

27 June 2014

Parks Canada

Greg Shaw, Project Manager
Prince Edward Island Field Unit
2 Palmer's Lane
Charlottetown, PE C1A 5V8

Re: Province House, Charlottetown, PE Our File: 3405 (Parks Canada)

- **Cursory Structural Engineering Review of Province House, PEI
Parks Canada Agreement#EODCC-140016
Parks Canada File#45339846**

- **Short Term Structural Concerns**

Dear Greg:

Further to our recent telephone discussions, I confirm I have concern regarding the structural integrity of the 3 ½ in. x 4 in. timber roof rafters. My probing in March 2014 was limited consequently, I do not know the extent of the deteriorated roof rafters.

The deteriorated roof rafters do not represent a safety issue related to the occupants of the building however, they do represent a safety issue relating to workers walking on the roof of the building.

If the roof rafters fail as a consequence of snow/ice loading, in all likelihood water damage would occur to the rooms below.

To avoid a localized collapse, the existing roof insulation located adjacent to the underside of the roof could be temporarily removed to enable an inspection of the timber roof framing. In all likelihood, any questionable timber framing could be strengthened without disruption to the occupants of the building.

Inspection of the timber framing at the lower portions of the roof however, cannot be made from within the attic.

If you have any questions, please give me a call.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

Suite 200
1046 Barrington Street
Halifax, Nova Scotia
B3H 2R1
tel (902) 422-4493
fax (902) 422-5066
jwcowie@eastlink.ca

"BY E-MAIL"

bill.courtney@pc.gc.ca

24 March 2014

Parks Canada

2 Palmer's Lane
Charlottetown, PE
C1A 5V8

Attn: Mr. Bill Courtney, FEC, P.Eng., Asset Manager

Re: Province House, Charlottetown, PE Our File: 3405 (Parks Canada)

• Observations in the Attic

Dear Bill:

My observations in the attic were limited to three areas.

My observations revealed the following:

1. Water Leakage Staining

There was a considerable amount of water leakage staining on the timber framing however, I did not detect any areas of wood rot.

2. Structural Steel Strengthening of the Timber Roof Trusses During the 1980's

The top and bottom chord members of the timber roof trusses are severely split. At many of the restoration steel connections, the steel bolts pass through wide cracks and many of the bolts have inadequate edge distance. A detailed inspection should be made of the connections and restoration implemented where required.

3. North/South Spanning Roof Stringers (3 ½ in. Deep x 4 in. Wide)

Many of the original stringers have been replaced by three 2 in. x 4's (nominal) during the 1980's roof restoration. At one probe location I noticed the North bearing end of an original 3 ½ in. x 4 in. roof stringer was failing at its bearing end. The notched end was splitting into the span of the stringer.

Suite 200
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Halifax, Nova Scotia
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jwcowie@eastlink.ca

Recommendations

Prior to deciding on the scope of the permanent roof restoration, it is recommended a detailed inspection be made of the existing roof framing. In order to conduct this investigation, it will be necessary to remove all the roof insulation. The lower portion of the roof can only be observed by the removal of the ceiling finishes of the rooms below.

My cursory inspection did not reveal an immediate concern of imminent failures affecting the life safety of the occupants in the building. A more detailed inspection is required as there are likely areas requiring restoration.

If you have any questions, please call.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

Cc: Ms. Marie-Pascale Rousseau, P.Eng.
Asset Management Specialist (Eastern Canada)
Parks Canada
marie.rousseau@pc.gc.ca

“BY E-MAIL”
[**mwronski@taylorhazell.com**](mailto:mwronski@taylorhazell.com)

6 March 2014

Taylor Hazell Architects Limited
333 Adelaide St. West, Fifth Floor
Toronto, Ontario
M5V 1R5

Attn: Mr. Mark Wronski, B Arch, OAA, MRAIC, LEED AP
Senior Associate

Re: Structural Integrity of Province House, Province House,
Charlottetown, PEI Our File: 3405

Dear Mark:

In response to your request for an opinion on the structural integrity of Province House I make the following comments:

1. The scope of our structural investigation was limited to the exterior masonry walls of the building. The scope of our temporary stabilization was limited to the third floor walls of the North and South elevations and the central arch over the South portico entrance. The temporary structural stabilization was completed in the Fall of 2013.
2. Our investigation revealed the capstones required lateral restraint along the top of the third floor walls of the North and South elevations. Two third floor masonry wall areas on the South elevation required lateral restraint as well as one location on the third floor within the North elevation. Steel framing was installed in order to provide the required lateral restraint.
3. Our inspection of the timber roof framing was limited to the end bearing conditions of the timber roof trusses. The bearing end of the timber roof truss located above the Northeast stair was strengthened by steel framing.

Suite 200
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Halifax, Nova Scotia
B3H 2R1
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4. First Floor Framing

Although inspection and documentation of the first floor framing is beyond the scope of our contract, during our inspection of the basement window openings, we noted a rotten North/South spanning timber floor beam located adjacent to the West exterior wall of the Speaker's office. (Northwest corner). Our observations of the floor beam were limited to observations through a hole in the brick masonry arch.

The first floor construction of the Western portion of the building appears to be supported on brick masonry arches. The central corridor has a stone masonry decking which is most likely supported on a sand and rubble fill between the brick masonry arches. In the office areas, the timber floor deck is most likely supported on timber sleepers spanning East/West. The timber sleepers are in turn most likely supported on the arches and sand/rubble fill between the arches.

The rotten North/South spanning timber beam below the Clerk's office would appear to support shallow East/West spanning timber joists. (Probably the typical sleepers extended across the opening). The timber beam in question was most likely installed in order to create a pipe chase for the hot water heating pipes.

Further investigation is required to establish the "as built" construction details subsequent to which we can provide recommendations for restoration construction.

5. Central Arch Over South Portico Entrance

The masonry columns supporting the portico have settled causing the arch to spread. As a safety measure, a steel framing member was installed on the North side of the arch to restrain the individual stones from displacement due to possibly future settlement.

6. General Conditions of Exterior Stone Masonry Walls of the Building

The masonry walls contain a lime/sand mortar which has deteriorated as a consequence of rainwater infiltration. In some areas, the mortar has deteriorated to sand while in other areas the mortar is very weak. (Very low compressive strength and very low shear strength).

It is understood, temporary remedial action will be undertaken to prevent future rainwater leakage from the roof and rainwater leaders.

The walls are susceptible to becoming unstable if subjected to uncontrolled ground vibrations. Previous correspondence recommended that if any construction takes place within the vicinity of Province House, restrictions are to be put upon the Contractor to limit the induced ground vibrations such that the peak particle ground velocity at the basement of Province House does not exceed 0.3 in. per second.

General Comments

Although lateral restraint has been provided to the capstones of the North and South exterior walls and steel framing installed to stabilize portions of the third floor masonry walls, it is recommended permanent restoration construction commence within the near future.

Without further deterioration, the exterior masonry walls are considered safe however, it is recommended regular inspections be made of the exterior stonework for detection of any displacements in the stonework or spalled stone from freeze/thaw action. Any spalled stonework should be removed to prevent injury to pedestrians below.

If there are any questions, please advise.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

Cc: Ms. Jill Taylor, Principal
Taylor Hazell Architects Limited
jtaylor@taylorhazell.com

Mr. Greg Shaw, Project Manager
Parks Canada
greg.shaw@pc.gc.ca

"BY E-MAIL"

[**mwronski@taylorhazell.com**](mailto:mwronski@taylorhazell.com)

4 March 2014

Taylor Hazell Architects Limited

333 Adelaide St. West, Fifth Floor
Toronto, Ontario
M5V 1R5

**Attn: Mr. Mark Wronski, B Arch, OAA, MRAIC, LEED AP
Senior Associate**

**Re: Structural Integrity of Province House, Province House,
Charlottetown, PEI Our File: 3405**

Dear Mark:

In response to your request for an opinion on the structural integrity of Province House I make the following comments:

1. The scope of our structural investigation was limited to the exterior masonry walls of the building. The scope of our temporary stabilization was limited to the third floor walls of the North and South elevations and the central arch over the South portico entrance. The temporary structural stabilization was completed in the Fall of 2013.
2. Our investigation revealed the capstones required lateral restraint along the top of the third floor walls of the North and South elevations. Two third floor masonry wall areas on the South elevation required lateral restraint as well as one location on the third floor within the North elevation. Steel framing was installed in order to provide the required lateral restraint.
3. Our inspection of the timber roof framing was limited to the end bearing conditions of the timber roof trusses. The bearing end of the timber roof truss located above the Northeast stair was strengthened by steel framing.
4. A limited investigation of the first floor framing revealed rotten timber floor joists located adjacent to the Northwest corner of the building. It is recommended shoring be installed to temporarily support the floor joists in question until permanent restoration.

Suite 200
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Halifax, Nova Scotia
B3H 2R1
tel (902) 422-4493
fax (902) 422-5066
jwcowie@eastlink.ca

5. Central Arch Over South Portico Entrance

The masonry columns supporting the portico have settled causing the arch to spread. As a safety measure, a steel framing member was installed on the North side of the arch to restrain the individual stones from displacement due to possibly future settlement.

6. General Conditions of Exterior Stone Masonry Walls of the Building

The masonry walls contain a lime/sand mortar which has deteriorated as a consequence of rainwater infiltration. In some areas, the mortar has deteriorated to sand while in other areas the mortar is very weak. (Very low compressive strength and very low shear strength).

It is understood, temporary remedial action will be undertaken to prevent future rainwater leakage from the roof and rainwater leaders.

The walls are susceptible to becoming unstable if subjected to uncontrolled ground vibrations. Previous correspondence recommended that if any construction takes place within the vicinity of Province House, restrictions are to be put upon the Contractor to limit the induced ground vibrations such that the peak particle ground velocity at the basement of Province House does not exceed 0.3 in. per second.

General Comments

Although lateral restraint has been provided to the capstones of the North and South exterior walls and steel framing installed to stabilize portions of the third floor masonry walls, it is recommended permanent restoration construction commence within the near future.

Without further deterioration, the exterior masonry walls are considered safe however, it is recommended regular inspections be made of the exterior stonework for detection of any displacements in the stonework or spalled stone from freeze/thaw action. Any spalled stonework should be removed to prevent injury to pedestrians below.

If there are any questions, please advise.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

Cc: Ms. Jill Taylor, Principal
Taylor Hazell Architects Limited
jtaylor@taylorhazell.com

“BY E-MAIL”

mwronski@taylorhazell.com

6 November 2013

Taylor Hazell Architects Limited

333 Adelaide St. West, Fifth Floor
Toronto, Ontario
M5V 1R5

**Attn: Mr. Mark Wronski, B Arch, OAA, MRAIC, LEED AP
Senior Associate**

Re: Province House, Charlottetown, PEI Our File: 3405

- **Temporary Structural Stabilization of Exterior
Masonry Walls**

Dear Mark:

I have reviewed your Job Minutes of Meeting#10 of 23 October 2013 where I note on Item#10.11 (Other Items, Subsection .08) that “PCA would like to remove the fencing around the building that was installed when concerns about the stability of the cornice block first arose”.

Now that the capstones have been stabilized and the exterior walls in Rooms; #302, #303 and #310 are temporarily stabilized the concern for isolated collapse has been eliminated.

If all the cracked faces of the exterior stonework have been repaired/removed, there should be no need to maintain the fencing around the building.

The concern regarding the control of induced ground vibrations however remains. Induced ground vibrations (typically produced by vibratory compaction equipment such as pneumatic rollers used during the construction of streets) should to be controlled such

Suite 200
1046 Barrington Street
Halifax, Nova Scotia
B3H 2R1
tel (902) 422-4493
fax (902) 422-5066
jwcowie@eastlink.ca

that the peak particle velocity at the basement of Province House does not exceed 0.3 in. per second. (See attached correspondence of 1 November 2012).

If, you have any questions, please advise.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

Attachment

Cc: Ms. Jill Taylor, Principal
Taylor Hazell Architects Limited
jtaylor@taylorhazell.com

Mr. Greg Shaw, Project Manager
Parks Canada
greg.shaw@pc.gc.ca

"BY E-MAIL"
jtaylor@taylorhazell.com

1 November 2012

Taylor Hazell Architects Ltd.

333 Adelaide Street West,
Fifth Floor
Toronto, Ontario
M5V 1R5

**Attn: Ms. Jill Taylor, Principal, OAA, FRAIC, CAHP,
Int'l Assoc. AIA, LEED®AP**

Re: Province House, Charlottetown, PEI Our File: 3405

• Controlling Ground Vibrations

Dear Jill:

Further to our discussion with Greg Shaw on the morning of 31 October 2012 regarding the need to control and monitor ground vibrations at Province House, the following is recommended:

1. Parks Canada should advise the City of Charlottetown and the Province of Prince Edward Island that ground vibrations produced by vibratory compaction equipment (rollers) typically used on the construction of streets, are to limit the induced ground vibrations such that the peak particle ground velocity at the basement of Province House does not exceed 0.3 inches per second.
2. To monitor ground vibrations at the basement of Province House will require retaining a geotechnical engineering firm to place recording seismographs at various locations in the basement of Province House when, vibratory compaction equipment is used on the adjacent streets.

If you have any questions, please advise.

Yours sincerely,



James W. Cowie, M.Eng., P.Eng.
JWC/lal

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Halifax, Nova Scotia
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