

May 30, 2013

CITY OF OTTAWA

Planning, Transit and the Environment
Building Code Services
Ben Franklin Place
101 Centrepointhe Drive, 2nd Floor
Nepean, ON K2G 5K7

OEI File: N009-002

Attention:

Mr. Peter Black, C.B.C.O.
Manager, Building Inspections

Dear Mr. Black,

RE: Heritage Structural Review of 197 and 201 Wilbrod Street, Ottawa

Thank you very much for inviting us to participate in this project. In order to provide deeper insight into the historical construction of the two buildings, I took the liberty to invite my colleague, Eric Jokinen, Ing., P.Eng, to assist with historical research, advice and opinion.

On May 15, 2013 we performed a visual inspection of the brick clad buildings at 197 and 201 Wilbrod Street in Ottawa.

This report is based solely on visual inspection.

GENERAL

The heritage structural review of the condition of the buildings at 197 and 201 Wilbrod Street in Ottawa was requested by the City of Ottawa on May 6th, 2013. The review was commissioned as an opinion on the condition of the buildings and the potential for retention of the heritage buildings as a whole or in parts.

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

- Order to Remedy an Unsafe Building, City of Ottawa, 27 November, 2012;
- 197-201 Wilbrod Street Concept Demonstration Study, H.O.D.I., January 2011;
- Survey, Farley & Martin, 1980.

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 H.O.D.I. report states that three buildings in a row were built in 1876. The third building, Wilbrod Street, is not included in the scope of this report.

The buildings are located on an approximately 7,000 square foot lot (Figure 1). The rear additions were made to both buildings at a later date, and a garage was inserted between them. Partial basements exist at the rear ends of both buildings. The original buildings appear to have only crawl spaces. Interior modifications happened throughout the history of the buildings.



Figure 1. Wilbrod Street View

The main structural system of the building appears to be a version of plank framing system without the corner posts, and with clay brick veneer walls. The foundation walls consist of rubble stone masonry. The clear height of the basement is approximately 5 feet. The clear height of floors varies. The gable roofs shed water towards the east and west.

We performed a limited literature search about the plank framing system. A sketch from the book “Guide de renovation, reparation, isolation, entretien d’une maison”, by Jules Auger, 1979 is copied here without permission (Figure 2). The sketch shows a classic plank framing system with corner posts and dovetailed inserts of the horizontal planks. The framing of the buildings on Wilbrod is a variation of this approach. The corners are

overlapped and nailed, and the vertical strapping appears to be an integral part of keeping the horizontal planks in line.

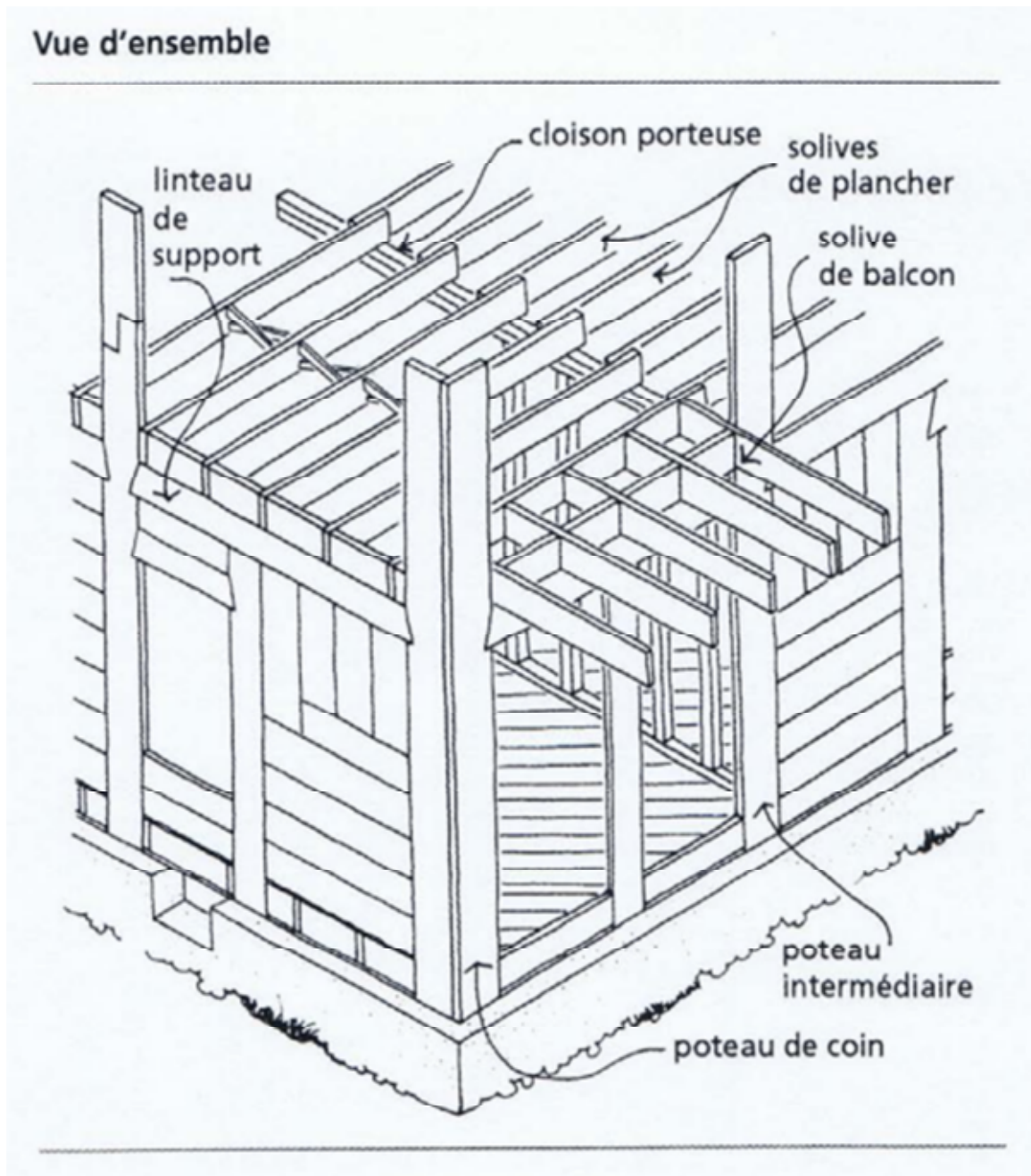


Figure 2. Typical Plank Framing System

from: "Guide de renovation, réparation, isolation, entretien d'une maison", by Jules Auger, 1979

It is not known if and how often the exterior brick veneer is secured to the planks. The interior finishes show a range of construction practices from wood lath and plaster to contemporary drywall sheathing.

DESCRIPTION OF AS-FOUND CONDITION

The buildings are in a poor state of repair. Years of neglect have resulted in serious damage. The two main reasons of concern for the stability of the building are:

- Deteriorated planks in contact with foundation walls;
- Potentially deteriorated planks and plank connectors; and
- Severely bulging west veneer wall of 197 Wilbrod.

FOUNDATION WALLS. The basement rubble stone foundation walls are approximately 24 inches thick. Parts of the walls have failed and parts appear to be weathered but sound. Figure 3 shows one of the walls. It was not possible to closely inspect the condition of the foundation walls in areas with crawl space.

The slabs on grade in both basements have failed (Figure 4). The basements are not high enough, and in one of them it was necessary to dig out the middle in order to install the furnace. If the decision is made to restore the buildings, a detailed survey of the walls with recommendation for repairs would have to be performed. If the use of the basements is required, an underpinning of the walls must be designed.

Exposure to weather and water has caused deterioration of several of the viewed ground floor joists. A lot of joists have been notched at the walls. Some of them have been randomly notched to allow passage of utilities. Most of the joists rest directly on rubble stone foundation walls instead on wood plates (Figure 5).



Figure 3. Foundation Walls



Figure 4. Basement Slab on Grade



Figure 5. Ground Floor Joists

WOOD FRAMING. Three inch thick planks, stacked on top of each other, form the main structural frame of the building (Figure 6). Please note the regularly spaced vertical strapping. It provides much needed lateral stability for the planks. Please note the absence of a corner post. The planks in the corners are overlapped. It was not possible to verify nailing in corners (Figure 7). In a few locations, it was possible to verify that there are no connectors along the horizontal joints between the two planks. The only lateral support appears to be vertical straps. The contact between the planks is discontinuous. The planks are often separated by a fraction of an inch for a few feet, measured horizontally.



Figure 6. Plank Framing System

Typically, there are no vertical members that frame the window and door openings, and there are no lintels (Figure 8). The openings are simply punched out through the wall. They were likely cut after the walls were built solid. This means that vertical strapping is the only lateral support for planks between the two openings.

Please note that there is no space between the wood planks and brick veneer, and that there does not appear to be any building paper between the two.

The stacked planks continue from the foundation wall up to the roof. The second floor joists and the ceiling joists are simply installed in pockets cut out in wall planks where necessary. Where joists run parallel to the wall, there is no shear transfer between the floor and the wall. The last joist is simply a few inches away from the wall, and the floor planks extend more or less to the wall. Where joists run perpendicular to the wall, they provide the shear transfer, as the floor planks are not connected to the wall. It could not

be verified how and if the floor joists are nailed to the wall planks. In general, although tested over 137 years, the lateral stability of the system is questionable. The system is gaining additional lateral stability from a number of interior partition/loadbearing walls. Past alterations have left a number of questionable framing details (Figure 9).



Figure 7. Planks are Overlapped in Corners



Figure 8. Typical Window Opening



Figure 9. Interior Partition/Loadbearing Walls

The deterioration of plank walls includes but is not necessarily limited to the following:

- A number of exposed walls of 197 Wilbrod and plastered or dry walled walls of 201 Wilbrod show traces of sustained water infiltration (Figure 10).
- Dry rot or other wood deterioration is found in several locations. Figure 11 shows deterioration at the base of the east wall of 197 Wilbrod.
- Fire damage of east wall of building at 197 Wilbrod has been repaired by nailing vertical planks (Figure 12).



Figure 10. Water Staining of Exterior Walls



Figure 11. Deteriorated Plank at the Base of Wall



Figure 12. Fire Damage Repaired with Vertical Planks

VENEER WALLS. The single wythe veneer walls appear to be in fair condition in general, with a few exceptions.

The brick veneer of the west wall of 197 Wilbrod has bulged out severely, and it poses the danger of falling down at any moment. The veneer should either be deconstructed or shored immediately. It does not look like the plank framing is affected. Please see Figures 13 and 14.

The street facades have received a stucco finish at some point in the past. The stucco is failing in many locations, one of which is shown in Figure 15. It is quite likely that the brick behind the stucco has suffered from repeated freeze-thaw cycling and that it is in poor shape.

All other veneer walls have been painted. The condition of brick behind the paint is unknown, but it has likely been damaged by frost. In a few locations, the brick damage is substantial and would require brick replacement (Figures 16 and 17).



Figure 13. Bulged Brick Veneer - West Wall of 197 Wilbrod Street



Figure 14. Close-up of Large Crack at the Bulge



Figure 15. Close-up of Deteriorated Stucco and Brick Behind



Figure 16. Frost Damage in East Wall of 197 Wilbrod Street



Figure 17. Frost Damage in East wall of 201 Wilbrod Street

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

The brick veneer of the west wall of 197 Wilbrod Street is bulged and can fail at any moment. Immediate attention is needed. The wall veneer can either be deconstructed or shored using diagonal wood or steel braces, anchored securely into the ground. Access to this side of the property must be blocked from both sides.

The vulnerable parts of this non-conventional framing are the loss of attachment of the planks at corners due to the corrosion of nails, and the rotting of the planks under window sills and at the top of the foundation wall.

Rotten elements could be repaired by selectively removing rotted portions of planks and inserting new pieces. This is common practice for this type of framing.

The structural integrity of the corners can be restored by inserting new vertical corner pieces to which the original planks can be connected using timber screws. Please note that the vertical strapping must be kept and reattached to the horizontal planks as required.

Any severely displaced walls will have to have the brick removed in order to allow for inspection. Once exposed, the wood framing could be drawn back into place if it is needed and if it is in sound condition.

If the decision is made to retain the buildings, repairs to the wood framing system to bring it to its original state would be possible, and not necessarily expensive. Foundation walls would have to be repaired first, and the landscaping around the buildings should be brought down a little, so that the brick veneer and wood framing is further away from ground.

The real question is the functionality and potential use of the restored buildings.

The framing system of both buildings is not compliant with the current building code. The load capacity of the floors is questionable. The lateral resistance of the frame is not known, but is likely insufficient. The buildings do not have vapour barrier and thermal insulation.

It is unfortunate that the original street facades have been ruined by the installation of stucco. It is highly unlikely that the brick behind the stucco could be reused either “as is” or in a rebuilt state to provide heritage look of the structure.

Being heritage engineers, we would like to see these buildings restored and preserved. The restoration and preservation would require, as a minimum:

- Repairs of foundation walls;
- Wood repairs to deteriorated members;
- Addition of corner posts, window and door posts, etc., to improve lateral stability;
- Retention of most of the interior partition or loadbearing walls in order to provide lateral stability;
- Strengthening of existing floor joists to achieve current building code specified capacity;
- Rebuilding of the west veneer wall of 197 Wilbrod Street and street facades of both buildings;
- Re-attachment of all remaining veneer walls using helical or other retrofit ties, or rebuilding of all remaining veneer walls;
- Architectural work, such as insulation, vapour barriers, roofing, new windows and doors, etc.;
- New mechanical and electrical systems.

With all this work done, there would be very little to show of the original building. The facades would have to be rebuilt, and the original plank framing would be hidden behind the insulation and finishes.

With this in mind, perhaps the best option would be to preserve one or both buildings somewhere else in an open air museum type setting or heritage village. In such a case, after some strengthening in a way that would be visibly differentiated from the original

structure, the house(s) could become an exhibit with carefully designed paths for visitors.

In either case, the detailed recording of the buildings should be performed, for the record.

While the strategies for adaptive reuse of the building are not the subject of this report, we could not resist offering the one mentioned above.

CONCLUSIONS AND RECOMMENDATIONS

The west veneer wall of 197 Wilbrod Street is bulged and can fail at any moment. Immediate attention is needed. The wall veneer can either be deconstructed or shored using diagonal wood or steel braces, anchored securely into the ground. Access to this side of the property must be blocked from both sides.

While the building frame of both buildings is in salvageable condition, the scope of work to restore it and make it compliant with the current building code would be substantial. If the buildings are restored to today's building code, most of the original fabric would become hidden. The street facades would have to be rebuilt, so that there is very little of the original heritage material that would remain exposed, except the volume and contextual participation in heritage character of the area.

Perhaps better use of the buildings would be found somewhere else, rebuilt in some museum – heritage village, with as much of the original building fabric exposed, while two new buildings could be constructed in the original location with massing and facades resembling the original as close as possible.

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

Yours very truly,

OJDROVIC ENGINEERING INC.



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



Eric Jokinen, Ing., P.Eng.