing brick and stone etc. can be salvaged for re-use in restored building, Figure 5. Heritage recording of the wall would be a must if the rebuilding of this section is to have historical appearance. We did not have a close-up access to the wall in order to confirm CEL's assertion that the wall is in immediate danger of collapse. We also disagree about the method of demolition. There is a good chance that a large number of original bricks can be salvaged for reuse somewhere else in the building. The stone bands at window sill level and stone window lintels may also be salvaged.

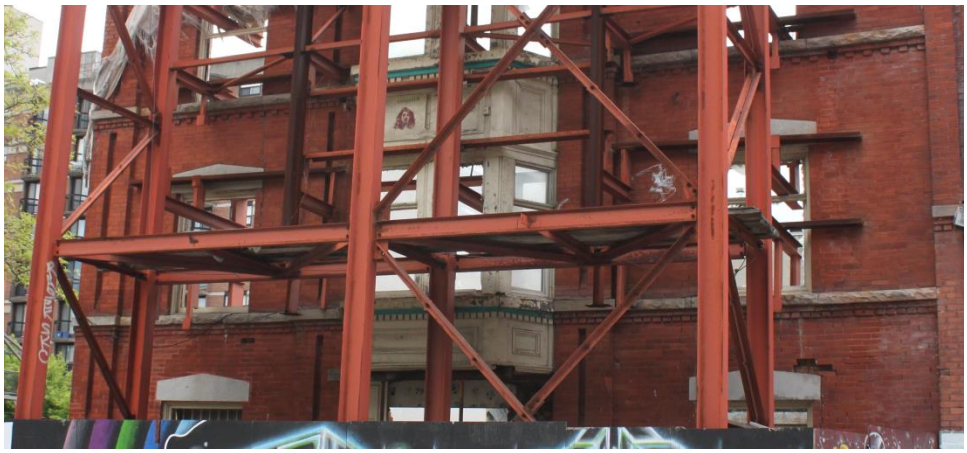

Figure 5. View of the part of the Somerset Street façade wall

The first bay of the original building, adjacent to the four storey addition. This bay (CEL's reference: Gridline A between gridlines 4 and 5) has unfortunately been exposed to the weather since the collapse as well. One could dwell on the reasons why it seems to be in the worst shape than the remaining wall of the addition. The efflorescence on the street (north) side and excessive spalling of the brick face on the building (south) side caused by the freeze-thaw cycling indicates that the load bearing characteristics of this wall have been completely jeopardised. Although CEL report suggests that it could be possible to repair the wall in situ by careful removal and replacement of the brick on a brick-by-brick basis, it is quite likely that the middle wythe of the three-wythe wall is also damaged by the frost action. We are of the opinion that much better result would be achieved by careful recording, dismantling, and rebuilding of the wall using as much of the original brick and terracotta features as possible. Heritage architectural recording of the façade is required in order to retain as much as possible of the original building fabric, and to be able to replicate damaged elements and the original building appearance A detailed laser scanning could be used for replication of elements deteriorated beyond repair. The brick reclaimed from the four storey addition could be used as needed to complete this part of the wall with 100% original material.

Figure 6. Efflorescence as evidence of constant wetting of the wall

Figure 7. Substantial spalling of the interior face of the brick exposed to the sun during the winter months

In addition to the above-ground concerns, the foundation wall in this areas appears to be unstable. The owner's mason expressed his concern that the top of the foundation

wall at the street level may have moved inwards, towards the basement. This could not be verified because of the plywood hoarding installed at this location. A slope in the first floor segment of the wall could be observed. This condition raises serious concern about the wall stability. An installation of jersey barriers and hoarding further away from the wall would be prudent. We disagree with CEL report that “a stack of ballasted shipping containers to within one foot of the masonry wall along the roadway” should be placed. The additional load near the weak foundation wall could only aggravate the current condition, and the work itself could create vibration that could cause the collapse of the wall. A professional engineer retained to design the foundation wall shoring could design the hoarding and jersey barriers in this area as well.

Remaining walls of the original building on Somerset and Bank streets. These walls appear to be in reasonable state of repair. We are concerned with the stability of the walls at the corner of the building and at the south-west staircase. The floor diaphragm is missing in the first bays along Somerset and Bank Streets. Some temporary ties seem to be installed to support the wall along the Bank Street, but it is not clear if anything has been done for the Somerset Street wall. See Figure 8. The staircase opening in the south-west corner leaves high wall unsupported.

Of concern is support structure of the only remaining bay window on the Bank Street façade. The framing should be closely reviewed and rebuilt as it does not seem to work properly, and substantial deformation can be observed on site. We would recommend rebuilding of the second bay window of the Bank Street façade, but this does not fall into the scope of this report. The walls do not seem to have sufficient lateral tying to the floor diaphragms.

Floor framing and Stairs. We did not review the floor framing in detail. Future renovation engineer should verify existing condition and determine the need for repairs or upgrade of the floor framing and stairs.

Lateral Resistance. The building is in its current state vulnerable to the lateral – wind and earthquake – loading. It was not within our mandate to perform any analysis, but several structural flaws in lateral force resisting system are obvious. There is no means of transferring horizontal force in the north-south direction along the east part of the building, adjacent to the collapsed part. The temporary 2x4 stud wall can hardly keep the weather out, and cannot be considered a shear wall. The connection of walls to the floor diaphragms is very limited. There is a concern for both shear and out of plane connection of the walls to the floors. The capacity of the floors as diaphragms is questionable. In a few locations, a three storey openings (staircase in the south-west corner, floor opening in the north west corner) leave high sections of the walls without lateral support. Connection of the roof trusses and roof framing in general to the walls and capacity of the roof to act as a diaphragm must be investigated. An engineer experienced in seismic analysis of heritage buildings should be retained to perform thorough review of existing conditions, perform required analyses and design seismic strengthening of the building.

Figure 8. Composite view of the unsupported walls at the corner of Bank and Somerset Streets

CONCLUSIONS AND RECOMMENDATIONS

Our conclusions and recommendations are based on the visual inspection of the building and review of available reports.

Two historical parts of the building should be recorded, dismantled and rebuilt. The remaining three storey high wall of the four storey addition on the east of the property, currently laterally supported by a steel frame, and the first bay of the original building adjacent to it, are unstable. It is our opinion that the latter, part of the three storey original building is more critical, as there is a chance that the foundation wall supporting

it is deteriorated and there may have already been a shift of the base of the wall at grade level towards the open pit of the basement.

We therefore recommend that pedestrian access to the building in this area is restricted by placing jersey barriers and hoarding as far away from the wall towards the street as possible. Ideally, this part of the sidewalk would be completely closed for pedestrians and the barriers would be erected on the curb. A professional engineer should be retained to design the hoarding, jersey barriers and shoring of the foundation wall.

We also recommend that the wall is recorded as soon as possible using a detailed laser scanning, before the hoarding obstructs the view. Careful dismantling should be designed and undertaken as soon as recording is completed. Salvaged components should be labelled and stored in a safe and dry space for reuse. An experienced heritage architect should be involved in order to ascertain the adherence to conservation principles and to enforce proper labeling and recording, as well as dismantling and storage.

The rubble stone masonry foundation walls along the former basement of the four storey addition should be, in general, demolished. An engineer should be retained to design retaining walls that will support the sidewalk and the parking lot until the construction of the new building in place of collapsed one.

A holistic approach should be adopted for the remainder of the building. Several deficiencies noted above focus around the need for establishment of the lateral force resisting system. Once the program for the building is determined, a heritage structural engineer experienced in seismic analysis and design of strengthening of masonry buildings similar to this one should be retained to perform the analysis and design. The scope should include strengthening of the floor and roof diaphragms, their attachment to the walls, verification of the stability of slender and unsupported walls where they are needed (staircase, for example), verification of the roof trusses and roof framing in general, etc.

We hope that this report meets your expectations. Please do not hesitate to call, should you require any clarifications.

Yours very truly,

Ojdrovic Engineering

Nebojsa Ojdrovic, Ph.D., P.Eng., CAHP