JOHN G. COOKE & ASSOCIATES LTD.
CONSULTING ENGINEERS

John G. Cooke, P.Eng., RSW — President
Grazyna A. Materna, M. Eng., P.Eng — Vice President
John D. Barton, C.E.T. — Vice President
Mary Cooke, C.Tech., CSP — Partner
Lisa Nicol, P.Eng. — Partner
Marty Lockman, P.Eng., ing. — Partner
Jonathan Dee, P. Eng., ing. — (Burlington) Associate
Chris Vopni, P.Eng. — Associate

Rafic Hokayem
Ottawa, ON

March 20, 2019

Project No. 19114

Attn: Rafic Hokayem
ottawarafi@gmail.com

Re: 124 Boteler Street
Structural Condition Review

Mr. Hokayem,

As requested, John G. Cooke & Associates visited the above noted address to review the condition of the existing structural elements. The site was visited by Chris Vopni, P.Eng. and John Barton, C.E.T March 13, 2019. Prior to the visit, we were provided with City of Ottawa Heritage Information Sheet. The house currently resides within the Lowertown West Heritage Conservation District.

The house is reported to have been constructed circa mid 1860s with perhaps multiple interventions over the subsequent years. Based on early representations found in the 1888/1901 and 1902/1912 Fire Insurance plans, the house had two garages/stables appended to its rear. These are no longer present. The house is currently vacant and is reported to have been since 2013.

Exterior Walls
The timber house is built in the modified Post and Plank method which came to be known as *Poteau et Piece Coulissante* or Post and Sliding Piece. In this construction, the exterior walls are built of corner posts grooved to receive squared and tenoned timbers. The timbers at this house are an average of 3”x14”. The walls are currently strapped with vertical strapping likely used to support wallboard in a past modification.

An addition is found at the rear of the house and based on the location depicted in previous Fire Insurance Plans, it is unlikely an original element of the house, although it appears to be framed using similar construction methods and materials.

The house is clad in horizontal plank siding, reported to have been installed in a 1950s modification. There are indications that the new siding included the installation of nominal insulation, this could not be confirmed during our visit.

In general the wall timber is in fair condition with evidence of mild water damage localized at windows. The condition of the exterior face of the wood could not be confirmed as it is concealed by the siding. An inherent issue with this method of construction is wood shrinkage perpendicular to the grain, this is caused by drying of the green wood that was used in construction. This type of drying is evident at this house with gaps between the horizontal timbers. These joints may be filled with chinking; none was observed except for suggestions that it may have been present at one time with observations of braided rope backings in some joints. Shrinking of the timber and opening of the joints presents significant occupant comfort issues by freely allowing heat to enter or escape through sizeable openings in the wall.

The windows and doors of the house and addition are not original and the replacements do not fit their original rough openings leaving large areas for heat loss. Other original elements have been modified and improperly supported, such as at the rear of the house where a past opening has been modified and improperly framed.

Foundation
The timber framed house was originally founded on a stone foundation, however modifications to raise the foundation added a short extension using Concrete Masonry Units (CMU). The basement has a perimeter of CMU at the interior which appears to be offset from the interior of the stone foundation wall, based on observations from an opening for the water meter. The foundation at the addition is CMU. Footings were not observed at either the house or the addition. Concrete slabs on grade are found in both areas of the basement.

The condition of the stone masonry walls could only be observed in two locations, the overall condition can not be inferred based on observations. At the bottom of the stairs, at the intersection of the house and addition the wall foundation wall is exposed and found to be in poor condition. This is a heavily modified area of wall and is not necessarily indicative of the overall wall condition. At the north wall, a small area of wall is exposed at the water meter. The masonry at this location is found to be in fair condition but again is not indicative of the overall condition. The exterior of the foundation is parged and not accessible for review, the majority of the parging was concealed by snow at the time of visit, it's condition could not be verified. In comparable stone masonry foundations of this age with unlikely maintenance for several decades the condition is often poor and requires attention. The condition can only be assessed with the removal of the inner CMU apron along the perimeter.

The CMU extension and CMU at the addition is found to be in fair condition at the exposed interior face. There are several locations of paint flaking and salt depositing on the face of the CMU indicating moisture passing through the wall, however no major damage is noted at this time. The condition of the exterior face of the CMU could not be reviewed due to the presence of parging and snow.

Ground Floor Framing
The floor framing may have spanned the full width of the house to bear on the stone foundation wall originally but currently is supplemented mid-span by a railway tie as beam which is supported on cast iron posts. It's possible that a timber mid-span support existed prior to the basement modifications. This mid support is found in both areas of the basement. The floor framing at house is 3"x8" timber spaced at an average of 36" c/c with tongue and groove decking measure at 1". The framing at the rear addition is 2"x8" at 20"c/c.

The floor framing at both areas of the house would not conform to the current Ontario Building Code (OBC) requirements but has served the residential occupancy for well over a century. At the original house this can be attributed in part to the higher strength of first cut timber from the era of construction, as compared to mass manufactured lumber of today. The condition of the framing is fair with some openings from past pipe penetrations and past access hatches to the original unexcavated basement. No observations of significant distress of the wood framing were noted however the bearing conditions at the foundation wall were available for assessment. A large log beam supports the back wall of the house and shows a small area of deterioration where is it exposed. The steel beam at midspan is severely corroded at both the house and the addition.

Second Floor Framing
The second floor framing is full span 3"x8" timber spaced at about 48" c/c bearing into notched openings in the timber wall with iron straps as mechanical connection from the underside of the joist to the wall timber. The floor is made up of tongue and groove decking measure to be about 1-1/2".

As with the ground floor framing, this framing does not meet modern requirements but no distress was observed. The framing is in fair condition with openings from past and current pipe openings.

Roof Framing
The original roof framing consists of rafters with a tie at approximately mid height which formed the ceiling support. During a modification to include dormers on the east and west sides of the house the rafters were cut at the elevation of the tie and re-supported with 2"x4"s to the exterior dormer wall. The dormer sloped roof of the dormers are built of 2"x4" which bear directly on the original roof shingles without

supplementary support. The vertical face of the dormers are built of 2" x unknown framing at 16" c/c clad with original roof boards at the interior.

The condition of the roof framing is fair with areas indicating past moisture infiltration. The inconsistency of the roof modifications suggests that it is unlikely that structural analysis of the framing would validate its ability to withstand modern Code expected loadings. There was no observed distress on any of the elements at the time of our visit.

Summary
While the as found structure would not be in conformance with modern Building Codes, the satisfactory performance of the structure over at least the past 30 years suggests that upgrades to meet current Code are not necessary. This is based on the National Building Code of Canada (NBCC) Structural Commentary L, which provides this allowance when there is no evidence of significant damage, distress, or deterioration and if the structural system and critical details are examined for load transfer. Further to our review, if the structure is intended to be retained we would consider the dormer to roof connection and collar splice/extension as a critical detail requiring detailed review to ensure load transfer.

The structural condition aside, there are items of concern in the house related to occupant comfort. The interior of the house has been stripped of all services and finishes, substantial effort would be required to make the house occupiable. It's very likely that the re-introduction of services will require alterations to the structure and analysis will be required to ensure they meet current OBC requirements or satisfy NBCC Commentary L.

The floors have performed for at least 30 years and would satisfy NBCC Commentary L, however there is noticeable deflection of the upper floors. Personal tolerances for deflection and vibrations are more strict in modern times and while they are not structurally deficient they present discomfort for occupants. To counter this discomfort, supplementing the existing joists with additional joists would be recommended.

Currently the house offers minimal insulating value and to bring the house to modern expectations would require significant intervention at either the interior or exterior of the house. Both options would present complications to either the geometry of the exterior or would restrict the already small liveable ground floor space.

Conclusion
While the structure has served the needs of residential loading without excessive distress or deterioration, it can be expected that that substantial reinforcing and upgrade will be required to accommodate the reintroduction of services to the house. A concern with reinforcing or modifying buildings of this age is the risk of scope creep. Otherwise stable elements can quickly become destabilized when load paths are altered leading to significant increases in the expected scope of work. High levels of risk management and contingency planning must be considered.

Should a comparison of upgrading and reinforcing versus building new demonstrate the latter to be more risk adverse, many of the materials found in the house are in good condition and may be re-used or repurposed.

Please don't hesitate to contact the undersigned should you have any questions or require clarifications.

Sincerely,

JOHN G. COOKE & ASSOCIATES LTD.

Chris Vopni, P. Eng.
Associate

CV/cv

19114/ltr_1

Figure 1: 124 Boteler; Street Elevation

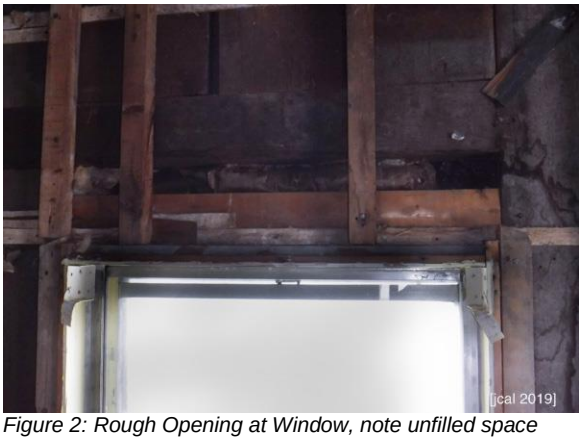

Figure 2: Rough Opening at Window, note unfilled space above

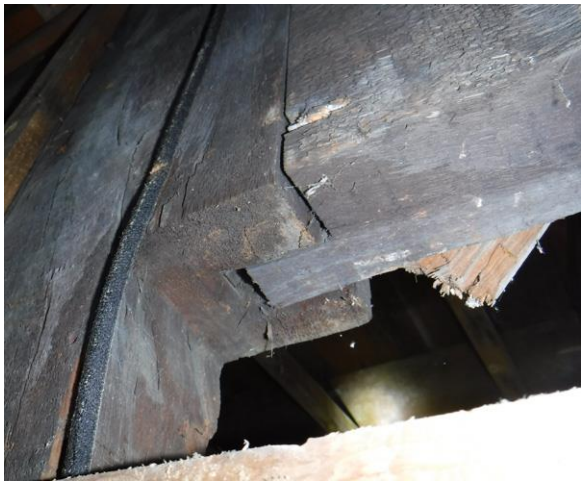

Figure 3: Post with Tenoned Timber

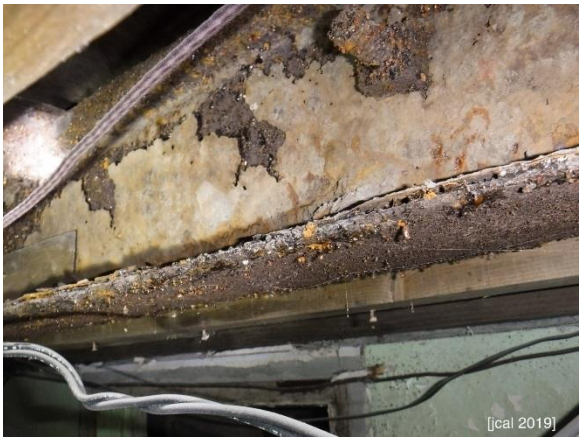

Figure 4: Corroded Beam at Basement

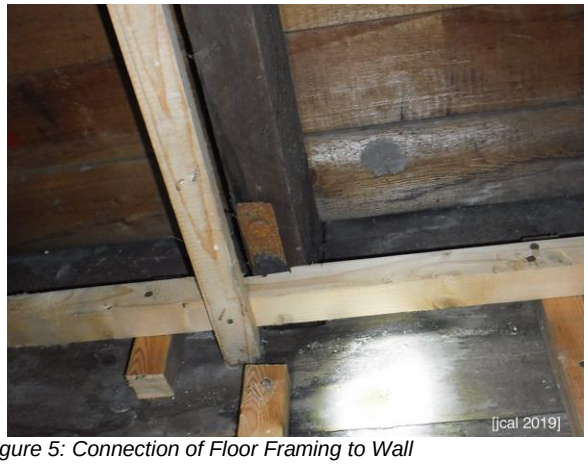

Figure 5: Connection of Floor Framing to Wall

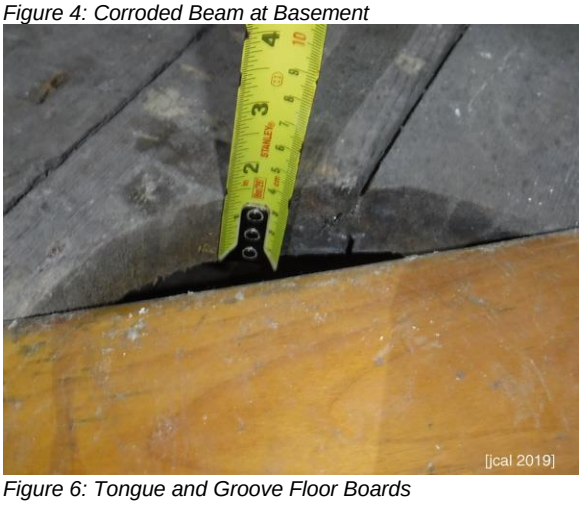

Figure 6: Tongue and Groove Floor Boards

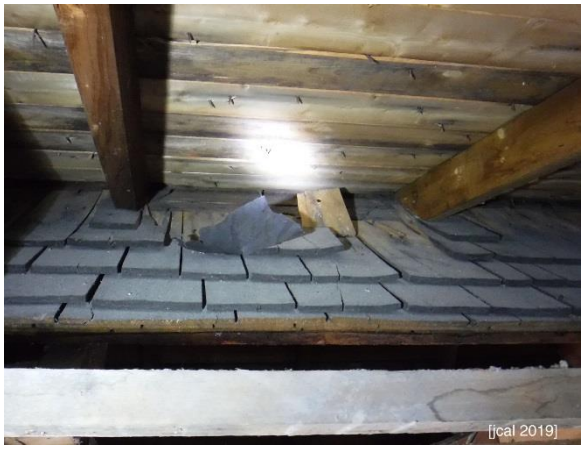

Figure 7: Dormer Rafters Bearing on Original Roof

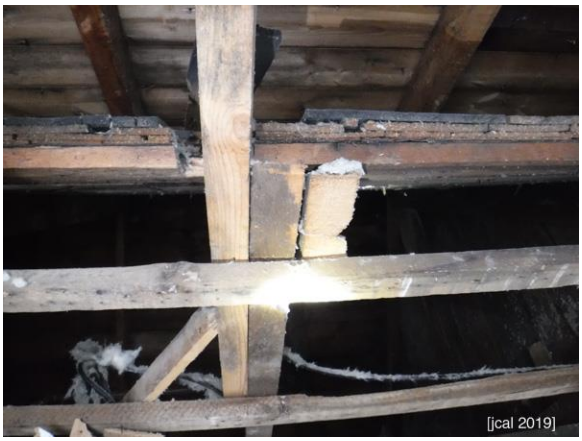

Figure 8: Cut Rafter End

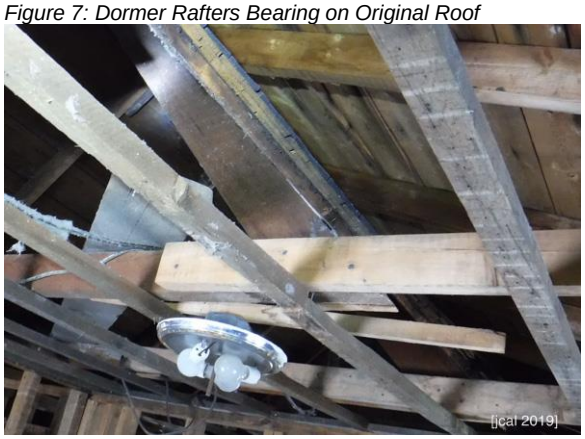

Figure 9: Cut Rafter End with Collar Extension at Dormers

Figure 10: CMU Foundation Wall Condition