

City of Ottawa
Building Code Services Branch
101 Centrepointe Drive,
Nepean, ON

December 23, 2021
Project No. 22078

Attn: John Buck

RE: 323 Daly Avenue
Fire Damage Assessment

Dear Mr. Buck,

As requested by the City of Ottawa (CO), John G. Cooke & Associates Ltd. (JCAL) has visited the above noted site to provide a second opinion on the condition of 323 Daly Avenue after suffering damage in a fire on November 30th, 2021. The fire occurred around 1AM and burned for approximately two hours before firefighters managed to put it out. The fire is believed to have started in the kitchen area and spread up the staircase on the west side to the upper floor levels.

Located in the Heritage Conservation District of Sandy Hill, the two-and-a-half storey residence at 323 Daly Ave was constructed between 1904 and 1907. As a prime example of the Queen Anne Revival style, the building is designated as Category 1 under Part V of the municipal Heritage Act.



Figure 1: 323 Daly Ave. prior to fire [Google maps, 2019]

Typical of early twentieth residential construction, the load bearing exterior walls were constructed of two-wythe brick walls with a header course every seven rows to tie the wythes together. The brick walls rest on a two-foot-thick rubble stone foundation. The interior framing consisted of rough-cut wooden joists with lath and plaster finishes on the ceilings and walls. Based on the age of the building and observations made on site, high quality first-cut lumber would have been used in the original construction. A two-storey addition on the north and single-storey addition on the west were constructed around 2007 from modern stick-frame lumber.

Terms of Reference:

The purpose of this report is to provide an overview of the level of damage observed at 323 Daly Avenue as it pertains to the building's structural components. This will allow the City of Ottawa to make informed decisions on a conservation treatment for the site that considers its heritage value and structural requirements for public safety.

The site was visited at 12:30PM on December 20th by John Cooke, P.Eng., FCSC, RSW (JCAL), Scott Lockhart (CO), Gwyn Nicholson (CO), and Kirk Thompson (CO) with access provided by the City of Ottawa. The building was inspected at grade level from the exterior. Limited access to the interior was provided: at the main entrance on the south elevation; through the west entrance into the addition and kitchen; and to the basement below the original building via the east entrance. The investigation was entirely visual and non-destructive, no investigative openings were made. Since the upper floors were inaccessible; close visual inspection of the roof was not possible.

The following documents were provided to JCAL for review:

- "Sandy Hill Heritage Study – Descriptive Sheet", *City of Ottawa*, August 2007
- "Structural Assessment Following a Fire", *DFA Engineering Services Inc.*, December 14, 2021

Observations:

Based on our review of the interior fire damage on the ground floor, the fire appears to have started in the kitchen, then spread into the next room on the south and up the stairs to the upper levels. No damage, other than smoke staining, was noted on the north end of the building. The additions on the north and west sides were similarly undamaged. The north exterior elevation of the original building appears to be in good condition where exposed.

The following sections describe the existing conditions observed on the building components at 323 Daly Ave. The classifications used were as follows:

Good: the component is mainly intact and is at minor risk of damage or deterioration due to normal service conditions (environment, loading) in the short term (1 to 5 years).

Fair: the component is compromised and is at considerable risk of damage or deterioration due to normal service conditions (environment, loading) in the short term (1 to 5 years).

Poor: the component is lost or is at considerable risk of damage or deterioration due to normal service conditions (environment, loading) in the short term (1 to 5 years).

Foundation

The stone masonry foundations appeared to be in generally good condition, with some localized areas of weathered joints. Most of the joints showed evidence of recent repointing. No damage related to the fire was noted in the stone foundation walls.

Brick Masonry

The brick masonry was generally in good condition. Inspection of all exterior elevations found no signs of cracking, bulging or other signs of damage or deterioration. It is possible that the interior bricks at the top of the walls at the third-floor sustained damage due to the high heat, however, these were not visible during the investigation.



Figure 2: Brick masonry, west facade [JCAL 2021]



Figure 3: Brick masonry, south façade [JCAL 2021]

It was also noted that the interior face of the keystone of the arch above the west bay window in the kitchen was missing.

Timber Framing

The basement was under renovation prior to the fire, as evidenced by steel stud framing in place for new partition walls and mechanical and wiring systems recently installed. No drywall had been installed and the first-floor framing was exposed. The new structural steel and wood framing did not appear to be damaged by the fire. Furthermore, no evidence of major saturation was seen in the basement due to exposure to weather or firefighting efforts.

The first-floor timber structure was largely intact, with smoke staining throughout. Some of the planking had charred near the probable source of the fire, however, the existing structural joists and planking were otherwise in good condition.



Figure 4: Smoke-stained basement joists [DFA 2021]



Figure 5: Charred and deflecting second floor joists [DFA 2021]

The second-floor joists were in poor condition; they suffered extensive fire damage and large deflections were observed, but no collapse had occurred. When wood is subjected to fire, the outside layers chars and expands, creating an insulating layer that protects the wood from damage. Over the course of a fire, the char expands, cracks and flakes off, exposing more of the wood, which gradually chars, continuing the cycle. In a standard fire, lumber typically chars at a nominal rate of around 0.65mm per minute, according to CSA O86-14 Engineering Design in Wood. The reduction in cross-section reduces the member's capacity until it can no longer support the applied load, at which point it collapses. Exposure to high heat and fire has not been shown to reduce the material properties of wood.

Old growth wood, such as what is seen in the building at 323 Daly, is slowly grown in dense forests over long periods of time. The long growth period contributes to a higher density of wood that tends to be much stronger than what is commercially available today. This high density contributes to a slower char rate which, combined with the high strength and quality of the old growth lumber, has prevented collapse due to the fire. Although the wood is severely damaged and structurally unsound, it maintains enough capacity to support the current dead load and provide lateral restraint to the brick masonry walls in the short-term.

The third-floor framing could not be visually inspected as this area was inaccessible during the investigation. However, it is assumed to be in a similar condition to the second floor, with significant charring, but enough remaining capacity to resist the current dead load and provide lateral restraint to the masonry walls in the short-term.

Roof

The roof of 323 Daly was in poor condition. Large holes were visible from the exterior at ground level and while interior inspection was not possible, the structure appears to have been severely compromised by the fire. The area of greatest concern is above the stairs where a large portion of the roof is missing. This opening allows snow into the building which both damages the structural wood elements and applies an additional load to the structure.

Chimneys

The two tall brick chimneys on the north end of the building appeared to be in good condition. No signs of damage were seen from grade.



Figure 6: North chimney in good condition [JCAL 2021]



Figure 7: Laterally unsupported west chimney at large hole in roof [JCAL 2021]

The chimney on the west wall appears to be in fair condition with localized deterioration near the top. Due to the collapsed roof at this location, the chimney may not be supported laterally. This presents a fall hazard and must be addressed prior to any work completed at the roof level.

Architectural elements

The front porch structure appeared to be in generally good condition, with minor localized damage at the spandrel. Minor damage to the cornices may have occurred during the firefighting efforts.



Figure 8: Front porch, smoke-stained spandrel [JCAL 2021]



Figure 9: Damaged bargeboards on south gable [JCAL 2021]

The bay window on the southern gable is in poor condition, having suffered severe damage in the fire. Similarly, the bargeboard at the peak of the gable and along the west slope have been destroyed in the fire. The upper portion of the south brick gable may have sustained damage due to the high heat. Any lateral support at this location was likely damaged or destroyed by the fire, potentially rendering this portion of the wall unstable.

Conclusions:

In conclusion, while we agree with most of the observation of DFA Engineering Services Inc., we must disagree with their final recommendations. While any future plans for the site will be made at the discretion

of the City of Ottawa, based on our investigation of the existing structure, we cannot recommend this building for demolition.

The fire damage has compromised the majority of the wood structure above the first floor, but the first floor remains intact. Although the wood structure above the first floor has been extensively charred, we believe that it is still providing lateral support to the exterior brick masonry walls.

The two-wythe brick walls appeared to be undamaged by the fire, with a possible exception of the south gable and below the eaves at the southwest corner due to a lack of lateral support. These areas may require further investigation to assess the level of damage.

The chimneys appear to be structurally sound. However, the west chimney may need lateral bracing as the floor around it appears to be severely deflected and may be at risk of failure.

The existing roof structure has failed, allowing snow and rain into the building. This creates additional weight on the structural framing and deteriorates the wood members, which may lead to collapse of the second and third floor structures due to overloading. The collapse of these floors may result in destabilization of the east and west walls and west chimney.

No visible damage was observed on the stone foundation walls or on the additions on the north and west facades. These areas are structurally sound and do not require intervention.

Recommendations

The following immediate action is required to ensure the building's stability while a conservation plan for the site's future is established. It is important that this work be completed before significant snow accumulation occurs, which can be expected in the very short term.

1. A contractor must access the failed roof by aerial lift and, under the guidance of a structural engineer, determine what material is unstable. Any unstable material must be removed, and the roof must be temporarily reinforced with new framing members.
2. The holes in the roof must be enclosed to prevent moisture and snow infiltration. It is recommended that the following additional work be completed at the same time.
 - o The chimney should be inspected to determine whether it is structurally stable, or if it must be dismantled for the safety of the contractors. It may be necessary to install additional lateral bracing for support.
 - o The south windows should be enclosed with plywood; then temporary heat should be installed and maintained.

If the structure is to be conserved, rather than demolished, it will be necessary to replace the wood framing above the first floor. The existing interior wood framing should be carefully demolished and rebuilt at the second and third floor level. Interior partition stud walls above the ground floor should be reconstructed.

Another concern that must be addressed during this work is the impact on neighboring structures, primarily 325 Daly, which is separated from the building by an alley, roughly 1200mm wide. As the fire was mainly concentrated on the west portion of 323 Daly, there is no visible damage on the east wall. Any construction at the roof level would require closing the alley between the two buildings. Protection of the walls and roof of 325 Daly would only be required in the event of demolition of the structure at 323 Daly.

Disclaimer and Limitations:

This report is based on and limited to information supplied to John G. Cooke & Associates Ltd. by the City of Ottawa personnel, and by observations made during walk-through inspections of 323 Daly Avenue. Only

those items that are capable of being observed and are reasonably obvious to John G. Cooke & Associates Ltd. or have been otherwise identified by other parties and detailed during this investigation can be reported.

The work reflects the Consultant's best judgment considering the information reviewed by them at the time of preparation. There is no warranty expressed or implied by John G. Cooke & Associates Ltd. that this investigation will uncover all potential deficiencies and risks of liabilities associated with the subject property. John G. Cooke & Associates Ltd. believes, however, that the level of detail carried out in this investigation is appropriate to meet the objectives as outlined in the Terms of Reference. We cannot guarantee the completeness or accuracy of information supplied by any third party.

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We trust this report covers the scope of work as outlined in our Terms of Reference. Should there be any questions regarding this report, or if we can be of any further assistance to you, please contact us.

Sincerely,

JOHN G. COOKE & ASSOCIATES LTD.



John Cooke, P. Eng., RSW., CAHP
President

A handwritten signature in black ink that reads "N. Smith".

Natalie Smith, MAsc., EIT

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