

# Province House, Charlottetown PEI

## Masonry and Building Envelope Report (2013)

Presentation July 10, 2014



**Thank you for inviting us to present to you today**

## **Introductions**

### **Power Point Presentation 1: 1:00-2:30 pm**

- **Jill Taylor, THA**

### **“Description of the Masonry and Building Envelope Improvements Report”**

1. Chronology and Purpose of Report
2. Site Review Investigations and Description
3. Findings: Assessment, Conservation and Recommendations
4. Conservation Methods
5. Substructure
6. Shell
7. Structural Interior Walls
8. Exterior Closures/Exterior Walls
9. Exterior Wall Vapour Retarders, Air Barriers and Insulation
10. Exterior Windows and Doors
11. Roof Coverings
12. Flashing and Downspouts
13. Services
14. Phasing
15. Cost estimates, 2013

### **Discussion:**

- Available Budget, 2014 and onward
- Phasing Options
- Adapting this presentation for Friday meeting
- Next Steps

**Power Point Presentation 2: 2:30 –3:45pm**

- **Jill Taylor, THA**

**“Emergency Construction and Conservation Work in 2013”**

1. Team
2. Process of Investigation
3. Prioritization of work
4. Limits to cost and schedule
5. Conservation approach
6. Testing and results
7. Implementation
8. Cost of work
9. Next steps

**Discussion:**

- Adapting this presentation to the Friday meeting

**Site Tour 4pm – 5pm:****Province House Basement, Ground, Second Floor, Third Floor and Roof**

## Project Team

### **Taylor | Hazell Architects Ltd**

Jill Taylor, OAA, AAPEI, NSAA

Mark Wronski, OAA

### **Spencer R. Higgins Architect**

Spencer Higgins, OAA

Will DeBaecker

### **J. W. Cowie Engineering Ltd**

Jim Cowie, M. Eng, P. Eng

### **A. W. Hooker Associates**

Alan Hand, PQ S(F)

Glenn Hultzer

## CHRONOLOGY AND PURPOSE OF REPORT

- THA and the Consultant Team were retained to prepare selected restoration of the exterior masonry at Province House extent determined by construction budget
- During site investigation additional and very significant masonry deterioration and instability was observed
- PCS commissioned a high level, comprehensive assessment report of the building including investigations into conditions and emergency stabilization of the most unstable elements observed to date
- Further stabilization of the cornice blocks was incorporated into the original restoration program resulting in a reallocation of scope and a reduction in exterior wall restoration

## The Report:

- Identifies areas of the building that might be at risk;
- Describes the interrelationship between deterioration of roof, timber and masonry structure;
- Describes deterioration of building envelope and substructure; and,
- Recommends a course of further investigations and testing for long-term overall building stabilization with order of magnitude costs for construction implementation in 2015.

## The Report DOES NOT:

- Discuss the comprehensive renovation or upgrade of the building and site from a program, building code or modernization of building services standpoint (ventilation, electrical power and communications etc)
- Identify all conditions of structural/masonry deterioration or instability due to limitations to time spent on site and the extent of investigations performed

## SITE REVIEW INVESTIGATIONS AND DESCRIPTION

- The consultant team visited the site to record by means of photographs, note-taking and documentation on drawings the conditions found on site
- Limited selective removals were made after consultation with and approval by PCA.

## Visual Site Review September 16 – 23, 2012

Review and documentation of the following:

- South Elevation exterior masonry at south, east and centre blocks, including shifting of 3rd floor window jambs and bowing of stone ashlar courses
- Sandstone arches at basement windows including slipping and other failures
- South Portico Masonry Arch – settling of keystone
- North Portico
- Interior face of exterior stone wall on 3rd floor – limited destructive testing to assess condition of deteriorated wall assembly
- Timber Floor Beam at vaulted masonry arch in basement Sprinkler Room – deterioration of the timber end condition

## Visual Site Review and Selective Removals October 19 -25, 2012

- Based on the findings in September, PCA authorized more selected removals of finishes at the following locations, along with documentation of the south and west exterior walls
- Removal of plaster to review inside face of stone walls and at the North stair, East Block; Rooms 214, 301, 302, 303 & 310
- Partial removal of plaster ceilings in the rooms noted above

## ASSESSMENT, CONSERVATION AND RECOMMENDATIONS

- The assessment of existing conditions, analysis and recommendations for conservation were grouped into 3 major categories that allowed for the integration of observations as they affected the components of typical assemblies at Province House.
- The extent of deterioration was significant and in certain assemblies had reached a point of indeterminacy to be considered unstable.

## CONSERVATION METHODS

These methods apply to the work undertaken at Province House, the building elements and assemblies described above.

### Identification and Evaluation

- Prepare screening reports describing, identifying and evaluating heritage attributes
- Define as-found condition
- Define risks to resources
- Conduct detailed conditions analysis,
- Develop mitigation measures that preserve the heritage attributes and address the inherent vulnerabilities of the original material and construction assemblies
- Evaluate Options
- Describe preferred options
- Describe options for conservation

## Pre-Engineering Work

- Conduct investigations, limited destructive testing and reports for all disciplines affecting the as-found and deteriorated conditions:
- Geotechnical
- Civil (drainage)
- Plumbing
- Foundations and superstructure (walls, roofs, windows and doors)
- Building envelope
- Masonry & timber structure
- Mechanical, electrical and building systems

## Record

- Prepare as-found drawing based on hand measured interior and exterior survey

## **SUBSTRUCTURE**

### **Foundations & Slabs on Grade**

- ***VERY POOR***
- ***VERY UNSTABLE***

Deterioration ongoing and due to moisture entering through various sources:

- From below slab wicking up masonry walls
- From breeches in exterior wall
- Very poor surface drainage of roof and surface water away from the exterior wall
- Retained moisture between original sandstone foundation and new concrete bench wall along south elevation (full extent unknown)

### Recommendations

- Underpin basement walls, pour new slab, drain, grout backfill, infill voids, new drainage courses, replace stone, deep point and point

## 7.1 Substructure A10 Foundations



Figure 7.1.1



Figure 7.1.2



Figure 7.1.3



Figure 7.1.4



Figure 7.1.5



Figure 7.1.6



Figure 7.1. 7



Figure 7.1. 8



Figure 7.1. 9

## 7.1 Substructure A10 Foundations



Figure 7.1. 10



Figure 7.1. 11



Figure 7.1. 12



Figure 7.1. 13



Figure 7.1. 14



Figure 7.1. 15

## **Basement Excavation & Walls**

- ***VERY POOR***
- ***VERY UNSTABLE***

Severe deterioration of masonry walls and heavy timber framing:

- Collapse is apparent in isolated walls and possible collapse in others
- Setting of walls related to portico piers
- Super-saturation of materials generates air-borne particulate and mould

## Recommendations

- Abatement, remove meek/elect systems and redesign, fill gaps, rebuild walls, new stone, grouting, pointing, conservation of materials including historic finishes, conservation/reinforcement/rebuilding of timber structure



Figure 7.1. 16



Figure 7.1. 17



Figure 7.1. 18

**7.1 Substructure A20 Basement Construction**

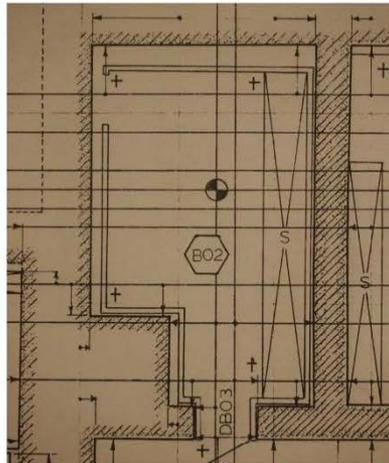


Figure 7.1. 19



Figure 7.1. 20



Figure 7.1. 21



Figure 7.1. 22



Figure 7.1. 23



Figure 7.1. 24



Figure 7.1. 25

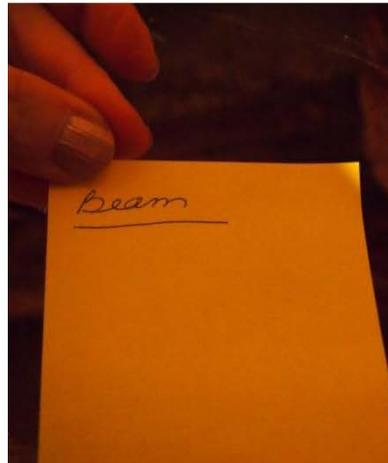


Figure 7.1. 26

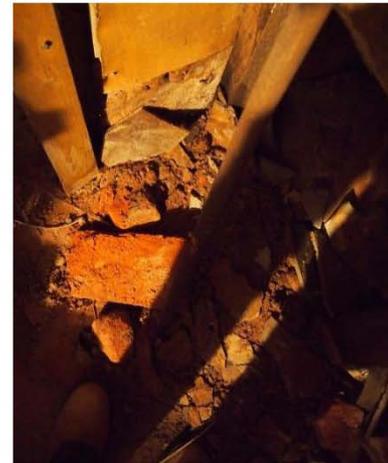


Figure 7.1. 27

### 7.1 Substructure A20 Basement Construction



Figure 7.1. 28

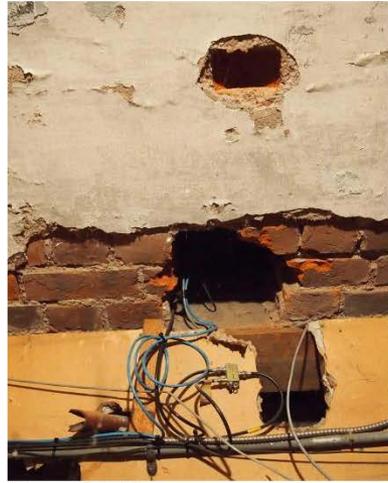


Figure 7.1. 29

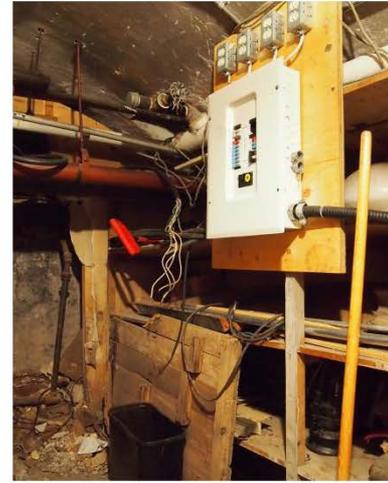


Figure 7.1. 30



Figure 7.1. 31



Figure 7.1. 32



Figure 7.1. 33

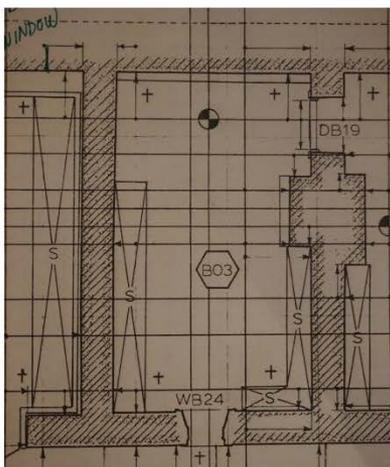


Figure 7.1. 34



Figure 7.1. 35



Figure 7.1. 36

## 7.1 Substructure A20 Basement Construction



Figure 7.1. 37

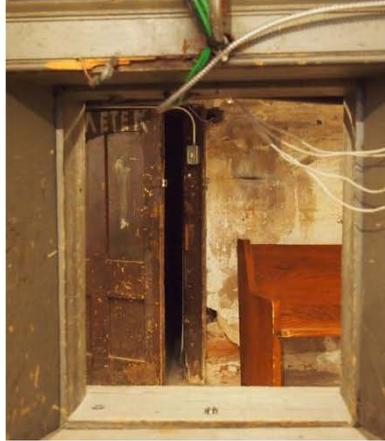


Figure 7.1. 38



Figure 7.1. 39



Figure 7.1. 40



Figure 7.1. 41



Figure 7.1. 42



Figure 7.1.43



Figure 7.1.44



Figure 7.1.45

## 7.1 Substructure A20 Basement Construction



Figure 7.1. 46



Figure 7.1. 47



Figure 7.1. 48



Figure 7.1. 49



Figure 7.1. 50



Figure 7.1. 51



Figure 7.1. 67



Figure 7.1. 68



Figure 7.1. 69



Figure 7.1. 70



Figure 7.1. 71



Figure 7.1. 72

### 7.1 Substructure A20 Basement Construction

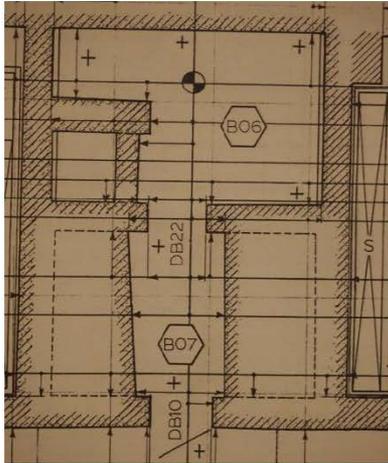


Figure 7.1. 82



Figure 7.1. 83



Figure 7.1. 84



Figure 7.1. 85

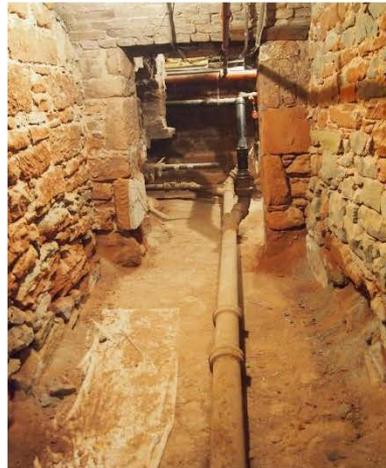


Figure 7.1. 86



Figure 7.1. 87

## 7.1 Substructure A20 Basement Construction



Figure 7.1. 100



Figure 7.1. 101



Figure 7.1. 102



Figure 7.1. 103

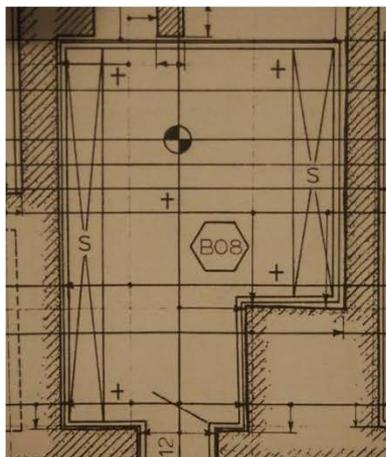


Figure 7.1. 104



Figure 7.1. 105

### 7.1 Substructure A20 Basement Construction



Figure 7.1. 118



Figure 7.1. 119



Figure 7.1. 120

## SHELL

### Timber & Wood Superstructure

#### Floor Structural Frame

- **VERY POOR**
- **VERY UNSTABLE**

Severe deterioration heavy timber framing when in contact with the exterior wall:

- Rot and dampness of bearing ends of heavy timber framing in Rm 214 where pocketed into wall
- These conditions can only be extrapolated across entire system until further investigations are completed
- Stone floor shows excessive wear and gaps have permitted wash and traffic supplied water to migrate into assembly below

#### Recommendations

- Removal of finishes, removal of flooring, removal of stone backup, conservation/reinforcement/rebuilding of timber structure

## **STRUCTURAL INTERIOR WALLS**

- ***FAIR TO POOR***
- ***EXTENT UNKNOWN***

Photos taken during prior restoration programs in 1980's indicate:

- Separation between interior walls and inside face of exterior wall
- Long stepped cracks moving inwards from exterior wall
- Capacity of interior walls to act as lateral restraint for structure to be re-confirmed

### Recommendations

- Examination, removal of select finishes, structural re-attachement in combination with timber and masonry structural work

## Roof Construction

### Roof Structural Frame

- **VERY POOR**
- **EXTENT UNKNOWN**

Limited review of truss ends and continuous timber bearing plate indicate:

- Evidence of dampness and rot at bearing plate & at 1 truss end
- Collapsing of wood due to an infestation
- Subsidence of roof assembly through crushing of plate
- Possibility of bearing failure and unintended transfer of roof load to 2nd floor framing through framed partitions

### Recommendations

- Examination, conservation/rebuilding of structure

## 7.2 B Shell B10 Superstructure – Floor Structural Frame (Wood and Roof Structure)



Figure 7.2. 1

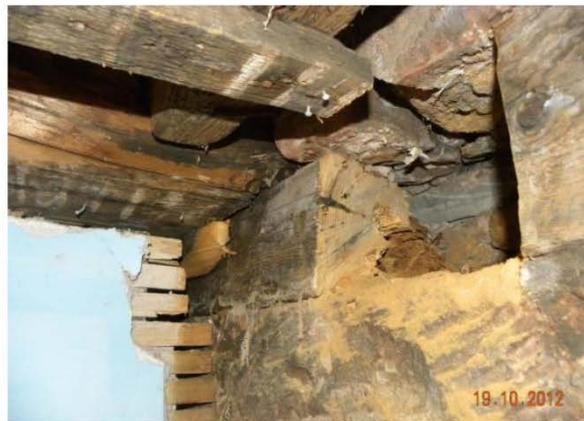


Figure 7.2. 2



Figure 7.2. 3



Figure 7.2. 4



Figure 7.2. 5



Figure 7.2. 6



Figure 7.2. 31



Figure 7.2. 32



Figure 7.2. 33

## EXTERIOR CLOSURES/EXTERIOR WALLS

### Exterior Wall Exterior Skin

- **VERY POOR**
- **VERY UNSTABLE**

Severe deterioration of the Pictou ashlar stone exterior wall face:

- Displaced, dislodged ashlar units throughout
- Wall planes bowed out (south elevation in several locations)
- Fractured and spalled stones and arises due to crushing
- Spalled stone face due to corrosion of metal cramp ties close to face
- Window jamb stones shifted, fractured and spalled
- Cornice blocks at top of the wall are displaced
- Saturated stone from failed gutters and roof drainage system
- Settlement of flat stone arch at main South entry
- Stone piers under stress
- Deteriorated pointing and voids of uncertain depth

### Recommendations

- Complete exterior masonry restoration

## Exterior Wall Construction

- **VERY POOR**
- **VERY UNSTABLE**

Severe deterioration of the wall assembly found at 4 locations on 3rd floor:

- Original rubble wall assembly acted as a single solid mass in compression and tension
- Core of the wall assembly had become loose, free flowing sand and fines with grog interspersed
- Interior wythe of Island sand stone randomly coursed with sizes varying greatly
- Island stone units are deteriorated
- Free flowing water noted during 2012 site review and during PCA review in 2011
- Only bonding between Pictou facing and Island stone occurs at alternately coursed, full depth window jamb stones
- Bedding of exterior facing and interior wythe appears to be greatly reduced
- Rot of existing wood lintels at windows observed

### Recommendations

- Complete exterior masonry restoration

### 7.2 B Shell B20 Exterior Closure – Exterior Wall Skin (Masonry / Exterior)



Figure 7.2. 39



Figure 7.2. 40

## 7.2 B Shell B20 Exterior Closure – Exterior Wall Skin (Masonry / Exterior)



Figure 7.2. 45



Figure 7.2. 46



Figure 7.2. 47



Figure 7.2. 48



Figure 7.2. 53



Figure 7.2. 54



Figure 7.2. 64



Figure 7.2. 65



Figure 7.2. 66



Figure 7.2. 85



Figure 7.2. 86



Figure 7.2. 87



Figure 7.2. 88



Figure 7.2. 89



Figure 7.2. 90



Figure 7.2. 136



Figure 7.2. 137

### 7.2 B Shell B20 Exterior Closure – Exterior Wall Construction (Exterior Wall Interior)



Figure 7.2. 123



Figure 7.2. 124



Figure 7.2. 125



Figure 7.2. 126



Figure 7.3.3



Figure 7.3.4



Figure 7.3.5



Figure 7.3.6



Figure 7.3. 11



Figure 7.3. 12

## **EXTERIOR WALL VAPOUR RETARDERS, AIR BARRIERS AND INSULATION**

- ***NOT APPLICABLE***
- ***NOT PRESENT***

Absence of contiguous air barrier has contributed to deterioration of wall assembly:

- Original paint on plaster on wood lath does not prevent migration of moisture into wall assembly
- Condensation forms at interior face of masonry assembly, at wood elements and at window frames, sash and trim
- Contribution of condensation within wall assembly to deterioration needs to be quantified
- Condensation at wood lintels will contribute to rot

### Recommendations

- Reassessment of envelope parameters and design in conformation with mechanical system design

## EXTERIOR WINDOWS AND DOORS

- ***FAIR TO POOR***

Windows appear to be original are deteriorated:

- Poor condition of glazing putty and glazing
- Raised grain of exposed face of frames and sash
- Deteriorated bottom rails of sash, bottom jamb frames and window sills
- Wood muntins are broken or deteriorated
- Doors are in stable condition and show deterioration associated with normal use

### Recommendations

- Conservation, repair, replacement

## ROOF COVERINGS

### Deck Vapour-Retarders and Insulation

- ***FAIR TO POOR***

45 lb asphalt impregnated sheeting is the only retarder under slate tiles:

- Inconsistent and damaged
- No ice & water shield at eaves and valleys
- No vapour retarder or insulation permits condensation to occur at the underside of the slates and asphalt paper damaging wood sheathing & framing
- Poorly controlled interior attic environment (warm attic)

### Recommendations

- Replacement

## Slate Shingles Insulation

- ***FAIR TO POOR***

Slates replaced poorly performing asphalt shingle roof in the 1980's:

- Most likely Vermont un-fading purple
- Poor starter edge detail – no starter slate
- No ice & wart shield at eaves
- Poor integration with copper eaves flashing and gutters complete with gaps
- Inadequate headlap for this roof slope

## Recommendations

- Replacement

## FLASHING AND DOWNSPOUTS

- Copper and Lead Sheet Flashings for Slate Roofing
- Copper Flashing at Portico Roofs
- Standing Seam Copper Roofing
- Copper Gutters and Downspouts
- Membrane Roofing
- Interior Finishes on Exterior Walls and Ceilings

### Recommendations

- Replacement

## SERVICES

### Plumbing Systems

- Sanitary Waste Systems
- Rainwater Drainage Systems

### Recommendations

- Replacement

## PHASING (P.133)

### Key Factors

- Stage 1: Public Safety (2012-13): restrictions to grounds; vibration restriction; emergency investigator and partial stabilization; testing; master plan
- Stage 2: Public Safety (2012-13): temporary stabilization on third floor; exterior repairs; restriction to grounds; restriction of vibration; inspection and testing; recording
- Stage 3: Other repairs deemed urgent; investigation and testing; preparation of preliminary cost estimates; consult authorities regarding process; retain consultant team (conservation, architectural, mechanical, electrical, civil, structural, interior design, historian); continuous consultation with authorities; prepare design and documents for total conservation project (holistic approach); prepare Class A, B, C cost estimates; prepare construction phasing plan and contractor procurement methodology

## PHASING (P.133)

### Key Factors (cont)

- Stage 4: gain approvals; divide contract documents into phasing packages as increases; prequalify contractors
- Stage 5: Implementation: begin phased construction program
- Stage 6: Construction completion; commissioning; occupancy
- Stage 7: Post-construction follow up and regular maintenance

## Construction Scope (p.133 Report)

- Comprehensive scope to stabilize, preserve, restore the building substructure, envelope, superstructure
- Foundation stabilization and basement slab replacement
- Interior bearing wall stabilization and repair
- Timber roof structure
- Attic insulation and vapour proofing
- Slate roofing and flashings, gutters, downspouts, below grade drainage
- Extensive stabilization of 2 of the masonry walls (basement to attic) including projections and pediments; exterior masonry conservation; repair deteriorated timber associated with masonry bearing walls
- Window and door conservation and retrofit
- Woodwork repair and conservation
- Repair and replacement of interior finishes
- ***Comprehensive mechanical and electrical fire and life safety retrofit***

## CLASS D COST ESTIMATE 2013

**\$20,093,000**

### Including

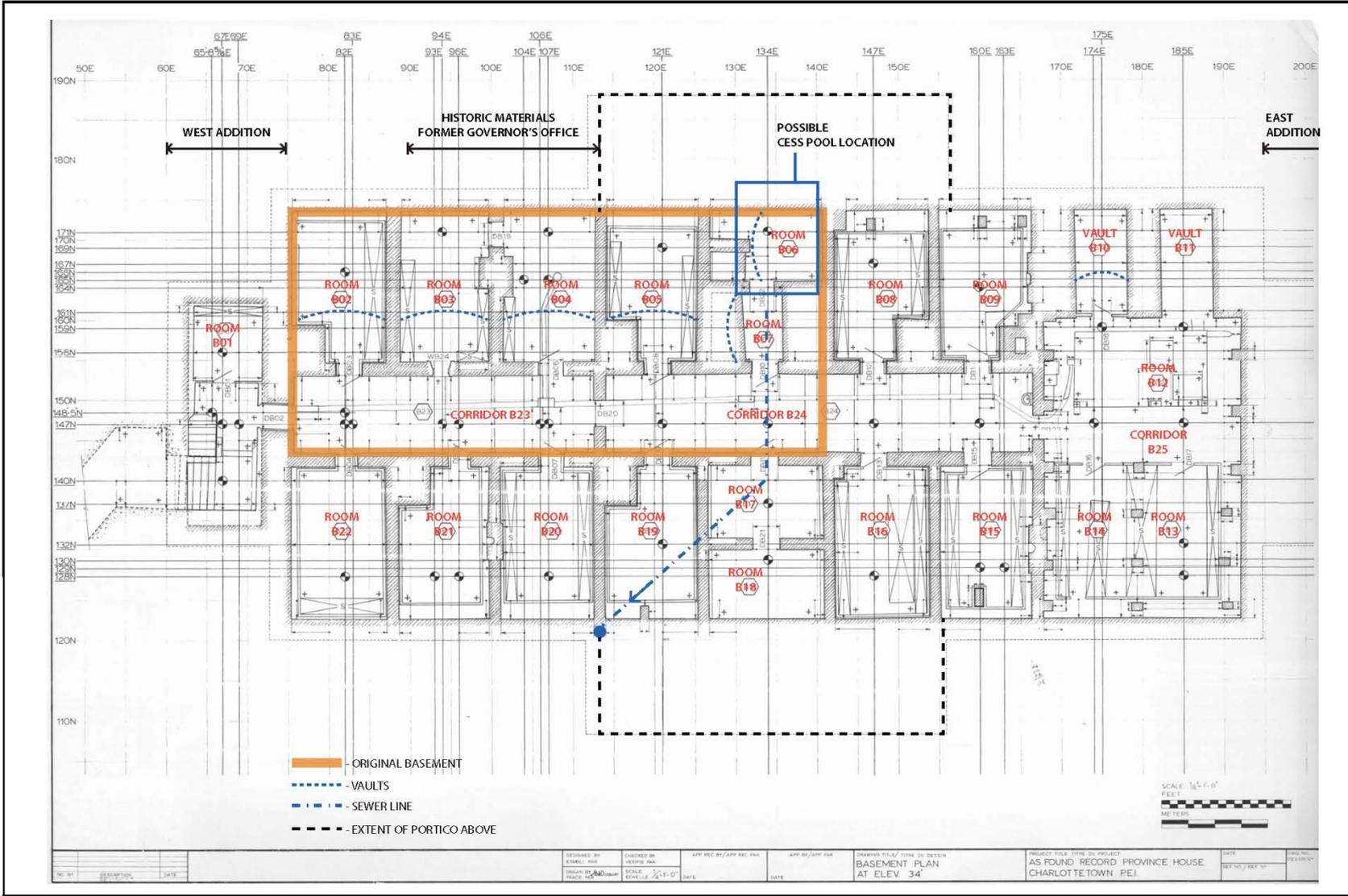
- Design contingency: 15%
- Escalation contingency: 15%
- Escalation to June 2015

### Excluding

- Mechanical, electrical and life safety retrofit
- Phasing of project
- Multiple general contractors
- Abatement of hazardous materials
- Consultant and project management fees
- Contaminated soils removal
- Moving, relocation or occupancy costs for current building occupants and programs
- Loss of revenue
- HST





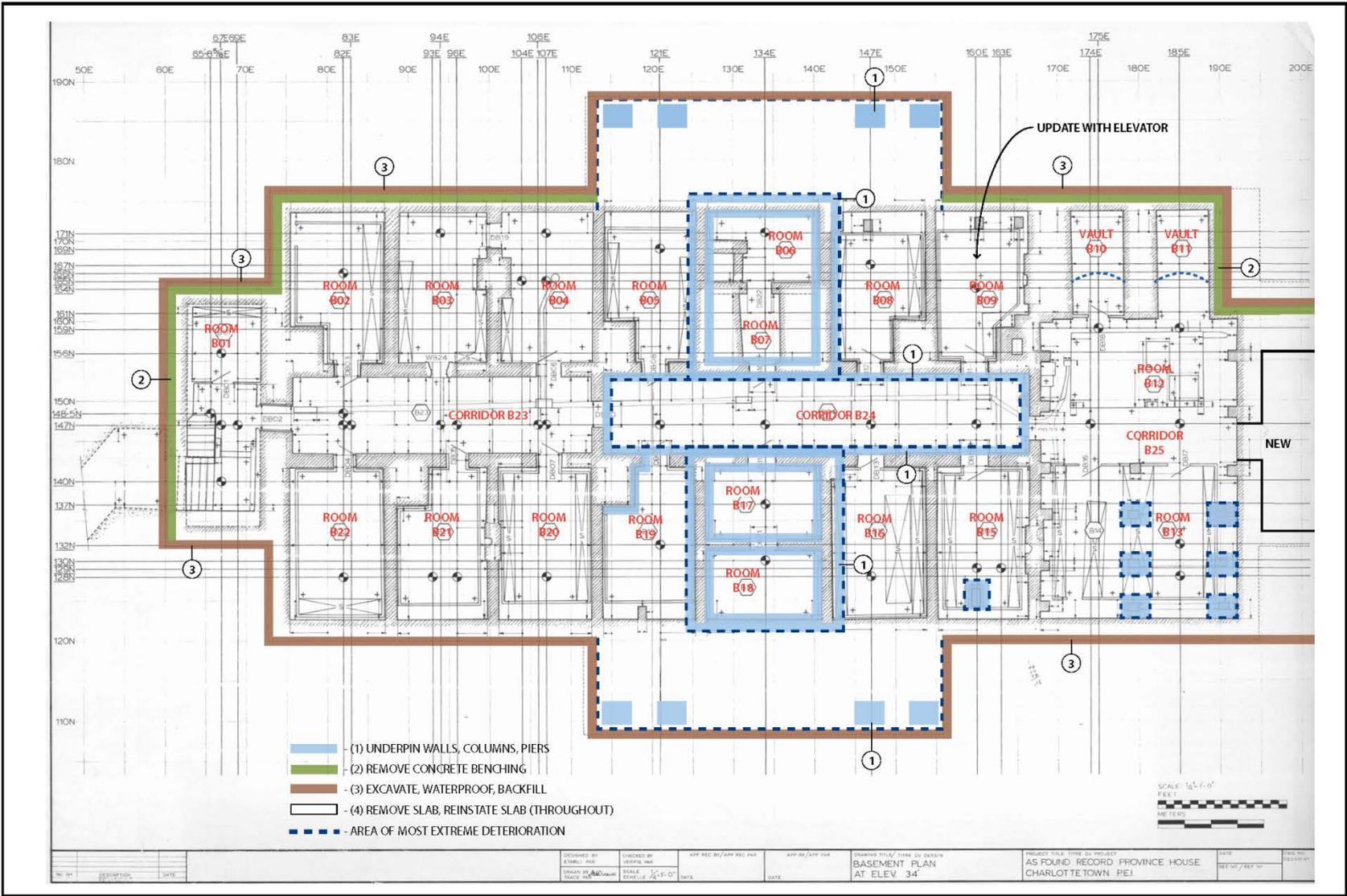


1286  
DATE: FEB 2013

A10-1

PROVINCE HOUSE BASEMENT - SUMMARY OF HISTORIC ERAS & USES

SCALE: NTS  
TAYLOR | HAZELL ARCHITECTS LTD.





**PHOTOGRAPH NO. 3S-33:**



**PHOTOGRAPH NO. 2S-10:**



**PHOTOGRAPH NO. 2S-11:**



**PHOTOGRAPH NO. NBW-2:**

## Next Steps

**Thank You!**