



CAPACITY ENGINEERING LTD.

# Condition Assessment

235/237 St. Patrick St

Ottawa, Ontario

Client: City of Ottawa

Date: 22 July 2024





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Version History

22 July 2024 - '235 & 237 St-Patrick Condition Assessment - Revision 0' - Draft for Client review

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Appendix A:

'Evaluation of Existing Structures at 227/229, 231/233, 235/237 St-Patrick, Ottawa, ON.' prepared by Gadiant Structural Engineering Ltd., 13 August 2021

Appendix B:

'Heritage Survey And Evaluation Form - 235/237 St-Patrick St' prepared by City of Ottawa Department of Planning & Development - M. Carter - January 1990

Appendix C:

'Heritage Survey And Evaluation Form, Category Scoring - 235/237 St-Patrick St' prepared by City of Ottawa Department of Planning & Development - M. Carter - June 1992





## **1.0 Executive Summary**

Capacity Engineering Limited (CEL) was engaged by Lesley Collins on behalf of the City of Ottawa to provide a condition assessment report for the multi-tenant residence heritage building located at 235/237 St-Patrick St. The structure was built between 1851 and 1872, falling within the ByWard Market Heritage Conservation District (HCD), per City of Ottawa By-law 60-91. To carry out this assignment, CEL attended site twice. Once to conduct a primarily visual assessment of the property, and the other to preform a detailed site visit utilizing hand tools and non-destructive testing (NDT) equipment, in line with our Heritage Engineering field assessment methodology. Based on our site visits, as well as a review of relevant documents (see Section 4.0), it is CEL's opinion that, despite the building's Category 2 Heritage Structure status under Part V of the retention of the Ontario Heritage Act (Ontario Heritage Act, RSO 1990, c O.18), retaining the building is not feasible and demolition is warranted. Section 5.0 outlines the deterioration of the property and section 6.0 discusses the feasibility of retaining the structure.

## **2.0 Applicable Codes & Referenced Documentation**

- ACI 201.1R-08 "Guide for Conducting a Visual Inspection of Concrete in Service"
- ASTM F2659 - Standard Guide for Preliminary Evaluation of Comparative Moisture Condition of Concrete [ ] NDT Moisture Meter
- BRE's "Foundation Movement and Remedial Underpinning in Low Rise Buildings"
- CAN/CSA A371-14 "Masonry Construction for Buildings"
- CAN-CSA-S478-95 (R2007) Guideline on Durability in Buildings
- English Heritage "Methodology and Guidance for Surveying Listed Buildings"
- National Research Council Canada CBD-230 "Applying Building Codes to Existing Buildings"
- OBC 2012 "Ontario Building Code"
- OSIM "Ontario Structure Inspection Manual"
- Parks Canada "Standards and Guidelines for the Conservation of Historic Places in Canada". February 2011
- Professional Engineers Ontario "Structural Condition Assessment of Existing Buildings and Designated Structures Guideline", November 2016
- PWGSC "Bridge Inspection Manual"
- Timber Frame Engineering Council "Guide to Structural Evaluations of Existing Timber Structures", January 2019



### **3.0 Limitations**

- Our report is limited to those issues specifically described herein. Our staff are not qualified to comment on matters other than those generally accepted to be in the purview of Civil Engineering, and where other concerns are raised, we have referred the client to a suitable consultant, contractor or other.
- We cannot warrant the work of any other party, nor be held responsible for their work. Where an existing design of an element is deficient but did not show signs of distress at the time of our review, we reserve the right to consider such an element's design as sound.
- We have not been engaged to complete a total review of 227-237 St. Patrick St or all the elements within. As such, hidden defects and issues without obvious visible signs or missing from the provided documentation will not have been identified or included in this report. Where further investigation is recommended, the client is strongly advised to undertake further work or investigation, and we stand by ready to assist.
- This report represents the best judgment of Capacity Engineering Limited ("CEL Ottawa") given the information available at the time of writing. Any use which a third party makes of this report, or any reliance upon, decisions made in response to or in any way influenced by this report are the responsibility of such third party. Professional Engineering requires significant judgement and can only be held to be valid for a specific client, with known information, for a specific location and timeframe. Any third party that uses this report without written consent of CEL waives any and all liability of CEL.
- Any and all decisions made based on this report without the direct involvement of CEL Ottawa are the responsibility of the party(ies) making such decisions. Do not make any interpretation of this or any other project documentation. Note that it is the policy of CEL Ottawa not to charge for phone calls as to interpretations of any of our project documentation, including this report. Contact CEL Ottawa for further assistance.
- This report is both confidential and copyrighted. Should you have received this in error, please return to Capacity Engineering Limited.



### **3.1 Amalgamated Building & Element Condition Ratings**

NB: Per PEO Guidelines, reports "should include" definitions of qualitative terms specific to the assessment. As such, these are our terms used in reports. Note that these are an adaptation and blending of the Ontario Structure Inspection Manual (OSIM) from the Ministry of Transportation, and the field methodology of English Heritage (UK).

#### **Excellent**

Like new; structurally sound; weathertight; no significant repairs needed.

#### **Good**

Structurally sound; weathertight; no significant repairs needed.

#### **Fair**

Structurally sound; in need of minor repair; showing signs of a lack of general maintenance.

#### **Poor**

Deteriorating masonry; leaking roof; defective rainwater goods, usually accompanied by rot outbreaks; general deterioration of most elements of the building fabric, including external joinery; or where there has been a fire or other disaster which has affected part of the building.

#### **Very bad**

Structural failure or clear signs of structural instability; loss of significant areas of the roof covering, leading to major deterioration of the interior; or where there has been a major fire or other disaster affecting most of the building.

#### **Archeological**

Ruins, or structure known to exist / have existed, but is not visible



#### **4.0 Background Information Received**

The following documents were provided for CEL's review:

- 'Evaluation of Existing Structures at 227/229, 231/233, 235/237 St-Patrick, Ottawa, ON.' prepared by Gadiant Structural Engineering Ltd., 13 August 2021
- 'Heritage Survey And Evaluation Form - 235/237 St-Patrick St' prepared by City of Ottawa Department of Planning & Development – M. Carter – January 1990
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#### **4.1 Gadiant Engineering Report Summary**

In October of 2023, Mathieu Gadiant of Gadiant Structural Engineering Ltd. was engaged to provide structural assessment of the condition of the structure located at 235/237 St. Patrick St. The findings of this report are summarized below:

*During the site visit Gadiant Engineering Limited, the main floors were not accessible, so their report only pertains to the building envelope and the basement. The framing of the exterior walls was found to have rot. The overall condition of the main floor support framing in the basement is poor, with several areas showing signs of rot. Floor joists are inconsistent, many have excessive holes and notching, and some are completely unsupported at one end due to modifications. Teleposts were likely added to support the joists without specific engineering.*

The overall conclusion of the report was that the deck must be demolished, most (if not all) of the exterior walls will require replacement, foundation walls would require repairs and the exterior cladding would require repairs or replacement. For these reasons, Gadiant concluded that the best option would be a complete demolition and rebuild.

#### **4.2 Commentary on Gadiant Report**

The Gadiant report appears to have been carried out to a suitable standard of care for a Professional Engineer licensed and practicing in Ontario, working in Structural Engineering, and in line with the requirements of the "Structural Condition Assessments of Existing Buildings and Designated Structures Guideline" from PEO. However, the report neglects to acknowledge the heritage characteristics and overall built heritage of the structure and site. By doing so, this report fails to suitably address the context of the structure and cannot be relied upon as a basis of a recommendation to demolish.



## **5.0 Observations and Photos**

Upon being led to the exterior of the building at 235/237 St. Patrick's Street, CEL staff observed that front (South) façade of the structure was clad with a modern, imperial size 4" architectural concrete block veneer as the cladding (see Photos 1 and 4). Above and below fenestrations, limestone was used for the lintels and sills respectively (see Photo 3). It appeared that the wall was founded on a cementitious base added to the face of the foundation wall. The base of the block cladding was noted to have been separated from the structure (see Photo 6). Step cracking in the mortar joints between the 4" block cladding as well as weathering and vertical cracks through the units themselves was observed (see Photos 2-4). The balconies appeared to be in good condition, with weathering observed in the timber, however the overall condition of the front façade appeared to be fair (see Photo 1).

The East and West façades however, were, in our opinion, in poor condition. The cladding appeared to be tin with a backing sheet, with a corroded surface in many locations and individual sheets peeling and bulging out from the underlying structure (see Photos 7 and 8). The West wall of the building showed similar deficiencies in the cladding (see Photo 13). Local openings in the West wall showed the plank-on-edge framing in a severely decayed state, in which the member(s) were easily penetrated by the claw of a hammer and by a field-knife probe. In this same location, what appeared to be *Serpula Lacrymans* fungus was present on the lower plank-on-edge timbers and on the back of the cladding where it had peeled away. Another opening on the East wall showed an air barrier, insulation, framing and vapour barrier erected on the interior of the original plank-on-edge framing (see Photos 9-12). On the West wall, underneath an opening previously covered with a garbage bag and tuck tape by the basement access door, decayed timber was noted, with some sections of the original plank-on-edge wall having been replaced with more conventional lumber (see Photo 6). The corner of the top of the foundation wall in this location had spalled and was easily penetrated with a field-knife probe.

Inside the building on the first and second floor, the structure appeared to be in good condition with minimal damage to the interior linings, minor damage to the floors and minimal sloping of the floors/ceiling observed. An exploratory opening in the roof showed stained roof joists (see Photo 28). In general this first and second floors appeared to be in good condition on the interior, however the ground floor framing will be elaborated upon further on in this report. The rear addition appeared to be of conventional stick-frame construction, bearing on a slab-on-grade foundation and clad with dutchlap vinyl siding (see Photo 14). The addition looked to generally be in good condition other than a local area of siding that had been removed.

Once staff descended into the basement of the structure, it was evident that the foundation was in poor condition. All foundation walls showed signs of constant exposure to moisture along the height of the wall and worse at the base. Decay at the base of a remaining wooden support post, where embedded into the slab, indicated that the slab has also been subject to high levels of moisture (see Photo 18). Efflorescence, corrosion staining, patchy discolouration and very severe scaling were observed along the height of



all foundation walls (see Photos 23-25). CEL believes this to be a fieldcrete concrete foundation poured before concrete batch plants were commonplace due to what appeared to be a sand rich cementitious material, large boulders, stones, bricks and many other different sizes and types of aggregate being observed in the wall. The mix and materials were likely poorly controlled and graded, and the systemic patchy discolouration of the wall indicated the concrete cured poorly and with varying water/cement ratios along the wall's height and length.

The wall in general was able to be pierced by a field-knife probe easily, is very friable and in a state of active deterioration. The severe scaling of the wall, most likely due to constant and aggressive freeze-thaw damage from heavy saturation with water and exposure to chlorides, has led to a large built-up of sandy material observed at the wall base along much of its length (see Photo 15). Evidence of the walls active decay. When tested with a Schmidt rebound hammer and the values adjusted for the horizontal testing, the average strength value of the wall did not even lie on the graph available, indicating an extremely weak concrete with a compressive strength much less than 10 MPa (see Photo 22). Applying a non-destructive electronic moisture meter to the interior face of the foundation wall showed relative humidity levels typically between forty (40) and ninety (90) percent. Closer to the wall base, moisture levels were consistently around eighty (80) percent (see Photo 19).

Note that generally all structures predating 1950 are founded by a foundation of fieldcrete, pre-cast concrete blocks (quite common in heritage structures in and around Ottawa, as this was a local product), or stone masonry. Such foundations generally perform very well so long as forms of Alkali-aggregate reaction (AAR), which are always serious problems for such foundations, were not present. Those foundations which survive may generally be considered to be relatively free from AAR, as they would most likely have been treated or demolished and replaced by 35 to 50 years of age. In such structures, which are built of early concretes or field batched concrete (commonly referred to as fieldcrete), it may be assumed that the concrete will be weak, likely in the order of 8 to 12 MPa, far less than the strength of common modern residential and small building foundations (which are normally 20 MPa at 28 day strength). Furthermore, such fieldcrete structures will often be comprised of ungraded and poorly controlled aggregates (small, ie: sand, and large, ie: stones), and unreinforced. Note that this remained common practice, albeit with laboratory testing of the source stone, until the mid-1990s. The lack of understanding of Alkali-Carbonate Reaction (ACR) and Alkali-Silica Reaction (ASR) forms of AAR were the primary issue of concern; the use of pit-run gravels for residential concrete is not in and of itself a problem, and those remaining exemplars in the built heritage should be retained and subject to preservation, restoration or repair as is appropriate. Modern (read: contemporary) materials are easily adapted to the repair of heritage elements with even introductory levels of understanding of materials science and heritage (fabric) engineering.

After assessing the foundation wall, CEL staff then moved on to the ground floor framing members. The ground floor joists and main spine beam were both found to be embedded into the foundation wall and have generally decayed to the extent where their cross section has been severely compromised by decay and now have minimal, to no





bearing on the wall (see Photo 16). The bottom row of the plank on edge exterior wall framing, where visible, as well as the exterior edges of the plank decking for the floor, displayed signs of extensive decay and exposure to moisture (see Photo 21). The existing timber spine beams were sporadically supported by temporary shoring.

A field knife was used in numerous locations to probe the existing wood spine beam and floor joists, and generally penetrated the member easily. Additional temporary shoring in the form of steel teleposts were supporting the main spine beam(s) and wooden posts supported most of the deteriorated embedded floor joist ends (see Photo 17). The wood temporary showing was observed to be stained at the base indicating a significant amount of moisture at the base being wicked into the columns.



## 5.1 Exterior Photos



In the figure above, 235/237 St-Patrick St can be seen outlined in red.



### 5.1.1 South Wall (Front)



Photo 1: Front (South) façade. Two-storey deck appears to have settled.

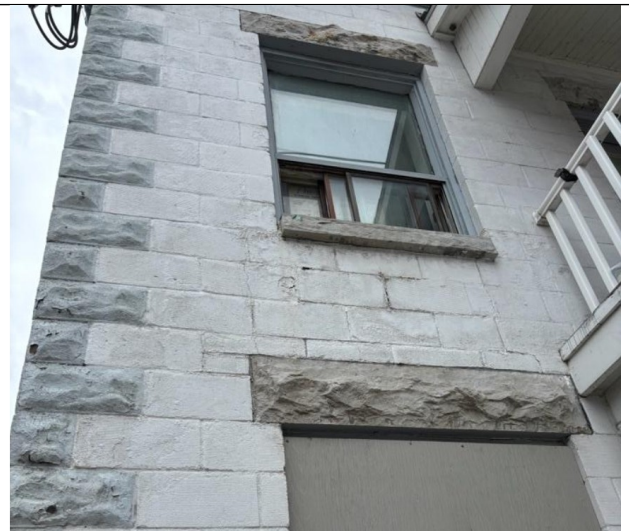


Photo 2: Weathering, vertical cracking and step cracking in cladding.



Photo 3: Weathering, vertical cracking and step cracking in faux-stone concrete veneer.



Photo 4: Nail applied tin panelling over timber wall (right) and Faux-stone concrete veneer detaching from underlying structure at South-East corner.





### 5.1.2 West Wall



Photo 5: Cladding detaching from structure at South-West corner.

Photo 6: Previously replaced exterior wall section with decay and foundation wall deterioration.



Photo 7: Bulging and peeling of existing cladding on West wall.



Photo 8: Bulging and peeling of existing cladding on West wall.





5.1.3 East Wall



Photo 9: Advanced decay in exterior walls at opening in the cladding on East wall.



Photo 10: Advanced decay in exterior walls at opening in the cladding on East wall.



Photo 11: Advanced decay in exterior walls at opening in the cladding on East wall.



Photo 12: Remains of deteriorated wall are visible piling up at the base of opening in the East wall at the Southern edge.



Photo 13: View of East wall.



Photo 14: View of east wall and rear addition.

## 5.2 Interior Photos

### 5.2.1 Basement



Photo 15: Sand build-up at base of wall due to deterioration.



Photo 16: End of beam deteriorated due to rot. Beam has lost all connection to foundation wall.



Photo 17: Jackposts and steel beam installed to support sagging floors.



Photo 18: Base of main post rotting away.





Photo 19: High moisture content near base of foundation wall (87%)



Photo 20: Deterioration of foundation wall.



Photo 21: Decayed and stained wood structure on top of foundation wall.



Photo 22: Photo of a Schmidt hammer test of foundation wall compressive strength.



Photo 23: Crack and discolouration in foundation wall.



Photo 24: Severe scaling of the wall.



Photo 25: Efflorescence, discolouration & staining on the wall. Possible sulphate attack.

This square is intentionally left blank.





### 5.2.2 Floors One & Two

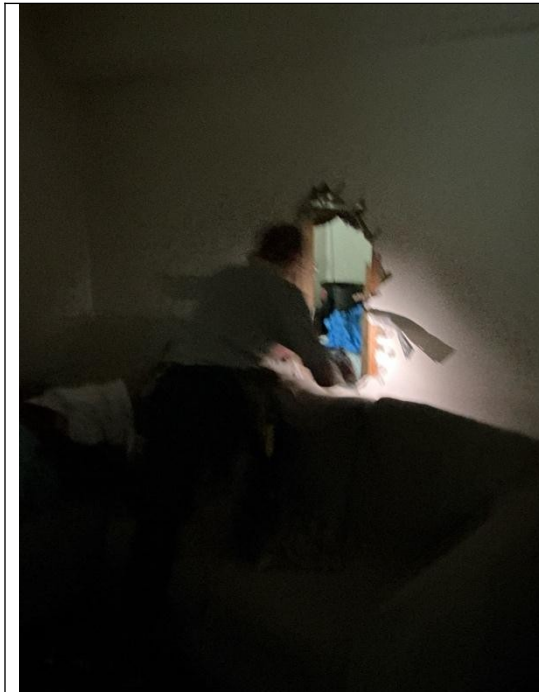


Photo 26: Hole in interior wall, adjacent unit is visible through the hole.

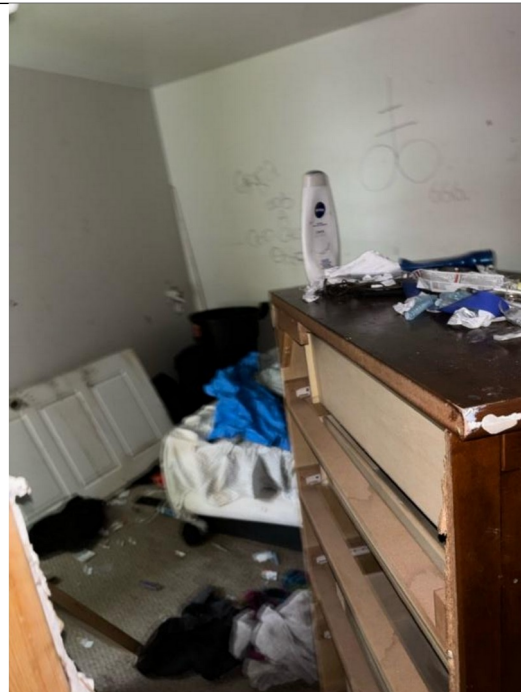


Photo 27: View through hole.

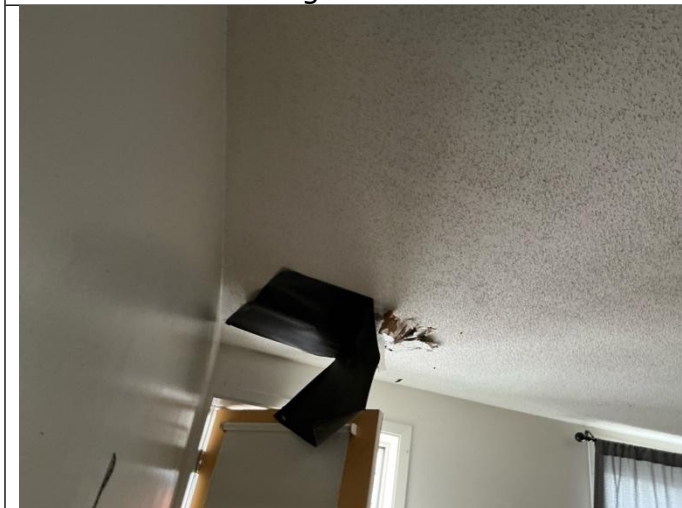


Photo 28: Ceiling damage.



Photo 29: Drywall damage.



## **6.0 Recommendations & Conclusions**

This semi-detached working class residential structure was constructed between 1851 - 1872. A Heritage Survey conducted in 1990 concluded that the subject structure had a contributing value to the Heritage Conservation District, with a Category 2 rating and a score of 70.1 / 100. The date of construction also leads to a significant value in the built heritage of the ByWard Market, being a structure built before 1880. The state of the structure at the time of the 1990 heritage evaluation, as evidenced by photos in the City records, is excellent.

Having reviewed the structure and its present condition in detail, we find that the property is an example of a working class residence and probable workshop in very poor condition. The building appears to be of plank-on-edge construction, which is an uncommon form of construction from the late 1800's timeframe. During the course of our work in Ottawa, we have run into number of buildings which are constructed of plank-on-edge framing, which have been generally in significantly better condition. Examples include 81 Armstrong Street, Ottawa, ON K1Y 2V6 and 98 Merton Street, Ottawa, ON K1Y 1V7.

Observations were made through openings in the three observable exterior walls of 235/237 St. Patrick Street. Peeling and bulging of the cladding on the East and West façades, and detachment, cracking and weathering of the cladding was noted on the South façade. The exterior walls, in our opinion, are in poor condition. Where the exterior walls are covered, the observable deterioration indicates that water has and continues to penetrate behind the cladding and affect the underlying structure. Where there are openings in the exterior wall assembly, advanced decay of the plank-on-edge structure was noted along with what appears to be *Surpula Lacrymens* fungus i.e. dry rot. Dry rot can continue to affect wood at much lower moisture contents (approximately 20%) as opposed to wet rot, and unlike wet rot, tends to spread rapidly throughout the structure once having devoured the lignin in an area, rather than staying localized. These observations lead CEL to believe that the decay of the exterior walls is likely systemic and not localized. Based on the condition of the plank-on-edge structure at the openings on the East wall, and the condition of the cladding and other walls indicative of water infiltration throughout the wall, we believe the wood to be sufficiently decayed to the extent that the strength of the exterior East, West and South plank-on-edge walls to be compromised.

The foundation wall of the structure is also believed to be in poor condition. From non-destructive testing methods the compressive strength of the wall was determined to be extremely low and is less than half that of the minimum strength to be considered concrete in a modern sense (ie: the lower bound threshold listed in the CSA A23.3 "Design of Concrete Structures"). This low compression strength and the observed deficiencies are evidence that the wall was likely a fieldcrete mix with poor aggregate and mix properties, resulting in severely reduced durability. The severe scaling, sand build-up, efflorescence, patchy discolouration, vertical cracks and high levels of moisture in the wall observed on the interior, align with these assumptions. We believe that the wall is in a state of accelerated active deterioration and future winter exposures are likely to



result in aggressive freeze-thaw cycle damage, which could compromise the wall entirely.

Note that with respect to the efflorescence, it appears to be both extensive and deleterious. While not all causes of efflorescence are deleterious, in this case we suspect that this building is exhibiting classic signs of harmful efflorescence. This, coupled with the texture of the surface of efflorescence being powderous, effectively all but rules out autogenous healing of the concrete. Thus we are left with mineral deposits from rising damp, or road salts (or other direct source of salts) within the concrete. Given the exposure and the lack heating, it is suspected that the walls are inwardly drying, depositing both minerals and salts at the surface. This is a aggressive environment for an unoccupied structure, as while the concretes are effectively never saturated in such cases, the inward drying results in the crystalization of salts within the concrete pores. These pores are highly desirable for most foundations and exposure; they allow for some freeze-thaw tolerance, as well as increase permeability and permit these older heritage fabrics of the building to, in effect, breath. Where these salts are permitted to form at the surface, the result can be pore-pressures above the tensile capacity of the base material, resulting in micro-fracture and powdering of the surface. This deterioration, given time, may result in serious damage to the structural element.

Such foundations materials are rather easy to repair, though the walls must be stable and able to sustain the likely capacity reducing impacts of interventions. The materials themselves are often well known, their field tested status all but rules out AAR influences, and where required petrography may be employed to positively identify characteristics to be mirrored and respected with modern materials. The contemporary repair of such structural elements may be distressing to some practitioners, entirely too enamoured with the precision and professional comforts afforded by modern repair materials, pre-prepared specifications, and manufacturers' written instructions. As such, this concrete itself would likely be easy to repair with contemporary materials, however the extent of deterioration gives rise to the concern as to safety in accessing the necessary surfaces. Such concretes may weaken when wetted, and wetting is an integral part of the repair interventions. The exterior of the wall may be in even worse condition, and given the interior condition, we would therefore hesitate to recommend repair due to the danger of loss of structure and the potential health and safety impacts on workers.

With such a low compressive strength and clear signs of decay, the wall would be difficult to repair with contemporary methods and the additional service-life as a result of repairs would be minimal.

The foundation could be re-poured in sections, in a procedure similar to what is carried out for underpinning, but that would be labour intensive and removing the foundation wall in feasible sections could compromise the stability of the adjacent walls. The stability of the structure above and it's ability to span any gaps would also be in question, due to the decay observed throughout. A new foundation could be poured and the house lifted, however lifting the house would likely cause extensive damage to the exterior wall structure due to its compromised condition. While the second-floor framing, roof framing and the rear addition appear to be in fair to good condition, the ground floor framing and structure bearing directly on top of the foundation wall have extensive decay



throughout. Repair of the ground floor framing is not recommended to the decay observed and replacement of the ground floor framing would be difficult to accomplish without compromising the structure above, again, due to house lifting concerns.

Generally structures perform well when occupied, and may depreciate and thereafter deteriorate rapidly when unoccupied. Such structures require the early and aggressive intervention of owners and Authorities Having Jurisdiction so as to prevent their loss. The subject structure is in an advanced state of distress, and the list of interventions necessary to achieve rehabilitation will grow with time.

In our review of a property, we apply a systematic approach to the evaluation of the structural and building envelope elements, with each analyzed in accordance with an approach adapted from English Heritage applying the Parks Canada "Standards and Guidelines for the Conservation of Historic Places in Canada", with the structural condition terminology as outlined by PEO. Thus in consideration of Heritage Value, Merit, and Context we score a property in accordance with the Standards and Guidelines, and where we look to the strength, stability, and durability of the structure, we score to PEO standards for field evaluation. With the exception of the the front porch structure, the rear addition, and front cladding system (separating, but integral within itself), which were in good to fair condition, the property consistently scores poor and very bad in all categories.

Considering the state of critical structural elements within the subject property, and more specifically the significant and advancing state of the plank-on-edge primary structure (ie: rotting and infected with an aggressive form of rot), preservation of the structure is not possible. Restoration of the building would be prohibitively difficult, with the sourcing of necessary timbers and other period materials being challenging at best. Rehabilitation of the structure is likely possible, however, it is our professional opinion that significant and necessary maintenance has been neglected in this structure. The rehabilitation of the property would likely do less to contribute to the Heritage Conservation District than would a suitably sensitive and heritage complementary reuse of the facade element within a new structure.

Significant structural work is required to the ground floor framing, foundation, exterior wall, in addition to extensive the cladding repairs. Front facade requires re-anchoring to the primary structure, and it is not clear if this element is entirely stable; in the event of a design level lateral load event (significant wind, or seismic, event), the facade could come away from what is clearly and evidently a rotting backing structure and pose a hazard to occupants or the unsuspecting public. This is a structure in a condition which may be explained as the "Do Nothing" approach to maintenance, upkeep, occupancy, and use has been adopted continually for an extended period of time. Immediate planning for intervention, be it rehabilitation, selective demolition, or stabilization is urgently required and strongly recommended.

**Written by:** E. Khazal & R. Paxton, B.Eng., EIT

**Reviewed and Approved for Release by:** M. Quinn, P.Eng.







**Note:**

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## **Appendix A:**

'Evaluation of Existing Structures at 227/229, 231/233, 235/237 St-Patrick, Ottawa, ON.'  
prepared by Gadiant Structural Engineering Ltd., 13 August 2021

NB: This appendix contains eight (8) pages, including this one. The appended report is not considered to count towards the total number of pages of our report, and hence is not reflected in the numbering of this document.



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