



STRUCTURAL INSPECTION REPORT

201 WATER STREET
FORWARDERS' MUSEUM AND VISITORS INFORMATION CENTRE
TOWN OF PRESCOTT



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GENIVAR No.: 131-20617-00



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1. INTRODUCTION

GENIVAR was retained by the Town of Prescott to perform a structural inspection of the building located at 201 Water Street in Prescott and provide guidance for future work. This investigation was prompted by the cracking and deformation of the stucco finish on the exterior of the east and south walls and other ongoing concerns.

The building is located in the historic town center, on the waterfront and dates from the 1820's. It is approximately 7.5m (25') x 11.2m (37') in size and was originally constructed as a small warehouse. At the front, facing Water Street, grade is approximately 1m above the level of the first floor. The property slopes down to the south along the sides of the building and at the rear, facing the waterfront, grade is at the level of the basement floor slab. The walls are stone rubble masonry but have been covered in stucco inside and out. The floor at the main and second level and the roof are timber frame.

The building currently houses the Forwarders Museum and Visitor's Information Center, displaying artifacts related to history of the Town of Prescott and settlement of the area. The Town assumed ownership of the building in the 1970's. A major structural intervention was undertaken in 1977. Since then significant maintenance work has been carried out periodically. At this time the Town has asked GENIVAR to provide general recommendations for repairs and further investigations to assist the Town in developing a comprehensive plan for the future of the building.

2. INVESTIGATION

As part of the work GENIVAR conducted a limited structural inspection of the existing building and reviewed available documents from the Town of Prescott's records.

A visual inspection of the accessible structural components was carried out to determine the typical material condition. The Town of Prescott retained contractors to remove sections of the exterior stucco to provide access to the stone walls. Removals were limited to areas where the stucco was previously cracked and bulging. Test pits were also excavated by hand in order to expose a portion of the foundation for inspection. During this inspection measurements of existing structural components were made where accessible.



The documentation provided by the Town of Prescott for review included:

- Town of Prescott, Prescott Museum Alterations, 1977 (Tender Documents)
- The Forwarder's Museum Board of Management, The future of the Forwarder's Museum, circa 2000

For the purpose of this report, the north side of the building, facing Water Street is considered the front.

3. FINDINGS

3.1. BASEMENT - INTERIOR

The basement of the structure is divided into an exhibition area at the rear (south) and storage room, washrooms and utility room at the front (north). The walls are covered with a thick layer of parging that has been reinforced with a wire mesh and finished with plaster. Polyethylene vapor barrier and rigid insulation were present between the original masonry wall and the parging. The presence of a timber stud wall in front of the masonry was confirmed along the east wall. The ceilings in the exhibition area are sheathed with drywall but a suspended ceiling has been installed throughout the remainder of the basement. The original stone masonry on the fire place (north wall) and interior wall (dividing exhibition from other areas) is exposed and has been repaired. Our findings pertaining to the basement are as follow:

- A damp / musty smell was present throughout the basement. This indicates water groundwater or surface water penetrating the foundation walls.
- The finishes in the exhibition room were generally in good condition.
- The existing stair case is approximately 900mm wide and the structure was generally in good condition. The railing does not conform to current OBC requirements for guards and railings.
- Dampness and water accumulation was noted in the utility room and staining was noted all along the base of the north exterior wall. (Photo 12)
- Finishes were removed at the base of the north wall in the bathroom in the northeast corner of the basement. In this area large amounts of damp sand were discovered behind the finishes. It was not possible to access or determine the condition of the masonry wall behind but the presence of the sand may indicate deterioration of the masonry. (Photo 13)

3.2. MAIN FLOOR - INTERIOR

The main floor is a single room. The drawings from the work performed in the 1977 alteration indicate that a timber stud wall was installed in front of the original masonry walls. A stucco finish was present on the walls but no finishes were removed on the main floor to confirm the structure beneath. The beams, joists and floor boards of the structure of the second floor are



exposed in the ceiling at the main floor. Our findings pertaining to the main floor are as follows:

- The main floor is below street level. Mr. Roger Arcand, the Public Services Supervisor, on site to assist in the investigation, indicated that during large rain storms runoff drains to the depressed patio in front of the building and then along the east side of the building beside the foundation wall. Water standing or flowing against the foundation could exacerbate water infiltration. A swale is provided at the south end of the wall, indicating that an attempt has been made to address this issue in the past.
- The beams and flooring visible in the ceiling were generally in good condition.
- The finishes on the interior walls were generally in good condition.
- The existing stair case is approximately 900mm wide and the structure was generally in good condition. The railing does not conform to current OBC requirements for guards and railings.

3.3. 2ND FLOOR - INTERIOR

The second floor also consists of a single room. The roof structure consists of timber rafters, meeting at the ridgeline and tied at the ceiling. The ceiling follows the underside of the rafters and ties. A dormer with window is provided along the east wall. Our findings pertaining to the 2nd floor are as follows:

- The finish on the interior walls and ceiling was generally in good condition.
- No evidence of water infiltration from the roof was noted.

3.4. EXTERIOR

The perimeter walls are rubble masonry, approximately 550mm thick. The south wall is exposed full height while the north wall is only exposed above the main floor. Grade slopes steeply to the south along the east and west walls. Our findings pertaining to the exterior are as follows:

- The south ends of the east and west walls have been strengthened with concrete cast against the exterior of these walls. These repairs extend approximately 6.25m from the south wall of the structure. (Photo 5)
- Above grade the walls have been coated with a parging that is reinforced with wire mesh. This parging is finished with stucco and painted. This finish terminates approximately 900mm below grade.
- Cracking has appeared in the parging/stucco, mainly along the east and south walls. Along the south wall a horizontal crack has developed the full width of the wall and along the east wall random cracking was noted throughout. Localized cracking was also noted at the north end of the west wall. (Photo 6)



- At the locations of the cracking along the east wall the parging had bulged outwards and was in danger of falling. When parts of the parging were removed it was found that the concrete block had been used to close off an old window. The brick sill that the block had been placed on had disintegrated causing the block to damage the parging and stucco. The block and the remaining loose stucco were removed to eliminate the hazard to the public.
- Where the stucco was removed on the east wall the rubble masonry beneath is generally in poor condition. The surface of the walls is uneven, the size of masonry units and joints are irregular and most of the mortar is severely deteriorated or missing entirely. Throughout the wall numerous masonry units were cracked. The brick sills at the windows have completely disintegrated and numerous masonry units around the windows are missing entirely. The wooden lintels embedded in the walls were in poor conditions and exhibit rot and weathering. (Photo 8)
- Based on the condition of the masonry where it was exposed on the east wall and the deterioration of the stucco elsewhere, we would assume that much of the exterior walls are in a condition similar to that noted on the east wall.
- The Town's representative indicated that one option they were considering would be to restore the façade on Forwarders Museum to resemble in appearance the masonry on the recently repaired building across the street. The masonry exposed during the course of our inspection is not in a condition where a similar finish could be easily obtained. In order to achieve a similar look, much of the exterior wythe (layer of stone) would have to be replaced.
- The asphalt shingles are also in poor condition and are weathered and curling upwards. Despite this no water damage was noted in the 2nd floor. (Photo 2)
- The timber balcony at the rear of the building was generally in fair condition and exhibited moderate weathering throughout. The bottoms of the columns supporting the balcony exhibited severe rot and section loss where they bear on concrete piers. Gaps in the parging/stucco finish were noted where balcony members are tied into the building. (Photo 4)

4. OPTIONS

The masonry walls of the structure were in poor condition and major structural work will be required to address the deterioration. We have provided two general options for addressing the condition of the structure; repair or replacement.



4.1. OPTION 1 – REPAIR OF EXISTING STRUCTURE

The structural aspects of the repairs would consist mainly of addressing the deterioration of the masonry walls. This will require at a minimum:

- Full excavation of the foundation on all 4 sides.
- Careful removal of the existing stucco and parging from both the interior and exterior.
- Reconstruction of the outer wythe of walls full height.
- Repair and repointing of the inner wythe of walls.

In addition to the repair of the foundation walls, any rehabilitation should also include the following structural work.

- Strengthening of the timber floor and roof structures to conform to loading requirements under the Ontario Building Code (OBC) for the correct use (i.e. museum, office, etc.).
- Waterproofing of the foundation below grade.
- Provide proper drainage for the foundation.

If the Town chooses to repair the existing structure it is strongly recommended that they retain the services of an Architect specializing in historic restoration. Any rehabilitation will also require the services of mechanical and electrical designers to install electrical and climate control systems appropriate for a museum environment. Due to the age and construction of the existing structure it may not be practical or possible to retrofit the structure to meet the requirements of the OBC for a museum at the implementation of measures may be too costly or affect the character of the building. Some items which may be difficult to implement include; minimum ceiling heights, fire separation and suppression, egress requirements, accessibility provisions, heating, cooling and ventilation requirement, etc..

Rehabilitation work will also require a designated substance survey to determine whether hazardous substances are present (e.g. mold, asbestos, lead, etc...). The dampness and staining noted in the basement may indicate the presence of mold and, although the original construction may be free of hazardous materials, subsequent renovations may have introduced substances such as asbestos or lead paint. The safe removal of any hazardous material can add significantly to the cost of the work.

Due to age, material deterioration and performance issues the repairs to the structure carry very significant financial risks that can only be fully assessed during the detailed design and actual construction. At this time we estimate costs for the repair of the existing structure would be on the order of \$350,000-450,000. Expansion of the existing facility would incur additional costs. We have provided an approximate breakdown of the above noted costs but these should be used for budgetary purposes only as the exact scope of work cannot be determined until detailed design and even then significant additional costs could arise during construction.



Cost Breakdown

ITEM	COST
Repair of walls above grade (Costs based on repointing the entire wall and reconstructing 30% of the stone walls at \$125/m ² and \$600/m ² respectively, plus an allowance for mobilization/ demobilization and access)	\$ 125,000
Repairs below grade including water proofing (Costs based on repointing the entire wall and reconstructing 50% of the stone walls at \$125/m ² and \$600/m ² respectively, plus an allowance for mobilization/ demobilization and access)	\$ 100,000
Replacement of Roof and Floor Structure (At this stage we have provided an allowance which should accommodate salvaging and reinstating floors and replacing the roof structure. The final costs of this work will depend largely on architectural and historical requirements.)	\$ 50,000
Allowance for architectural finishes, electrical and mechanical retrofit	\$ 75,000
Subtotal	\$ 350,000
Contingency	30%
Total Cost Estimate	\$ 455,000

4.2. OPTION 2 – REPLACE

Replacement of the building would entail the following:

- Salvage the historic features (Interior wood work; original fire place; interior masonry wall in basement, etc.)
- Demolish existing structure
- Build new structure conforming to current OBC requirements incorporating salvaged features

As with repairs it is strongly recommended that the Town retains the services of an Architect specializing in historic restoration. The services of mechanical and electrical designers will be required to install electrical and climate control systems appropriate for a museum environment. As with the repairs a designated substance survey would still be required for the safety of workers performing the salvage and demolition.

As the specifics of a replacement structure are unknown the following costs estimate should be used for budgetary purposes only. Site conditions and the Towns requirement would determine the final cost of this option. At this time we estimate that the cost for replacement of



the structure would be comparable with rehabilitation, on the order of \$400,000-\$450,000 for a new structure, with approximately the same footprint as the existing. There is significantly less risk involved with replacing the structure.

The costs for the structure replacement were estimated based on two storeys approximately 815 sq. ft. each and a construction cost per sq. ft. of between \$250 and \$275. At this time it there is insufficient information to provide additional detail.

5. CONCLUSION

We appreciate the Town's desire to have this building resemble the historic building across the street currently in commercial use. This may be extremely difficult to achieve as the original masonry is in very poor condition and could be very difficult to stabilize and repoint. The repairs could easily become a complete replacement of the outer masonry wythe during construction and repairs to the interior wythe could also be extensive.

At this time our estimate indicates that the cost of repairing the structure could be less expensive than reconstruction but the cost of repairing the original structure could rise significantly during construction eliminating any financial advantage. From a structural perspective replacement of the structure would entail less risk but other factors (available funding, historic value, public opinion, etc.) may be significant in the Towns decision making process. The Town may be able to accomplish reconstruction at a lower cost depending on the they may wish to build.

As noted above we recommend that the Town retains the services of an Architect specializing in historic restoration to proceed with the project. An architect should also be able to assist the Town to assess their needs and select an appropriate plan for the facility. The services of structural, mechanical and electrical designers will be required at that time.

Also, in order to complete demolition or repair work on the existing structure, a designated substance survey will be required. The discovery of hazardous substances could significantly increase the cost of the works. This could be performed at any time and would eliminate some uncertainty faced by this project. The cost of a designated substance survey for the building would be on the order \$3,000-\$4,000.



We suggest that the Town start the process of securing funding on the order \$450,000 to cover the design and construction. The specified amount could apply to either repair or replacement of the building. As we indicated previously, the costs for the repairs and replacement should be in this range. The repairs could be less expensive than a complete replacement; however the risks of unforeseen costs will be much higher.

GENIVAR



Jennifer Huntley, P.Eng.
Structural Engineer

APPENDIX A – SITE PHOTOGRAPHS



SITE PHOTOS



Photo 1 North Elevation

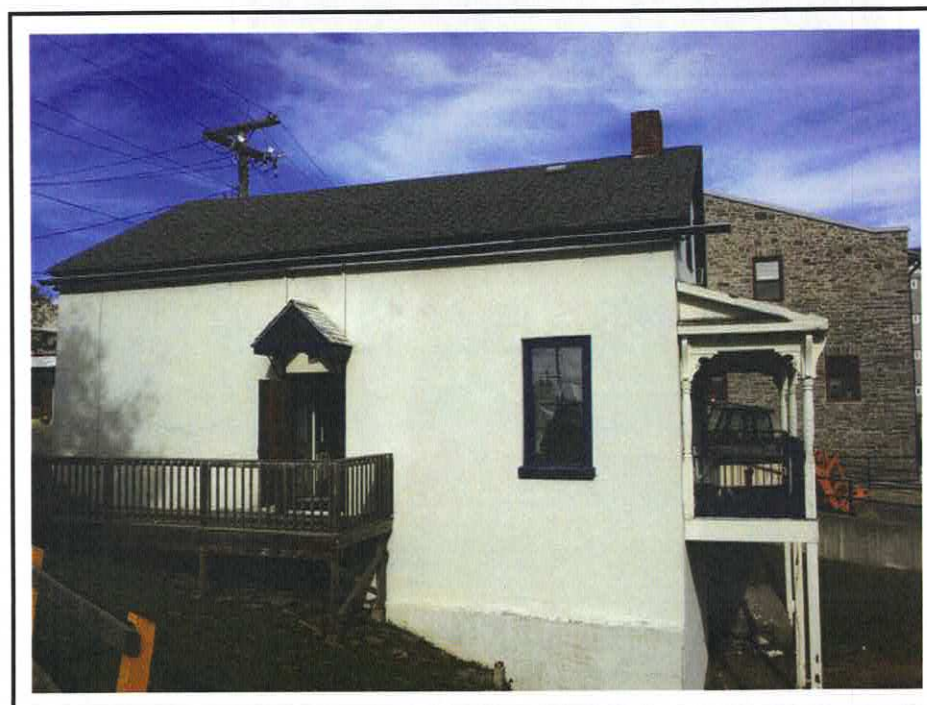


Photo 2 West Wall



SITE PHOTOS



Photo 3 South Elevation



SITE PHOTOS



Photo 4 East Wall



Photo 5 Foundation Reinforcement at East Wall



SITE PHOTOS

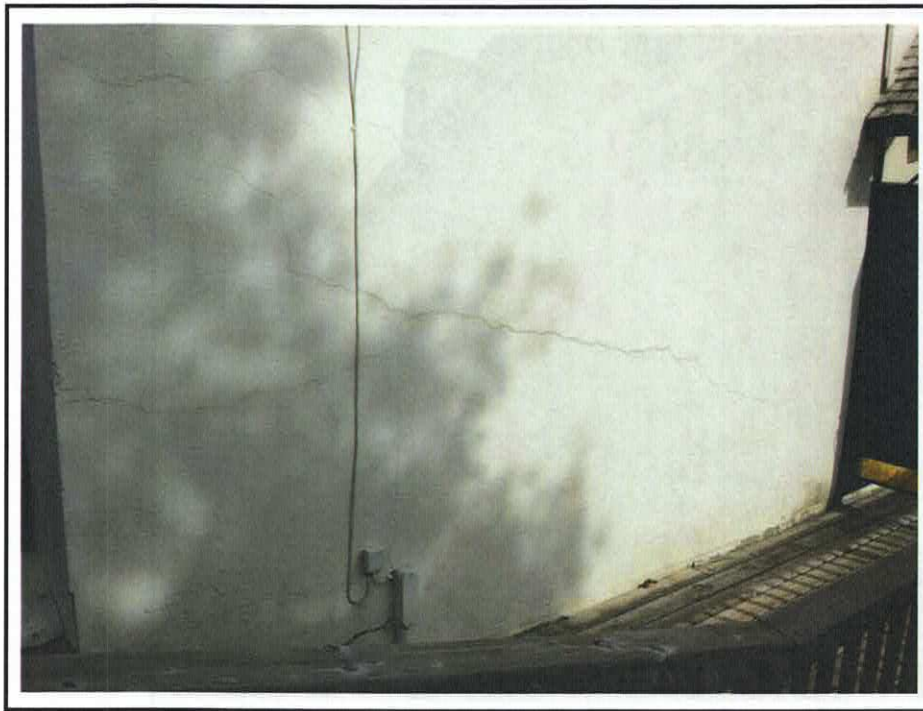


Photo 6 Cracking at North End of West Wall



Photo 7 Removal of Stucco/Parging on East Wall



SITE PHOTOS

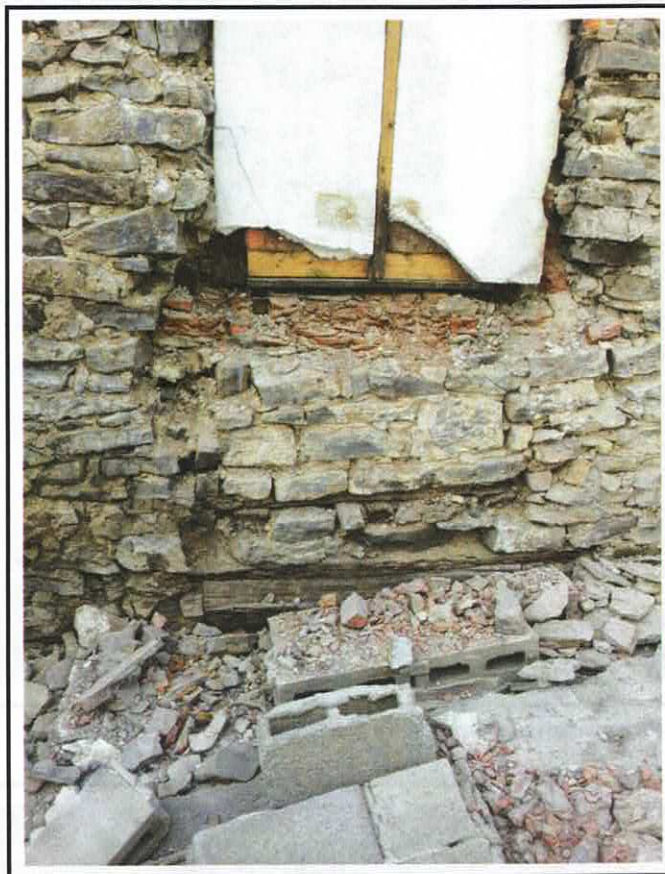


Photo 8

**Deteriorated Masonry and
Deteriorated Timber Embedded in
Masonry Wall**



SITE PHOTOS



Photo 9 Deterioration at Window in East Wall

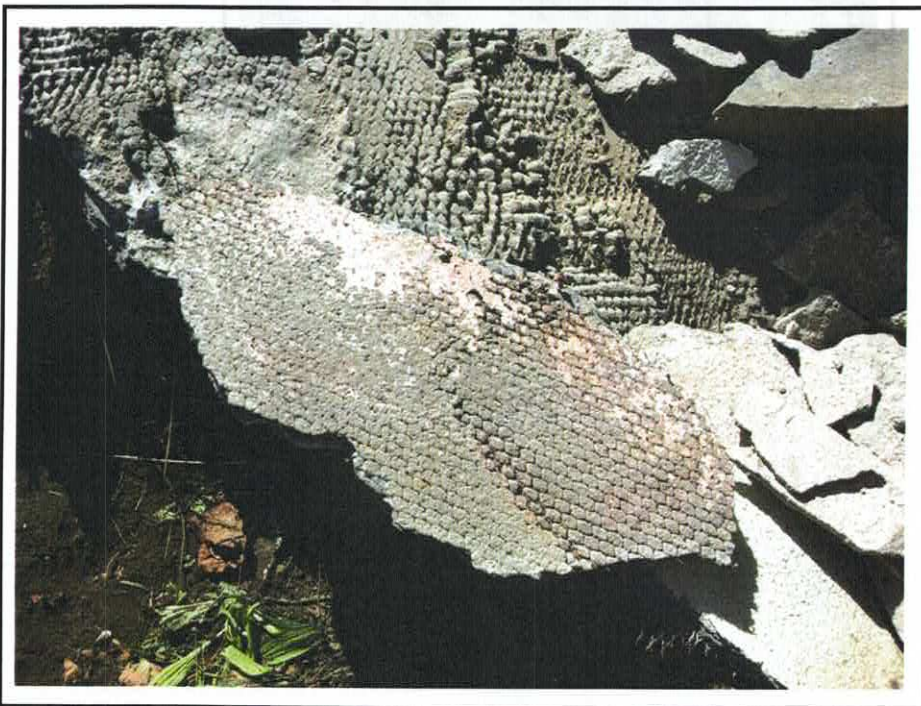


Photo 10 Piece of Parging Removed from Exterior of Building



SITE PHOTOS

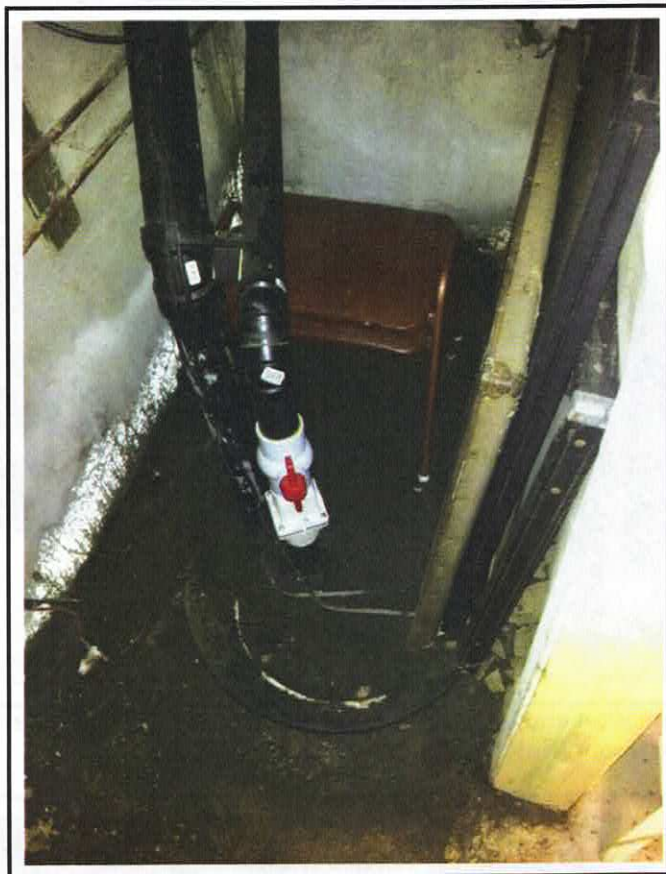


Photo 12

Dampness and Staining in Utility Room



SITE PHOTOS



Photo 13 Insulation and Vapor Barrier where Finishes Removed in Basement (Note: staining and dampness)



Photo 14 Exposed Beams in Ceiling of First Floor



SITE PHOTOS



Photo 15 Attic Above Ties