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December 3, 2021

City of Ottawa
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Project No. 21159

Attn: Luis Juarez, MCIP, RPP

RE: Hintonburg Pumping Station Ruins
Structural Condition Assessment Report and Options Analysis

1. Introduction

The City of Ottawa is planning to conduct public realm improvements to Lemieux Island in the near future. The stabilization and restoration of the ruins of the former Hintonburg Pumping Station is considered a key component of these improvements. John G. Cooke & Associates Ltd. (JCAL) was retained to conduct a structural condition assessment of the ruins located at 1 Onigam Street.

Also included in the project scope is a feasibility analysis outlining potential options for the stabilization and restoration of this historic site. Based on discussions with the City of Ottawa, the three proposed options are:

- **Option 1 – Stabilization:** Remove any masonry in poor condition, restore the remaining masonry walls and protect by capping skyward facing joints to prevent water infiltration.

- **Option 2 – Preservation & Protection:** Restore all remaining masonry elements by deep repointing, local dismantling and rebuilding, and core consolidation. Protect the masonry walls by capping skyward facing joints to prevent water infiltration, or by a partial self-supported roof structure.

- **Option 3 – Restoration & Reconstruction**: Restore all remaining masonry elements by deep repointing, local dismantling and rebuilding, and core consolidation. Reconstruct collapsed masonry elements based on existing physical evidence and historic photos or documentation. Protect the masonry walls by a self-supported roof structure, supported by the verandah posts.

1.1. Site Visits

The building was assessed visually and on foot to determine the overall condition. Site visits took place on the following dates:

Date	Present	Weather
June 15th, 2021	John Cooke, P.Eng., FCSC, RSW (JCAL) Justin Morton, P.Eng. (JCAL) Natalie Smith, B.Eng. (JCAL)	Light rain (16ºC)

September 7th, 2021	John Cooke, P.Eng., FCSC, RSW (JCAL) Justin Morton, P.Eng. (JCAL) Natalie Smith, B.Eng. (JCAL)	Sun (23ºC)

1.2. Building Description

Figure 1: Hintonburg pumping station, 1928

Built in 1899, the Hintonburg pumping station was used to supply water to the village of Hintonburg until 1912, shortly after the village was annexed by the City of Ottawa. Upon completion of the Lemieux Island Water Purification Plant in 1932, the pumphouse was converted to a residence for the plant superintendent. The building was used as a residence until 1980 after the death of the Commissioner of the Waterworks and has been vacant ever since.

The Hintonburg pumping station and surrounding grounds received municipal heritage designation in 1987 based on its architectural value and historic industrial significance. The one-and-a-half storey cut limestone structure originally was recognized for its pitched cedar-shingled roof, circular turret with a conical roof, large half-arch windows on the north and south walls, and verandah along the south and east façades.

A restoration project took place in 1980, however in 1989, a fire destroyed the interior of the building and caused the roof structure to collapse. Partial masonry wall collapse occurred during the 1989 fire, and subsequently as a result of exposure to the elements. The Hintonburg Pumping Station has been abandoned ever since and the structure has been left exposed to the elements, with only the masonry elements remaining.

Figure 2: Hintonburg pumping station after 1989 fire

Figure 3: Hintonburg pumping station present day [JCAL 2021]

2. Structural Condition Assessment

Figure 4: Site plan of Hintonburg pumping station [GeoOttawa, 2021]

The masonry structure was visually inspected on June 15, 2021, however the overgrown shrubs and greenery limited the scope of the inspection at the time. The brush was cleared, and the condition inspection was completed on September 7, 2021.

2.1. Roof

The roof structure was destroyed and collapsed during the 1989 fire. The asphalt-shingled roof was supported by wooden rafters. Portions of the roof remain above the west wing, above the gable and north and south walls. This remaining roof consists of a small overhang, roughly 400 mm, around the exterior of the walls which provides some moisture shedding away from the exterior wythe of the walls.

2.2. Exterior Masonry Walls

The exterior walls of the building are constructed using two distinct building techniques. The exterior rubble stone masonry walls of the west wing, as shown in Figure 4, consist of an outer and an inner wythe of stone separated by a rubble core. The two wythes are tied together with intermediate header stones spaced throughout the wall; these walls are roughly450mm thick (18”). The core of the wall consists of stone rubble and lime mortar. On the east wing of the building, the limestone walls have a multi-wythe brick backup, with low quality bricks used for the core of the wall. Based on the remains of the structure seen on site, the interior was originally finished with lath and plaster.

The brick masonry in the building, with the exception of the verandah piers, was all constructed from interior brick. In the era when this building was constructed, the method of brick production by firing in a kiln produced at least two types of brick masonry. The “stock” brick was the best quality and generally used for exterior construction, due to the higher compressive strength and lower porosity. The “common” brick had a lower compressive strength and higher porosity and did not weather well in exterior exposure. This brick was used only for interior conditions. Due to the partial collapse, much of the exposed interior brick masonry, especially in the wall cores, is deteriorating.

Based on the time of construction, the original mortar would have been a lime-based mortar. Lime-based mortars are desgned to be soft and porous, to absorb minor structural movements and facilitate moisture transmission within the masonry wall. On site, it appeared that the original lime mortar had been pigmented black, however, various types of repointing mortar were seen on the exterior of the masonry walls.

Past interventions consisted of using hard Portland based cementitious mortars to repoint the exterior walls. The original lime mortar would be much weaker than the stone and have a high porosity. In masonry construction, the mortar is considered to be sacrificial and should be weaker than the units. The mortar used to repoint the joints is a much denser and stronger cementitious mortar with low porosity. In the original composition of the walls, moisture would have migrated by means of capillary action through the porous lime mortar, to the exterior face of the wall where it would have evaporated. Due to the improper repointing repairs, the low porosity cementitious mortar blocks the migration of moisture. This moisture activates the salts which occur naturally in the stone masonry. The moisture tends to remain trapped behind this hard cement mortar and as a result, the salts re-crystalize and attack the soft mortar and the adjacent masonry. The original lime mortar will deteriorate to sand and the bond to the cementitious mortar will be lost or moisture is driven into the stone or brick which results in freeze-thaw damage and more rapid deterioration of the unit.

Figure 5: West wing wall assembly [JCAL 2021]

Figure 6: East wing wall assembly [JCAL 2021]

In addition to the above, the stone at the upper several courses of the walls, especially on the north side, will have been exposed to high heat during the fire This will change the characteristics of the stone, making the stone weaker and more brittle.

2.2.1. North Wall

The north wall of the west wing had areas of localized collapse of the inner masonry wythe above the two arched windows and above the bricked-in archway at the center of the north wall. The masonry construction is of a high quality with good keying seen around the arched windows, but the wall is not adequately protected at the top from moisture. Water infiltration at the roof level has deteriorated the core of the masonry wall and washed out the mortar joints, leaving large voids. This has resulted in a loss of structural integrity and the partial collapse of the inner wythe.


Figure 7: Collapsed inner wythe above arched windows [JCAL 2021]


Figure 8: Collapsed inner wythe above archway [JCAL 2021]

The large semi-circular arch window on the east wing portion of the north wall is one of the remaining character-defining elements which is still largely intact. The limestone exterior wythe is in fair condition. This area appears to have been repointed with Portland cement mortar, which is incompatible with the original lime mortar. The bricks on this portion of wall are severely deteriorated, particularly below the window sill, where many bricks are missing and displaced. The remaining bricks in general were in poor condition, with fractures and spalls observed throughout the wall. Void joints were predominant above the arch. The lack of mortar in these joints and poor condition of the remaining brick has severely reduced the structural integrity of the wall. Furthermore, with the collapse of the roof structure and east wall, there is a potential for a lack of lateral support. Depending on the heights and geometries of the restored walls, rebuilding the return at the northeast corner should be considered for lateral stability.


Figure 9: North window arch [JCAL 2021]


Figure 10: Repointed limestone masonry around arch [JCAL 2021]

The vertical joint along the northeast corner of the structure has debonded and the corner appears to be separating from the structure, particularly at the top of the wall. Inspection of the mortar joints on the north wall found that these were only about 25 mm deep. The joints were void behind the face-pointing; these had likely been washed out by water infiltration due to the lack of protection at the top of the wall.

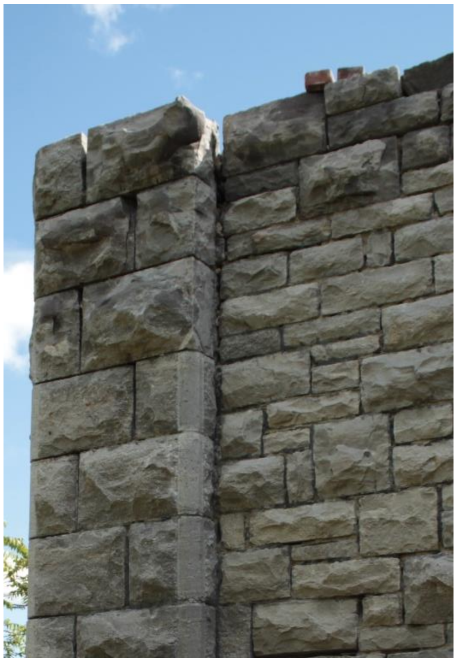


Figure 11: Detached northeast corner [JCAL 2021]

Figure 12: Mortar condition on exterior wythe of north wall [JCAL 2021]

2.2.2. East Wall

The east wall of the building has collapsed, to below existing window sill level. The condition of the double wythe masonry wall below this level is similar to that of the north wall, east wing. Portions of the brick piers which previously supported the verandah, the rounded stone steps at the center of the wall and two partial basements openings remain. The collapsed stone on the east side of the building may be salvaged to reconstruct other areas of the masonry walls, or to rebuild some portion of this wall.

The brick piers have collapsed, however, the fallen brick remains on site and may be salvaged to reconstruct areas of the building, if it is in good condition, in order to replace like-for-like materials. The rounded stone steps could not be fully inspected as these were covered in debris and sand, but the visible portions of the stones appeared to be in fair condition.

Two partial basements were found on either side of the stone steps. The floor above the southern basement had collapsed. The north basement extended about 2 m into the building and was about 1.5 m deep. Investigation of this area found that the foundation wall was constructed of limestone masonry. The wooden joist structure was still in place and appeared to be supporting the floor and debris above. Due to health and safety concerns, JCAL did not enter the basement. Given the exposure and quantity of debris on this floor structure, the condition of the wood floor structure is likely unsalvageable.


Figure 13: Remaining features of east wall, including brick piers, stone steps, and basement [JCAL 2021]


Figure 14: North basement on east wall [JCAL 2021]


Figure 15: Basement interior [JCAL 2021]

2.2.3. South Wall

A large quantity of limestone from the collapsed south wall was seen on the ground outside the building; this may be salvaged and used to reconstruct portions of the structure if the stones are found to be in good condition – it can be anticipated that most stones found around the site would be able to be re-used. Portions of the exterior south wall had been previously repointed with Portland cement-based mortar which is incompatible with the original masonry components and contributes to the accelerated deterioration of the original mortar and limestone masonry, as discussed.

The large arched window on the east wing had partially collapsed. Since this window was constructed in the same manner as the north window, it may be possible to reconstruct the arch to its original form based on existing evidence. Due to a lack of moisture protection at the top of the wall, most of the brick backup has deteriorated, particularly the core which was constructed from lower-quality common bricks. Open joints were seen on the exterior wythe of limestone masonry around the arch. The lack of mortar in the joints and large voids in the core of the wall is detrimental to the structural integrity of the wall and may result in further localized collapse of wall.

Figure 16: Collapsed east wing arch on south wall [JCAL 2021]

Figure 17: Portland cement repointing on south wall [JCAL 2021]

The inner wythe of the masonry wall has no protection from moisture infiltration at the top. Continued exposure to water has washed out the mortar joints at the top of the inner wythe and likely the core, which is not visible. This has also exposed the masonry to freeze-thaw damage. The lack of mortar in the joints has allowed stones to shift and fall off the wall.

2.2.4. West Wall

The exterior wythe of the west façade appeared to be in fair condition. What remains of the roof provides an overhang which protects the masonry below from moisture infiltration, except for the peak of the gable which is exposed. The Portland cement-based face pointing on the west wall is incompatible with the original materials.

Figure 18: West wall interior [JCAL 2021]

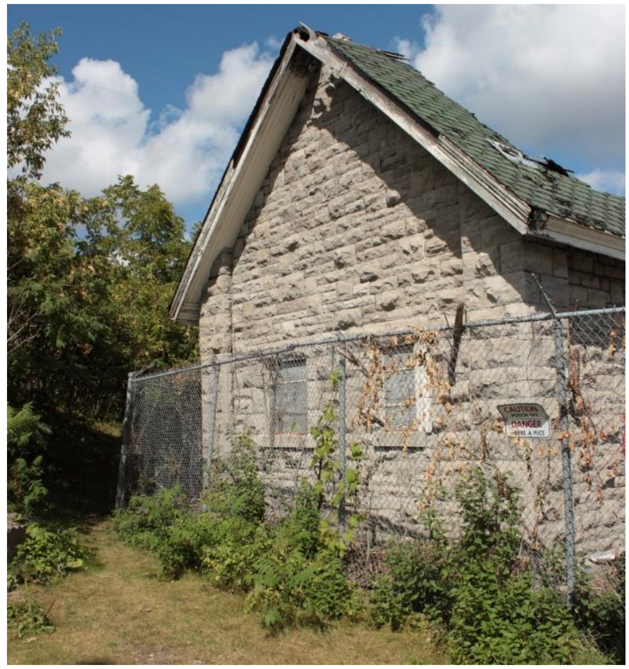


Figure 19: West wall exterior [JCAL 2021]

Significant deterioration was seen in the central third of the gable on the interior wythe. The joints in this section were void and several stones were missing near the roof peak. The loss of mortar in the joints has compromised the integrity of the wall and may lead to further collapse of the inner wythe. Some of the stone masonry in this section of wall may have also been exposed to high heat during the fire.

Figure 20: Void joints and displaced stones at gable peak [JCAL 2021]

2.3. Interior wall between East and West Wing

The interior partition wall between the east and west wing was constructed from multi-wythe brick with header rows every fourth-row keying into the core. Like the east wing, the bricks in the core of the wall would have been of a lower quality than the outer wythes.

2.4. North Cinder Block Addition

The cinder block addition to the north side of the building is in poor condition. It is constructed from unreinforced cinder block and bricks, likely between 1920 and 1950, and for the purpose of this report it is assumed that it will be removed as part of the restoration work.

2.5. Fencing

The existing fencing creates a perimeter around the building which keeps the public at a distance from the building. Once the structure is stabilized, it would be safe for the public to stand adjacent to the building or enter the building. Recently, JCAL carried out a similar restoration project at Chaudiere Falls, where it was desirable to have the public close to the buildings but not enter. We designed guardrails, or fencing, in the window and door locations to satisfy the needs of the project. As shown in the photos below, the new steel was designed to subtly mimic the form of the original windows and green doors shown in Figure 21 to retain some aspect of the heritage characteristics of the original building. A similar design approach could be taken for this site, if that is the direction the City would like to proceed.

Figure 21: Original window and door (green) at Chaudiere Falls [JCAL 2015]

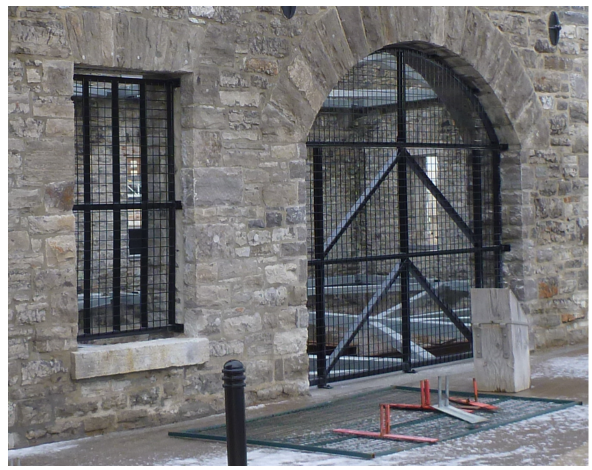


Figure 22: New steel guard rails at Chaudiere Falls [JCAL 2020]

3. Discussion

The conservation or restoration of the Hintonburg Pumping Station presents a unique opportunity to meet the City of Ottawa's vision for the improvement to Lemieux Island. Countless options are available for the future of this structure, and based on previous discussions with the City, three options are presented in this report. We recommend considering the following items as part of the feasibility analysis:

1. Brick masonry durability: Bricks that were manufactured in the era that this building was constructed were made with varying levels of durability. Typically, the lower grade bricks, "common bricks" would be used for interior walls and higher grade bricks, "stock bricks", would be used for exterior walls. From our experience, there is risk of deterioration when exposing an historic interior brick to the elements in the long term. As seen on the interior side of the north wall (eastern half with the arched window), some bricks are deteriorating due to exposure to moisture and freeze-thaw cycles. Future work on the building should consider how these bricks will be protected for longevity. The best option is likely providing a roof above this portion of the building. Other options may include an oversized soffit overhang to minimize rain water saturating the brick wall or providing a breathable sealer and perform regular maintenance as required.

2. Skyward facing joints: It is recommended that all skyward facing joints be protected from water infiltration with a roof or flashing. Skyward facing joints include the top of all walls and the top of window sills. The areas with the most prevalent masonry deterioration, which are still standing, include the top of the walls and just below window sills due to water entering the wall and deteriorating the mortar. For long term durability it is essential to protect these areas.

3. Foundation conditions: Below grade, the mortar joints have likely never had any form of maintenance. It is expected that the mortar joints below grade have failed to some degree both on the interior and exterior of the building. Before construction documents are created, test pits could be dug at sample locations to determine whether maintenance is required below grade or not.

4. Heritage Contractors: Heritage masonry restoration work should only be completed by masons with experience in heritage stone and brick masonry. Masonry construction techniques with modern brick or stone veneer vary significantly from historical techniques. Typically, conservation engineers prequalify masonry contractors to perform the work requiring a minimum of 10 years of experience for the lead mason. Masons should have the knowledge and skills to reset displaced stones, perform various types of stone repairs, and have an overall understanding of the structural system of masonry walls. A conservation engineer would provide scope of work and specifications for compatible materials such as mortar, brick and stone replacements and review work during construction to provide quality control and general oversight.

5. Potential installation for roof, doors, windows etc: The focus on this report is the masonry conservation, however, depending on the overall goals for the site, the City may consider constructing other components to make the building more hospitable. Once the walls are restored, a roof with the same pitch as the original roof could be installed that bears directly on the masonry walls. Further structural analysis could be completed to change the shape of the roof. If heavier loads or bracing are required, independent columns could be installed to provide specific needs. Any option provided in this report could have the option of adding a roof, either bearing directly on the masonry walls or as a self-supported roof structure.

6. Self-supported roof structure: The option for a self-supported roof structure has been included in the cost estimate. This structure is assumed to be a non-heated enclosed spaced formed by a gable roof supported on eight galvanized steel columns outside the perimeter of the building. A 5” concrete slab and column footings have also been included in the cost estimate. The proposed structural system and framing are assumed to be entirely constructed from galvanized steel, with corrugated steel roof decking. The self-supported roof structure is an additional feature that may be applied to any of the three feasibility options presented below and would eliminate the need for capping and flashing the skyward-facing masonry joints. Note that the proposed steel structured has been approximated for the purpose of this cost estimate only. The actual structural design may vary based on structural requirements, and must conform to the National Building Code of Canada or any other applicable design guidelines. See Appendix A for the design proposed by Shadeview structures.

7. Lateral bracing: The old roof structure would have provided lateral support to the top of the walls to prevent overturning from wind and seismic forces. Ultimately, the location and type of bracing will depend on which walls are restored and the height of those walls. For example, if the west gable end wall were to remain in its current form, it will likely need to be braced (possibly with steel or wood) down to the adjacent perpendicular walls.

For the feasibility options listed in the following section, it is assumed that any walls to remain will be conserved so that they are safe for the public to be adjacent to, their structural integrity will be restored, and the guidelines set in the Standards and Guidelines for the Conservation of Historic Places in Canada will be met. In general, the followings steps will be completed for the conservation work:

1. All joints will be raked out, including below grade, and on both faces of the walls, until sound mortar is reached or for a minimum depth of 30mm. If no sound mortar is found or the stone/brick becomes loose, then the masonry unit should be removed and reset. While the stone is removed, the core of the wall would be consolidated. Joints below grade would follow the same procedure but should be assessed to determine the quantity of repointing required.

2. In areas that require dismantling and rebuilding, stones/bricks would be recorded in the location before being removed from the wall. During the rebuild, the stone/brick would be installed at the same location. Photographs would also be used to document the wall.

3. Stones that are damaged by weathering or due to exposure to high heat will be assessed after the raking out is completed. Stones would either be repaired or replaced depending on the degree of deterioration. Bricks would also be assessed and replaced as required.

4. Replacement stone and brick sourcing: New stone and brick need to be compatible with the stone and brick used originally to construct the building. Testing is often completed prior to construction to determine the physical characteristics of the masonry units specific to each site. Replacement units would be specified depending on the results of the testing.

5. Repointing Mortar: Mortar used for repointing heritage building needs to be compatible with the original mortar. Depending on the physical characteristics of the masonry units, it is likely that a type O mortar would be used for applications above grade, and Type N would be used below grade. Various repointing repairs are evident throughout the building. The most prevalent mortar colour on the exterior is tinted black and without further historical documents showing otherwise, it is assumed that this is the original mortar colour. On the interior, the mortar appears to be un-tinted which is common as the walls would have been covered with lath and plaster.

4. Feasibility Analysis

Three options are presented in this report with varying degrees of repairs. Ultimately any combination of the options below are feasible. Each option below is presented with an estimate of probable cost, identified in the following section, and attached sketches. For all options included in this report, the installation of a self-supported roof structure is feasible. As discussed in the previous section, if the installation of a roof bearing on the masonry is desired, structural evaluation may be required to confirm that the walls are able to support the weight of a roof.

4.1. Option 1: Stabilisation

The first option aims to stabilize the structure through the least amount of intervention by removing unsound masonry and restoring the remaining masonry which is in fair condition. The following work is recommended to stabilize the current structure:

1. Remove what remains of the wooden roof structure, lath, and any debris in and around the structure. Remove any shrubs or overgrowth as necessary. Also, remove all debris from the building interior, including the floor over the basement.

2. Deconstruct the unstable masonry elements in poor condition (see sketches) including:

- the west gable above the roofline;
- the top courses in poor condition on the south wall down to sound masonry;
- the top courses of the north wall, down to the base of the window arches;
- the large south wall arched window to the windowsill.
- The interior wall between the east and west wing

3. Restore the remaining walls, including; rake out and deep repoint 100% of wall, reconstruct areas as required and consolidate the core. Include an allowance for foundation repairs.

4. Cap the top of the walls to minimize moisture infiltration, include a 400mm overhang. Alternatively, protect the walls by installing a self-supported roof structure.

4.2. Option 2: Preservation & Protection

The second option proposes restoring the existing structure stone masonry, including rebuilding the sections of masonry in poor condition.

1. Remove what remains of the wooden roof structure, lath, and any debris in and around the structure. Remove any shrubs or overgrowth as necessary. Also, remove all debris from the building interior, including the floor over the basement.

2. Restore masonry walls that have not collapsed, including rake out and deep repoint 100% of wall, reconstruct areas as required and consolidate the core. Include an allowance for foundation repairs.

3. Restore the remainder of the interior multi-wythe brick wall between the east and west wings.

4. Cap the top of the walls to minimize moisture infiltration, include a 400mm overhang. Alternatively, install a self-supported partial roof structure above the west wing of the structure.

5. Install lateral bracing as required, likely at the gable wall. Structural evaluation may be required to determine the necessary bracing.

4.3. Option 3: Restoration & Reconstruction

The third option requires the most intervention to the structure. This option includes preservation of the current structure and reconstruction of collapsed elements based on historic photos and physical evidence of the remaining masonry elements.

1. Remove what remains of the wooden roof structure, lath, and any debris in and around the structure. Remove any shrubs or overgrowth as necessary. Also, remove all debris from the building interior, including the floor over the basement.

2. Reconstruct south arched window. Refer to historic photographs and the north window which was constructed in the same manner.

3. Reconstruct the east wall, south arch, and partial verandah based on historic photographs and remaining window sills.

4. Reconstruct the interior multi-wythe brick wall between the east and west wings.

5. Restore masonry walls that have not collapsed, including rake out and deep repoint 100% of wall, reconstruct areas as required and consolidate the core. Include an allowance for foundation repairs.

6. Reconstruct the wood joist floor above the basement.

7. Install lateral bracing as required, likely at the gable wall. Structural evaluation may be required to determine the necessary bracing.

8. Cap the top of the walls to minimize moisture infiltration, include a 400mm overhang. Alternatively, the structure can be protected with a roof structure, supported by the reconstructed verandah posts.

5. Estimate of Probable Cost

The following is an estimate of probable costs associated with the recommendations from above. All costs are in 2021 dollars and are based on recent prices for similar projects we have worked on in the region. The actual costs will depend on where and when this work is executed. Inflation of 2-3% per year can be assumed for planning purposes.

A contingency of 20% of construction cost is recommend to be included in budgeting to cover unforeseen items which may arise. General contract soft costs such as engineering fees and permits have not been included. The cost of the future installation of doors, windows, a heating system, floors, and interior finishes have not been included, but can be added to the costs provided. The optional cost of the self-supported steel roof structure described in Chapter 3 is included separately as this may be implemented with any of the three options outlined below.

5.1. Option 1: Stabilisation

Item	Estimated Cost	Notes
Demolition & removals	$ 25,000.00	Roof, vegetation, north addition, misc interior debris
Masonry Repairs below grade	$ 66,500.00	Includes excavation and masonry repairs, assumes 100% to all exterior joints and 10% to interior joints
Dismantling unstable masonry	$ 8,400.00	
Masonry repairs above grade to remaining masonry	$ 116,800.00	Including interior and exterior of masonry walls and interior wall between east and west wing
Cap flashing on all skyward facing masonry	$ 48,000.00	Assumes lead coated copper flashing
sub total	$ 264,700.00	

general requirements (15%)	$ 39,705.00
Fees (2.5%)	$ 6,617.50
Construction Contingency (20%)	$ 52,940.00
Total	**$ 363,962.50**

5.2. Option 2: Preservation & Protection

Item	Estimated Cost	Notes
Demolition & removals	$ 25,000.00	Roof, vegetation, north addition, misc interior debris
Masonry Repairs below grade	$ 66,500.00	Including excavation and masonry repairs, assumes 100% to all exterior joints and 10% to interior joints
Masonry repairs above grade to remaining masonry	$ 182,500.00	Including interior and exterior of masonry walls and interior wall between east and west wing, includes rebuilding and new materials as required to restore walls which are still standing
Cap flashing on all skyward facing masonry	$ 48,000.00	
Rebuild wood joist floor over basement	$ 5,000.00	
sub total	$ 322,000.00	
general requirements (15%)	$ 48,300.00	
Fees (2.5%)	$ 8,050.00	
Construction Contingency (20%)	$ 64,400.00	
Total	**$ 442,750.00**	

5.3. Option 3: Restoration & Reconstruction

Item	Estimated Cost	Notes
Demolition & removals	$ 25,000.00	Roof, vegetation, north addition, misc interior debris
Masonry Repairs below grade	$ 66,500.00	Including excavation and masonry repairs, assumes 100% to all exterior joints and 10% to interior joints
Masonry repairs above grade to remaining masonry	$ 182,500.00	Including interior and exterior of masonry walls and interior wall between east and west wing, includes rebuilding and new materials as required to restore walls which are still standing
Rebuild masonry that has previously collapsed	$ 65,000.00	Including new materials and reconstruction of verandah piers
Cap flashing on all skyward facing masonry	$ 48,000.00	Assumes lead coated copper flashing with 400mm overhangs
Lateral Bracing at gable end	$ 10,000.00	

Rebuild wood joist floor over basement	$ 5,000.00
Install 'fencing' in all window and door openings	$ 38,500.00
sub total	$ 440,500.00
general requirements (15%)	$ 66,075.00
Fees (2.5%)	$ 11,012.50
Construction Contingency (20%)	$ 88,100.00
Total	**$ 605,687.50**

5.4. Additional Feature: Self-Supported Roof Structure

Based on the cost estimate provided by Shadeview Structures, the cost of a self-supported roof has been estimated as follows:

Item	Estimated Cost	Notes
Excavation, concrete footings and 5" pad	$ 20,000.00	
20' x 60' Steel Roof Structure	$ 106,170.00	Based on cost estimate provided by Shadeview Structures, see Appendix.
sub total	$ 126,170.00	
general requirements (15%)	$ 18,925.50	
Fees (2.5%)	$ 3,154.25	
Construction Contingency (20%)	$ 25,234.00	
Total	**$ 173,483.75**	

6. Disclaimer and Limitations

This report is based on and limited to information supplied to John G. Cooke & Associates Ltd. by the City of Ottawa personnel, and by observations made during walk-through inspections of the site. Only those items that are capable of being observed and are reasonably obvious to John G. Cooke & Associates Ltd. or have been otherwise identified by other parties and detailed during this investigation can be reported.

The work reflects the Consultant's best judgment in light of the information reviewed by them at the time of preparation. There is no warranty expressed or implied by John G. Cooke & Associates Ltd. that this investigation will uncover all potential deficiencies and risks of liabilities associated with the subject property. John G. Cooke & Associates Ltd. believes, however, that the level of detail carried out in this investigation is appropriate to meet the objectives as outlined in the Terms of Reference. We cannot guarantee the completeness or accuracy of information supplied by any third party.

John G. Cooke & Associates Ltd. is not investigating or providing advice about pollutants, contaminates or hazardous materials.

This report has been produced for the sole use of the City of Ottawa and cannot be reproduced or otherwise used by any third party unless approval is obtained from John G. Cooke & Associates Ltd. No portion of this report may be used as a separate entity; it is written to be read in its entirety.

We trust this report covers the scope of work as outlined in our Terms of Reference. Should there be any questions regarding this report, or if we can be of any further assistance to you, please contact us.

JOHN G. COOKE & ASSOCIATES LTD.

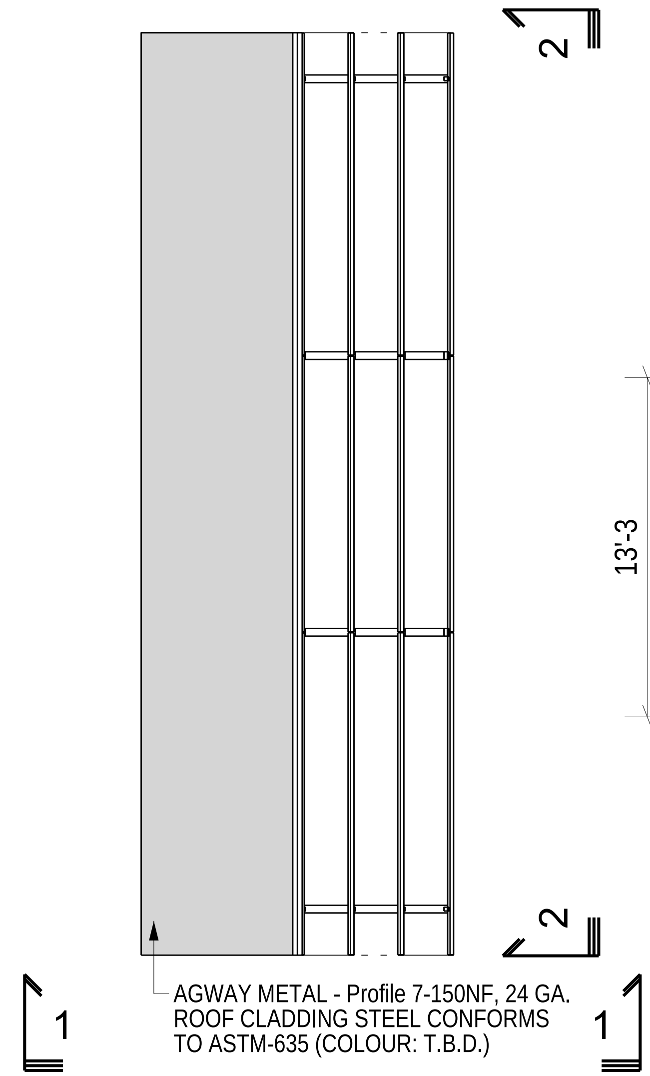
Justin Morton, P.Eng.

Natalie Smith, B.Eng. EIT

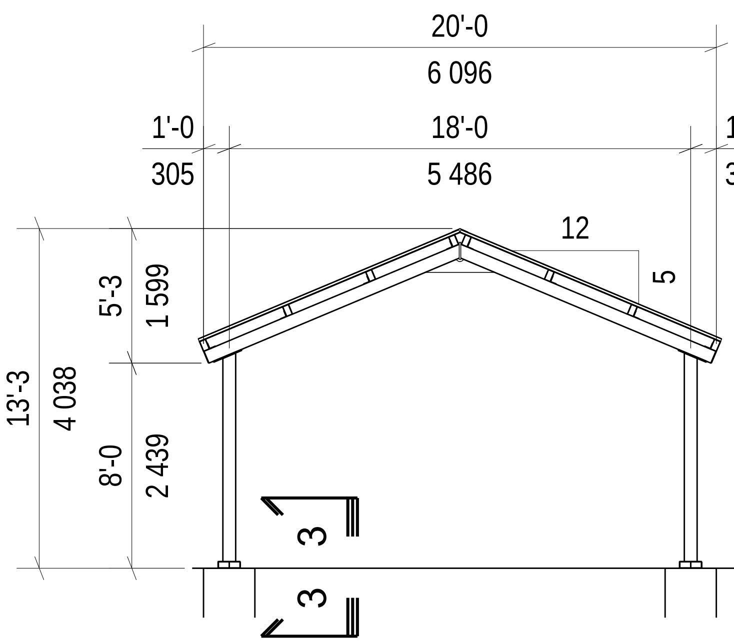
NS/jm
21159/Hintonburg Pumping Station

Appendix A

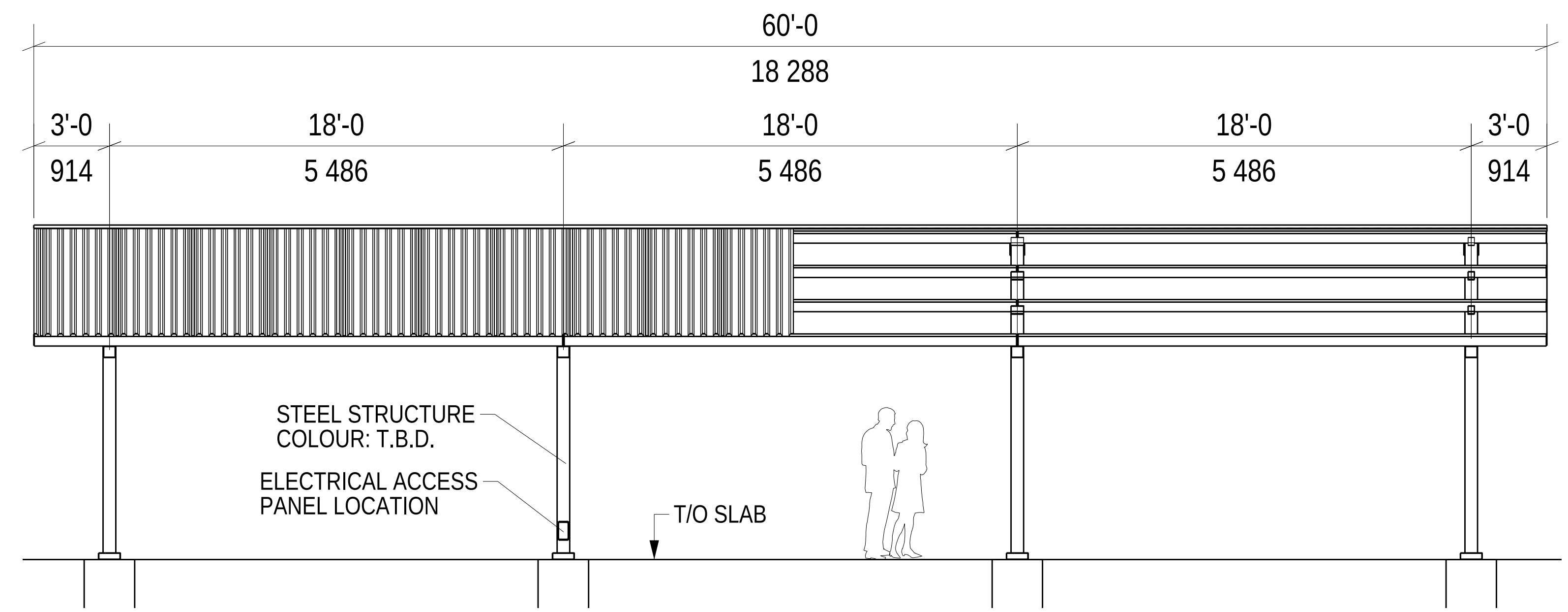
The proposed roof structure is shown in drawing GA-01, provided by Shadeview Structures. The quotation for this steel roof is also included in this appendix.



ROOF FRAMING PLAN
N.T.S.



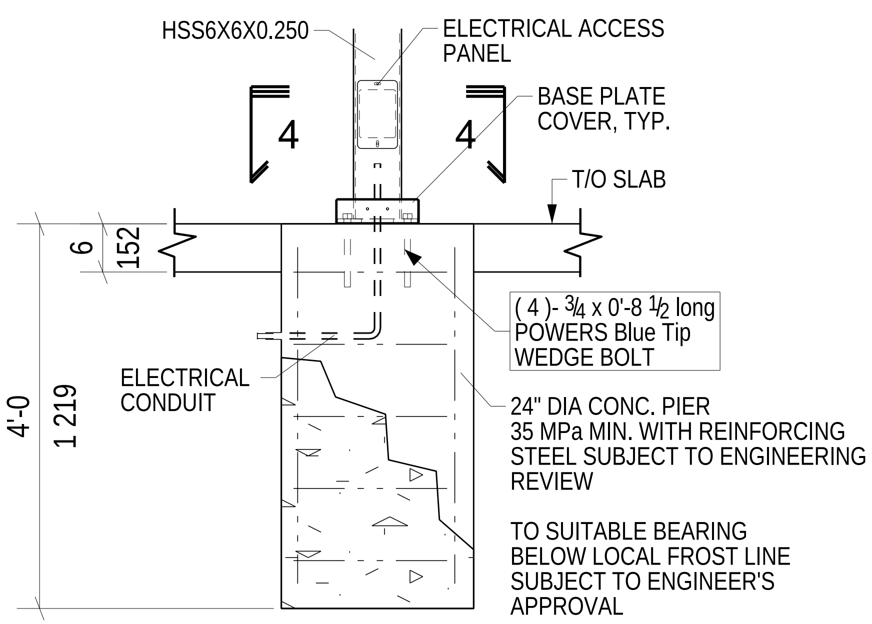
1 - 1 GA-01 SECTION
N.T.S.



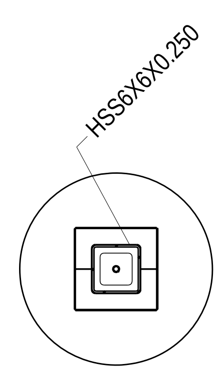
2 - 2 GA-01 SECTION
N.T.S.

GENERAL NOTES:

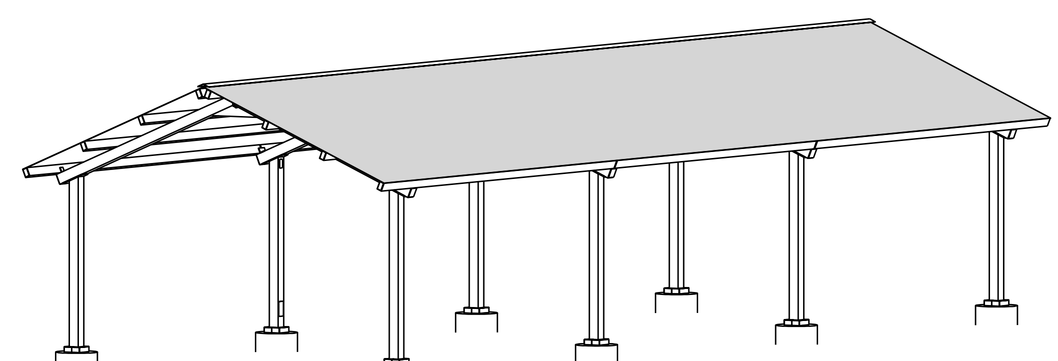
1. All concrete to have a minimum 28 day strength of 35 MPa.
2. All reinforcing steel to have a minimum yield strength of 400 Mpa (60ksi) - deformed bars.
3. All footings to have a minimum cover of 4'-0" (frost protection).
4. All excavations and reinforcing steel should be inspected by the engineer prior to the placement of concrete.
5. All work is carried out in accordance with the latest version of the Ontario Building Code 2012.
6. Excavation for the concrete piers to be completed using vertical auguring machine taking care not to disturb the adjacent soil. If excavation is completed using an excavator to create a larger hole than the granular material with maximum 12" lifts compacted to 98% SPMDD.
7. All structural steel frame components used shall be a minimum grade 44W Steel.
8. All structural bolt fasteners shall be ASTM F3125 grade A325. Other hardware may include box bolts, turnbuckles, shackles, cable systems – all to be specified at time of design.
9. Concrete anchors to be cast in place or equivalent as specified by the engineer.
10. Metal Roofing – Andex/Agway Profile 7-150NF, 24 gauge conforming to ASTM A653 / A653M or A792/A792M.
11. Powder Coat Finish – shall meet all current standards for adhesion, hardness, impact, flexibility and salt spray. Includes blasted surface preparation, zinc rich primer and powder coat finish.



3 - 3 GA-01 SECTION
N.T.S.



4 - 4 GA-01 SECTION
N.T.S.



ISOMETRIC VIEW
N.T.S.

SHADEVIEW® STRUCTURES

A	11/22/2021	For Presentation Only
REV	DATE	REMARKS

PROJECT: Hintonburg Pumping Station
LOCATION: Ottawa, ON
MODEL #: Echo 20' x 60' - Gable Roof
DWG. TITLE: General Arrangement

DRAWN BY: RL	CHECKED BY: BBK	WO#	DWG. NO. GA-01 A
DATE: 20.04.12	DATE: 22.11.21 TIME: 04:05:40pm	Q # 21-1874	

SHADEVIEW STRUCTURES

Quotation:	**21-1874**
Reference:	Hintonburg Station
Customer:	**JG Cooke & Associates**
Date:	**November 24, 2021**

JG Cooke & Associates
57-B John St S.
Suite 2
Hamilton, ON
L8N 2B9

Contact: Andre Bryan
Telephone: 905-834-0922 *34
Email: abryan@stolk.ca

Thank you for the opportunity to submit this quotation - if you have any questions or require clarification do not hesitate to contact us.

QTY	DESCRIPTION (Shadeview Structures Custom 20' x 60' Gable Roof)	Each	PRICE CDN ($)
One (1)	**Shadeview Structures Custom 20' x 60' Gable Roof**		$ 84,995.00
	Eight - 6" Square Steel Single Columns		incl.
	Finish: Powder Coat w/ blast prep and zinc rich primer		incl.
	Anchors: POWERS Blue Tip Wedge bolts		incl.
	24 gauge multi ribbed roof -ANDEX Profile 7-150 NF		incl.
	As per presentation drawing		
1	**Stamped Engineer Drawings (Province of Ontario)**		$ 1,845.00
1	**Engineered footing design**		$ 580.00
1	**Post install inspection and engineer review letter**		$ 750.00
	COLOUR: to be determined	**TOTAL EQUIPMENT**	$ 88,170.00
		Installation	$ 15,600.00
		Freight	$ 2,400.00
		sub total	**106,170.00**
		hst 13%	$ 13,802.10
		TOTAL INVOICE	**$ 119,972.10**

DELIVERY: approx. 6-8 weeks from drawing approval
F.O.B. Beamsville, ON
TERMS: 25% deposit, Balance prior to delivery.
VALID: This quotation is valid for 90 Days.

Standard Exclusions:

All permits are by others. Footings by other.
All site preparation and concrete work is by others.
All landscape restoration is by others.
All electrical and mounting of light fixtures is by others.

Regards,

Eric Nadeau

Proudly Made in

Eric Nadeau - Sales
M: 226-929-3875 eric@openspacesolutions.com
Shadeview Structures Inc. P.O. Box 81165, Fiddlers Green, Ancaster ON L9G 4X2