HERITAGE STANDING INC.

J19189 St Mary the Virgin Anglican Church, New Maryland, NB

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ST MARY THE VIRGIN ANGLICAN CHURCH CONDITION ASSESSMENT & PROJECT PLANNING

PROJECT J19189 **REVISION 0**

HERITAGE STANDING INC.

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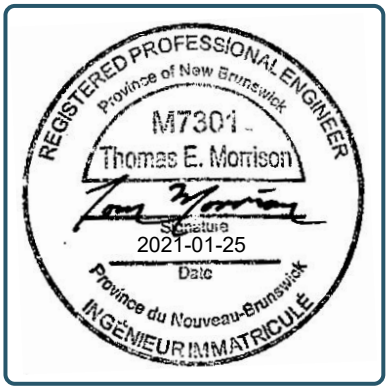

EXECUTIVE SUMMARY

St Mary the Virgin Anglican Church has been a landmark in the Village of New Maryland since its construction in 1864. The building is a fine example of the gothic revival Anglican churches constructed by Bishop John Medley and his son Edward in New Brunswick. The building has not been used for worship since 1987, and the New Maryland Heritage Association has undertaken the task of revitalizing this historic building to restore its central role in the community. The building is a wood frame structure supported on a rouble stone foundation typical of that era.

Heritage Standing Inc. was engaged to perform a condition assessment, assist with project planning, and prepare a rough order of magnitude cost estimate. The conditions observed on site were evaluated based on the following criteria:

- **Good** – the element is in good condition with little risk of significant loss or deterioration over the next 10 years.
- **Fair** – the element is beginning to deteriorate and at risk of further deterioration over the next 10 years.
- **Poor** – the element is severely deteriorated and at risk of loss within the next 5 years. Action should be taken earlier.

This report details the observed conditions in the building and their causes, and the following table summarizes the findings. Many of the pathological issues seen in the building are related to the foundation and ground movement, therefore this will be the top priority for stabilization.

Component	Condition	Observations
Site	Fair	Localized areas with poor drainage, gravestones may impede exterior construction interventions
Foundation	Poor	Several collapsed areas, cracked throughout, incompatible repointing with cement-based mortar evident. Lower foundation walls found in good condition.
Roof	Poor	Metal roof near end of service life, no moisture issues observed in interior, however conditions are expected to deteriorate quickly soon. Structure in fair condition with some spreading
Bell Tower	Fair	Viewed from ground, some flashing that has fallen off and must be replaced, minor interventions would improve appearance
Chancel Arch	Fair	Significant structural movement, mechanical damages such as cracking and splitting observed
Walls	Fair	Evidence of structural movements and joint separation, in need of repainting to protect wood and improve appearance

Floor	Fair	Only viewed from above, appears sound based on past performance, tiles may contain asbestos
Chimney	Poor	Open mortar joints, leaning outwards
Furnace Room Access	Poor	Bad drainage, opening in roof, deteriorated shingles, cracked foundation. Interior issues assumed but could not be viewed.
Narthex	Fair	Needs ventilation to prevent mildew, floor failed, significant cracking and structural movements
Stained Glass	Fair	Stable, but will continue to warp and may become damaged if not properly vented

Heritage Standing Inc has provided recommendations for the stabilization and rehabilitation of St Mary the Virgin Anglican Church. These recommendations have been prioritized based on urgency. High priority recommendations are required repairs, medium priority recommendations require some decisions, and low priority recommendations are mostly for aesthetics.

Recommendation 1. **HIGH:** Improve Site Drainage
Recommendation 2. **HIGH:** Repair Stone Foundation
Recommendation 3. **HIGH:** Stabilization of Walls
Recommendation 4. **HIGH:** Chancel Arch Repair
Recommendation 5. **HIGH:** Roof Replacement
Recommendation 6. **Medium:** Hazardous Materials Testing
Recommendation 7. **Medium:** Exterior Painting
Recommendation 8. **Medium:** Furnace Room Chimney
Recommendation 9. **Medium:** Accessibility Requirements

Recommendations 10 to 15 are low priority items which are covered in section 4.5.3 in the report.

This project has been categorized into phases to align with client's business plan: Phase 1 - Stabilization and Phase 2 - Rehabilitation. Phase 1 - Stabilization addresses urgent repairs necessary to ensure the building's safety. Design decisions must be made prior to Phase 2, as there are currently some unknowns regarding the furnace room and its foundation. Phase 2 provides options both for necessary interventions prior to building occupancy and for optional interventions to improve the building's appearance.

The total rough order of magnitude cost of the project has been estimated between $ 55,000 and $ 110,000 depending upon decisions made during the project. As discussed, this project was used for training proposes and therefore includes a greater depth of detail than is customary for the scope of service.

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INTRODUCTION

Heritage Standing Inc. (HSI) has been engaged by the New Maryland Heritage Association to support the rehabilitation of St Mary the Virgin Anglican Church. The New Maryland Heritage Association committee plans to adapt the historic building to suit the current needs of the community.

OBJECTIVE AND SCOPE

The project objectives were:

Objective 1. Understand the existing building condition and identify repair items

Objective 2. Provide a plan of repairs and rough order of magnitude costs

Objective 3. Identify priorities and potential phasing of repairs

The scope of services was to undertake assessments in line with the following charters, standards, and codes:

- ICOMOS Charter for the Analysis, Conservation and Structural Restoration of Architectural Heritage[1].
- Standards and Guidelines for the Conservation of Historic Places in Canada, 2nd Edition, Parks Canada[2].
- 2015 National Building Code, National Research Council Canada[3].

The project scope includes:

1. Pre-site tasks
    a. Project start up and document setup

[1] Also referred to as the ISCARSAH Principles. ICOMOS (the International Council on Monuments and Sites) is a non-governmental international organization dedicated to conservation, noted for advising UNESCO on World Heritage Sites. ISCARSAH (the International Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage) was founded by ICOMOS in 1996 as a forum for engineers involved in the restoration and care of heritage buildings.

[2] Based upon international best practices and lessons but with a focus on Canada, this document was developed to aid all groups involved with Conservation projects, including owners, consultants, and contractors.

[3] The 2010 National Building Code of Canada has been adopted by the Province of New Brunswick as the governing document for the construction industry. The document is predominately designed for new construction, although it applies to construction on existing buildings as well. The Code defines the performance objectives that must be met to ensure acceptable levels of safety and includes the most commonly referenced acceptable solutions.

   b. Review of existing documents and background research
   c. Establish site visit methodology
2. Site visits
   a. Visual inspection of the building, including crawlspaces and foundation
   b. Documentation of building and conditions
3. Evaluation
   a. Documentation of data collected
   b. Holistic review of collected data to understand the building and identify root causes of problems
   c. Identification of options for intervention and hierarchy of repairs
   d. Development of rough order of magnitude costs
4. Letter Report
   a. Evaluate recommendations for the building
   b. Priorities issues recorded across the site
   c. Summarize findings and provide a report

The current scope of service aims to understand the building and establish priorities prior to intervention. Design of repairs is not included in this scope. However, design cost estimates for the full rehabilitation project are included.

Methodology

The methodology selected for this project includes background research, on site condition assessment, and a holistic review of the observed conditions to determine the causes of damage. Recommendations for preservation based on the urgency of intervention are also included in this document, as well as a rough order of magnitude cost estimation for the rehabilitation project.

By providing a record of all information available, this report will be a baseline of information for current decisions and for future evaluation.

CONSERVATION APPROACHES

Recommendations are based upon national and international conservation best practices, derived from hundreds of years of experience with old buildings. Properly applied, they should result in solutions that are practical, high quality, ecological, and cost effective.

It is important to understand a building before designing interventions. Interventions should focus on minimizing actual construction to achieve desired results. In order to minimize construction costs, design costs are typically a higher percent of the total costs than they would be if using new construction techniques. However, the end savings can be extremely significant. Every project is different, but a rule of thumb for good conservation design is 15% to 25% of total project costs. Design must be done more rigorously than for new construction because optimized repair procedures are typically very different than the conventions most contractors are trained to follow for new construction. Design costs include additional assessments, design and development of construction documents, as well as regular site visits during construction to monitor progress. All design and construction should be thoroughly documented.

BACKGROUND

HISTORY

St Mary the Virgin Anglican Church is a pre-confederation Neo-Gothic Church located in the Village of New Maryland, New Brunswick. The small wooden building was designed in 1863 by Reverend Edward S. Medley, son of Bishop John Medley. Bishop John Medley is known for having commissioned Christ Church Cathedral in Fredericton. The church is a wood frame structure set on a rouble stone foundation as was typical at the period. As a more iconic building greater detail, in terms of constructed durability and overdesign, was added than for most rural churches.

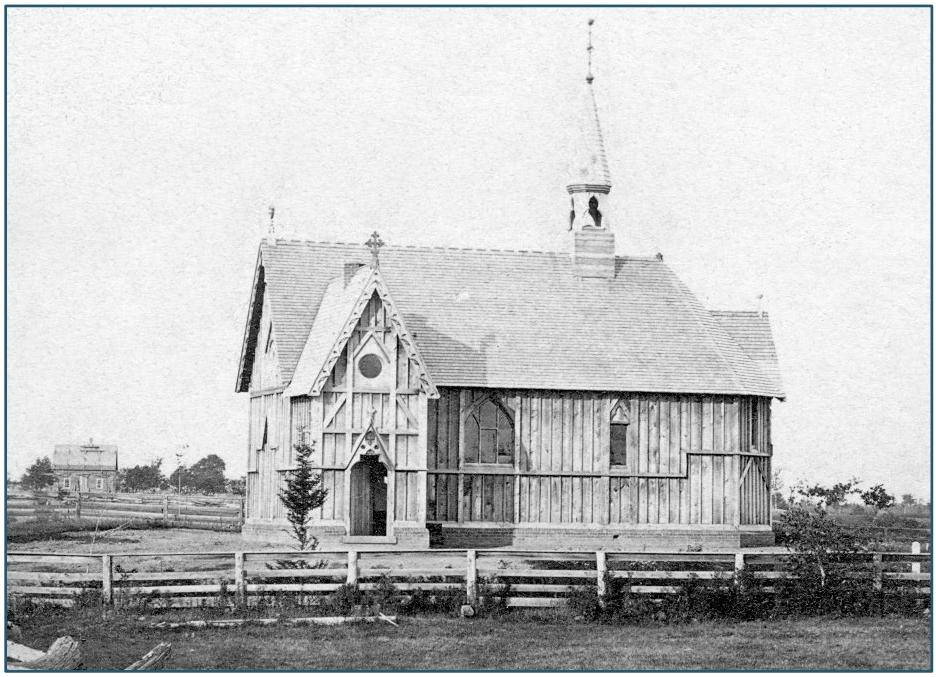

Figure 1: St Mary the Virgin Anglican Church, circa 1865

St Mary the Virgin is one of over a hundred churches built by the father-son duo during Bishop Medley's episcopate from 1845 to 1892. The Medleys' architectural program drew inspiration from the High Victorian Stone Churches in their native England. However, they adapted this elaborate style to smaller wooden churches suitable for rural New Brunswick towns. The Neo-Gothic detailing in St Mary the Virgin Anglican Church makes it one of the finest examples of Medley's Anglican Churches in New Brunswick.

St Mary the Virgin Anglican Church has been a part of the New Maryland community for over a century. After the construction of the new Holy Trinity Anglican Church in 1987, St Mary the Virgin fell into disuse. It was recognized as a provincial historic site in 1994. In 2019, the church was deconsecrated to allow for a new building use and to re-establish the building's cultural and social importance within the community. The intended purpose will highlight art and culture, showcase the history of the village, and give the public access to this fine example of Gothic Revival architecture. The goal of the restoration is to revitalize the building and provide a space for new uses while respecting the heritage value of the site.

Figure 2: St Mary the Virgin Anglican Church in 2020

HISTORIC SITE DESIGNATION

The building was designated a Province of New Brunswick Historic Site in 1994 based on its association with Bishop John Medley's Gothic Revival Architectural Program. The building's character is enhanced by the rural setting of the churchyard and the surrounding gravestones. The Gothic architectural layout and detailing are distinctive of Anglican Churches constructed in the mid-nineteenth century.

Other character defining elements include:

- The neo-gothic bargeboards on eaves
- The cross motif in east gable woodwork
- The Celtic cross above west gable, which is now stored in the church
- The window tracery which reflects the neo-gothic style
- Verticality of the interior, which converges on the bell turret
- The plastered interior with the outline of the timber frame
- Gothic ornamentation (quatrefoil and trefoil) on arches, walls, and furnishings
- The vertically panelled south door
- The cross above the south gable

Figure 3: East gable, showing stained glass, cross motif, and trefoiled bell tower

PAST REPORTS

Background reports and information that document where and why previous changes occurred can reveal inherent strengths and weaknesses of the site and thus guide the direction of plans. The following were provided to and examined by HSI.

1. Report titled "*Business Plan for the Saint Mary the Virgin Church*" prepared by New Maryland Heritage Association, dated June 18, 2019

2. Report titled "*Consideration of Options for the Decommissioning of St. Mary the Virgin Anglican Church, New Maryland, New Brunswick*" submitted by the Committee to the Vestry of the Holy Trinity Church, Anglican Parish of New Maryland, dated October 24, 2016
   a. Appendix A includes November 22nd, 2009 condition assessment by David Steeves
   b. Appendix B includes the statement of significance from New Brunswick Register of Historic Places and information about the listing under the Heritage Conservation Act

3. Lease between the corporation of the Anglican Parish of New Maryland and the New Maryland Heritage Association Inc. dated November 1st, 2019

4. Email from John Leroux, report on condition, subject: "Inspection of the Saint Mary the Virgin Church" dated July 12, 2018

LIMITATIONS

Because there is no heritage master plan for this building, all evaluations and recommendations concerning previous work are limited by the completeness of the background information provided to HSI. If additional information arises some findings may be reconsidered.

SITE VISITS

Date	Staff Present	Visit Focus Overview
2020-10-07	T. Morrison & N. Smith	Evaluate and document the condition of the current building

EVALUATION

Evaluation of the building looked at issues or conditions found in regard to the building components. The Discussion section of this report considers what the evaluation data means, including recommendations for next steps.

The conditions observed on site were evaluated based on the following criteria:

- **Good** – the element is in good condition with little risk of significant loss or deterioration over the next 10 years.
- **Fair** – the element is beginning to deteriorate and at risk of further deterioration over the next 10 years.
- **Poor** – the element is severely deteriorated and at risk of loss within the next 10 years.

SITE

St Mary the Virgin Anglican Church is surrounded by gravestones, clustered most densely on the north and west sides. Near the back of the apse, some of the gravestones come within 380 mm (15 inches) of the building. This presents some constraints, as any interventions to the building exterior will need to work around the grave markers. It was noted that some of the grave markers in the cemetery show dates within the past five years and therefore it is assumed that the cemetery is still used for interments. The graves are closely spaced, and the exact locations of the burials are not clear. Frequent excavation and the physical characteristics of burials affect how water drains and can cause the ground to shift, settle, or heave. These events occurring in cemetery, if close to the building, can contribute to movements in the structure.

Plant growth can cause both direct and indirect damage to the structure. Near the large window on the west wall, there is a large shrub that encroaches on the foundation. This plant must be removed or relocated so that its growth does not affect the structure.

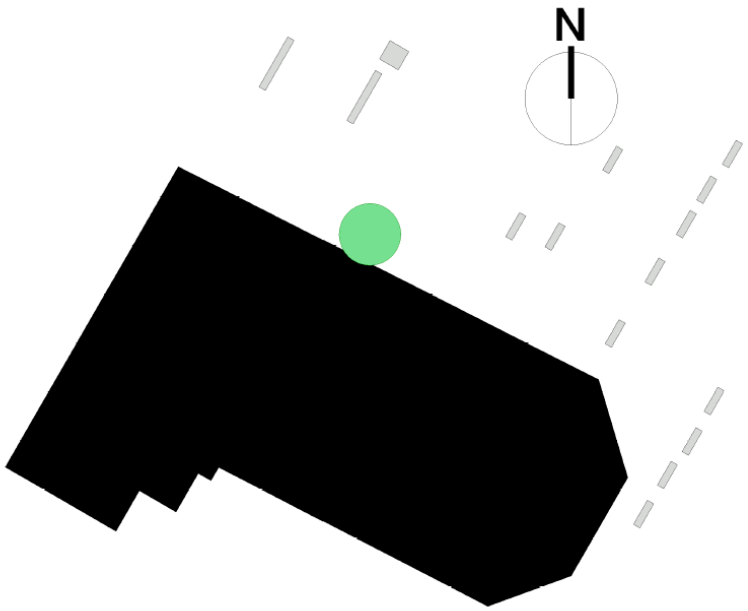

Figure 4: Site plan showing gravestones (grey) and shrub (green)

For site drainage, there are small ditches on the north and south sides of the building to catch and direct rainwater towards the west, away from the foundation walls. However, on the south side, this ditch directs water towards the building entrance. As shown in the figure below, the ground generally slopes west, directing water towards the road. The ground around the furnace room access on the south side slopes towards the building, which has caused significant moisture infiltration at this corner.

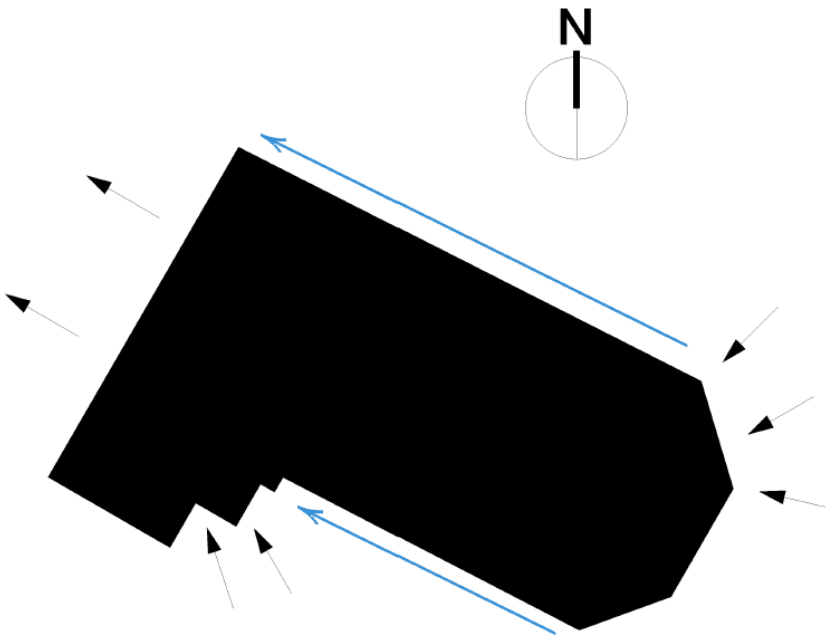

Figure 5: Drainage plan with ditches shown in blue, arrows show direction of ground slope

Figure 6: Drainage ditch on north side

Figure 7: Moisture draining towards foundation near shed

FOUNDATION

Figure 8: Brick foundation, circa 1865

Based on photographic evidence from 1865, the original foundation is assumed to have had a brick masonry outer wythe covering the stone masonry. The current foundation is a combination of cut and field stone, which is assumed to have been concealed by the brick masonry originally, because the historic pictures shows the brick proud of the exterior wall by approximately one brick thickness. Additionally, a concrete block wall is assumed to have been installed to create a furnace room at some point between 1960 and 1987. It is unknown when the brick was removed. A test pit was dug next to the building on 2020-12-21 and found some remains of the original bricks below grade.

The current stone foundation appears to have been repointed with what appears to be a Portland cement-based mortar. This repair mortar has become unbonded from the stone throughout the foundation, and there are many areas where it has cracked and fallen off, leaving open joints in the masonry. From similar sites it is likely that the harder, less porous Portland caused deterioration to the core of the masonry, due to its incompatibility with the system.

The test pit dug on 2020-12-21 was documented by John Leroux and went approximately 1 metre below grade. The foundation below grade was in good condition. Shortly below ground level the mortar in the joints was in good condition, while the lower portion of the foundation did not appear to have mortar, but soil was packed tight into the wall.

Figure 9: Damaged concrete block wall

At an unknown date, a concrete block foundation wall was installed around the furnace in the building's crawlspace. It is assumed that a furnace room space was created, however it was not possible to access the space at the time of the site visit. The block wall was inspected visually through an opening in the collapsed west foundation wall. Many of the concrete masonry units were found to be severely damaged, likely due to structural movements. The concrete block wall has a higher stiffness than the masonry foundation; this affects the stress distribution in the building and has created stress concentrations in both the original and new foundations. While the exact footprint of the concrete block foundation is unknown, it is set back from the west wall and extends around the furnace room up to the chimney. This part of the foundation could not be fully accessed during the site visit. Because access was not possible when on site, further inspection will be required. Further inspection can be combined with the masonry repair project.

Figure 10: Stone door sill, removed

The original stone sill below the door is no longer in place; it appears to be on the ground beneath the wooden door sill. The posts framing the south doorway are structural columns. These were originally supported by the stone door sill; however, they are now supported by short wood blocks. Based on the deflections measured in these columns, these blocks do not provide adequate support.

Overall, the foundation is in poor condition and is worsening over time. The 2009 condition assessment prepared by David Steeves observed that the foundation was in worse condition compared to a previous inspection; Steeves attributed the deterioration to cyclic frost action. Currently, there is evidence of repointing with an incompatible cement-based mortar throughout: the parging east of the chimney is failing, there is cracking throughout, and the foundation has collapsed in several areas. The localized damages observed in the foundation are summarized in the following table:

Location	Description	Photo
North wall, west of large window	Partial collapse	Figure 11
North wall below small window	Partial collapse	Figure 12

Northeast corner below apse	Collapsed, diagonal cracking below apse	Figure 13 Figure 14
Southeast corner, west of apse	Partial collapse	Figure 14
South wall, east of chimney	Spalling parging	Figure 15
Southeast corner of narthex	Deterioration, repaired with plywood	Figure 16
Southwest corner	Vertical cracking, open mortar joints	Figure 17
West foundation wall	50% of wall collapsed	Figure 18

Figure 11: North wall partial collapse west of large window

Figure 12: Partial collapse below small north window

Figure 13: Collapse below northeast apse corner, note separation at sill beam joint

Figure 14: Partial collapse in south wall near southeast corner, note checking in sill beam

Figure 15: Parging failure and collapse at block wall near chimney

Figure 16: Diagonal cracking and inappropriate plywood repair at southeast narthex corner

Figure 17: Collapse and cracking at southwest corner

Figure 18: Boarded up collapsed west foundation

Due to the proximity of the graves and poor drainage, rising damp and excessive moisture have caused the mortar bonds to deteriorate and weaken throughout the foundation. As a result, ground settlement and frost has caused parts of the foundation to settle and shift, creating stress concentrations.

The foundation will require intervention to stabilize the structure. Many of the issues seen in other elements of the building are related to foundation movement. For instance, the leaning walls, splitting in the chancel arch, joint separation, cracked plaster, and gaps in the panels are all consequences of the unstable foundation and structural movements.

A test pit was dug near the north end of the road facing wall on 2020-12-21 to gather additional information on the condition of the foundation. HSI was not on site, but the verbal reports and photographs that were provided to HSI for information are outlined below. The test pit dug down approximately 1 m (3 ft), and the foundation wall appeared to continue further below grade. HSI gave direction to stop digging at this depth, as this gave adequate information to compliment our understanding of the building, and further digging may reduce existing soil compaction. The test pit found that the wall immediately below grade was deteriorated but was in good condition by 150 mm depth. Mortar was present between stones in the first 300 mm depth, after which no mortar was

evident. The stones in the wall appeared plumb. These findings suggest that the deterioration of the foundation is above grade or within the first 200 mm of depth. It is assumed that some exposing of the wall will be necessary, however this supports the preliminary plan to repair in place and avoid excavating the full wall height.

Note that a time capsule is recorded to have been placed in one of the corners of the building.

ROOF STRUCTURE AND FEATURES

ROOF

The roof was visually inspected from the ground level. Due to high wind speeds during the site visit, it was not possible to safely access the roof or fly a drone to take photographs. Based on historic photos and on-site observations, the roofing material was originally wooden shingles; a stamped metal roof has since been installed over the shingles. Overall, the roof appears to be in fair condition. While the metal roof is corroded and may be nearing the end of its service life, it seems to be performing adequately at this time.

Figure 19: Original wood shingles under newer metal roof

Figure 20: Missing flashing at roof valley

Figure 21: Patched roof at previous chimney location

Some of the metal panels have blown off the roof, revealing the wood shingles below. Additionally, in a few areas, the flashing at the roof ridges and valleys has fallen off. These missing elements could leave the building prone to water infiltration and should be restored to prevent moisture damage to the supporting structure. Options for this repair are outlined in the discussion section. If possible, full roof replacement may be more practical than short term local repairs.

The historic photos show a previous chimney above the southern entrance. The chimney was likely removed after the metal roof was installed, as this area appears to be patched with different paneling. The rafter ends appeared to be in good condition, largely thanks to the protective roof overhang. While the roof does not have eavestroughs, it appears that the overhang adequately sheds rainwater away from the building walls.

Figure 23: St Mary the Virgin Catholic Church interior roof structure

The roof structure is a heavy timber A-frame joined with pegged mortice and tenon carpentry joinery. Overall, the wooden roof structure is in good condition. Signs of moisture damage appear to be local and mostly made up of staining from past moisture. Some checking was observed in the west-most truss. The checking is assumed to be old and related to the original use of green wood.

Figure 22: Pegged mortice and tenon joint between rafter and tie beam

BELL TOWER

The bell tower is supported from below with a pointed wooden archway that separates the nave from the chancel. The trefoiled window openings contribute to the building's character. Some of the flashing around the edge of the bell tower roof is missing and has likely been blown off by the wind. Where the flashing is in place, it allows water to drip away from the walls.

Figure 24: Bell tower viewed from ground level

The metal roofing material has been used on the bell turret walls. Based on historic photographs, the walls were originally clad with horizontal wood paneling. While the metal roofing offers protection to the underlying wood paneling, it may be desirable to remove it to improve the building's appearance.

Some of the drip edge flashing around the bottom of the bell tower roof was found to be missing and should be replaced to ensure proper moisture shedding. Additionally, the trefoiled arches on the bell tower have been sealed with mesh to prevent animal invasion. While this is an acceptable solution to prevent damage to the church interior, it detracts from the bell tower's appearance. Tucking the mesh behind the arch frame would highlight the trefoiled gothic arches and improve the bell tower's appearance.

CHANCEL ARCH

The chancel arch separates the church nave from the chancel and altar. The pointed wood arch exemplifies the neo-gothic style of the building and the intrados is ornamented with gothic trefoils and quatrefoils. Each half of the arch consists of two chords, with decorative panelling spanning between the chords. Like the roof trusses, the chords are connected to the structure with wooden pegs and bear on large columns. The arch is supported at the base with decorative hammer beams, which

Figure 25: Chancel arch, viewed from the east

transfer load to the walls. On the wall below both sides of the arch, the two columns frame a small window.

Observations	Global Movement	Photo
• Gaps between arch panels • Joint separation at top of arch • Columns leaning outwards • Worse on south half of arch	Arch spreading at base due to outward thrust[4]	Figure 26
• Splitting at connections on east side • Detached southwest bell tower post • Predominant wind direction is eastwards	South half of arch leaning towards east due to wind	Figure 27
• Triangular gaps in panelling • Twisting effect at top of arch	North half of arch bending towards west[5]	Figure 28
• New material spliced in • Aging shows repair has been in place for a relatively long period of time	Partial replacement of northwest arch cord near peak, likely due to past moisture infiltration	Figure 29

Figure 26: Arch joint separating and splitting at connection

Figure 27: Detached bell tower post at arch peak

[4] Arches convert gravity loads into outwards thrust at the base, which often results in spreading, as seen in the chancel arch.

[5] In the north half of the arch, the checks indicate that the eastward leaning is less severe in this portion of the arch. As a result, torsional effects have been induced near the top of the arch, which contributes to the detachment of the southwest bell tower post

Figure 28: Cracks and triangular gaps in north arch panels.

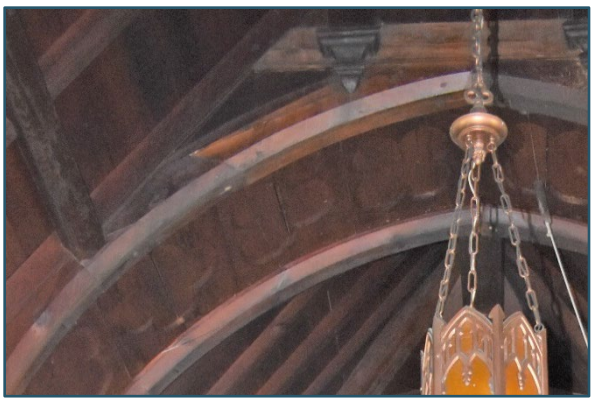

Figure 29: New cord near top of arch

FLOOR

The floor tiles appear to be made from linoleum. It is possible that this type of tile contains asbestos, due to the material's wide-spread use prior to the 1980s.[6] If the tiles are found to contain asbestos, any broken tiles should be carefully disposed of. However, unbroken tiles do not present an immediate health risk and can be sealed in place by installing a new floor over them.

Figure 30: Raccoon feces near chancel porch, July 2018

Overall, most of the tiles are in good condition, other than in the area near the porch chancel nave where some have warped. In the winter of 2018, a racoon was found to have been living in the church. This was discovered in the July 2018 inspection conducted by David Steeves, John Leroux, Tim Scammell, and Darrell Butler. Racoon excrement was found all over the carpet, particularly near the chancel porch. The raccoon damage was cleaned, and the carpet was removed, however, the tiles are warped in this area due to the excessive moisture.

Figure 31: Warped tiles near chancel porch.

At the time of inspection, it was not possible to assess the floor structure from below since the entrance to the furnace area was screwed shut and neither the furnace room nor the crawlspace could be

[6] Unless it is known that the tiles do not contain asbestos, they should be tested for the hazardous material. Airborne asbestos fibers present a health hazard, as they can get trapped in the lungs and cause mesothelioma. However, in this case the fibers are encased in the tile and only become airborne if the tiles break.

accessed. The floor felt sound when pressure was applied, and no significant deflection was felt when walking around the church. However, full inspection of the floor structure from the crawlspace is needed to accurately assess its structural capacity. This can be done when reviewing the masonry repair project.

EXTERIOR WALLS

The exterior walls are painted board-and-batten siding. Square posts at the corners and openings support the wall structure and roof beams. The walls also feature decorative wood elements that contribute to the heritage character of the building rather than the structural capacity. These include: the diagonal braces on the angled walls around the apse, the cross motifs on the east and west gables, the horizontal wood trim along the center of the walls, and the trim detail on the west wall which previously outlined the church sign.

Figure 32: Decorative wood detailing on west and south facades

Figure 33: Southeast view, showing wood detailing around apse

Overall, the walls appeared to be in fair condition, with some localized damage. While the wood is weathered, no signs of decay were observed during the inspection. Some checks were observed in the wood posts, but these were assessed as not a structural concern.

Some of the joints between the timber frame elements were found to be separating, particularly in the beams above the foundation and in the diagonal braces around the apse. In some cases, the gaps had been previously filled with multiple layers of caulking. This indicates that the condition is worsening as the gaps are continually increasing in size over time.

Figure 34: Separating joint at post

Figure 35: Separating at beam joint above foundation

The exterior walls were measured with a digital level to determine their tilt. The walls near the bell tower arch were found to be leaning outwards. Arches convert gravity loads into thrust, which often causes outwards movement at their bases.

Figure 36: Southwest corner

The south wall of the narthex was leaning outwards, with the worst lean occurring in the center of the wall, around the door. The door is framed by two columns, which support the load from the roof. The southwest corner has cracked and collapsed inwards, possibly due to frost heave. Since the columns are not restrained at the base, this movement may have caused them to lean outwards.

The east walls around the apse were measured and found to be leaning inwards slightly, with a more significant tilt towards the north of the building. In the northeast corner of the apse, a large gap, measuring about 2.5 cm (1 in) across, has developed between the column and the wall panel. This gap allows moisture and small animals to enter the building and damage the structure. Since there is no evidence of prior repairs at this location, it may be a recent development.

Figure 37: Gap at northeast corner

This gap appears to be indirectly caused by the unstable foundation. Based on the cracking patterns, the corner of the foundation appears to have settled. The settlement has caused the corner column to drop, which induced tension at the joint between the sill beams. The corroded fasteners were not able to resist the tension, which led to failure. This allowed the walls to separate at the base, creating the triangular gap seen in the wall.

Figure 38: Cracked foundation and separated sill beams at northeast corner

This explains why the back of the apse is leaning inwards near this corner. The west-leaning walls may be countering the east-leaning chancel arch, which could explain why the damage appears less severe on the north half of the arch. Additionally, the foundation below this portion of the wall appears to be collapsing. Since the east corner of the wall has dropped, this causes the wall to rotate, creating an uplift force at the opposite end. This would cause the wall to lift away from the foundation at this location. Another potential cause of collapse is frost heave.

Figure 39: Failed foundation beneath chancel arch

The building appeared to have layers of different types of paint, which was found to be peeling. The roof overhang and trim offer some protection, as indicated by the good condition of the paint immediately below these elements progressing to poorer condition further down the walls. The exterior walls should be repainted with a compatible paint, as this will help protect the wood elements from further weathering and improve the overall appearance of the building. In all instances all loose paint must be removed. Painting could be done with either more common latex based paints, or using longer-lasting traditional linseed oil paints. The traditional linseed oil based paints require different treatments and applications that are unfamiliar to most commercial painters. Details follow in the recommendations section.

Figure 40: Layers of peeling paint

INTERIOR WALLS

The interior walls are lath and plastered with decorative wood elements that align with the exterior posts. The gothic arches contribute to the verticality of the interior and draw the eye upwards. Overall, the interior walls are in fair condition with some localized damage. The walls were measured with a digital level to determine if they were leaning. These measurements were generally in agreement with the exterior plumb measurements.

Figure 41: Church interior

Hairline cracks were seen throughout the interior walls. The cracking in the walls is caused by stress concentrations, thermal expansion, and minor structural movements. Cracking was seen near windows, which tend to be vulnerable locations.

Cracks were observed below the large northern window. These extend downwards from the window corners and are caused by a stress differential around the windows. Small cracks were also observed in the glass in both large windows.

Figure 42: Cracking around stained glass

Cracking was also observed around the stained-glass windows in the apse. The window openings present a weak area in the wall, however, the stained glass is highly stiff and brittle. A large crack was observed above the door arch.

Figure 43: Crack above door arch

The 2009 condition assessment by David Steeves found the plaster walls to be significantly cracked and attributed the damage to structural movements. It is not known if the interior cracks have become worse since the 2009 inspection. As stated in the previous report, the foundation must be repaired and stabilized before repairing the plaster finishes to prevent the damage from reoccurring.

Figure 44: Mildew on west wall

Additionally, mildew was seen on the west wall, predominantly near the northwest corner. Mold and mildew favour high humidity and warm environments. Examination of the mildew indicated that it is a surface fungus, which can be treated with a commercial cleaner. Based on photos from earlier documents, the mildew does not seem to have spread since 2014 and may be dormant. It does not appear to be causing long-term structural damage, but should be cleaned before the building is occupied.

NARTHEX

The floor of the narthex was severely deflected and was found to have failed. This area could not be inspected from below at the time of inspection. There are a few steps in the narthex leading to the church nave, which also deflected when used. If the church is to be used by local vendors and artists, making some alterations to allow a ramp to the outside door and raising the narthex floor could improve

accessibility for the building. This would also facilitate bringing tables and merchandise in and out of the building.

Figure 45: Narthex floor and steps

Figure 46: Previous chimney hole in narthex ceiling

The previous hole in the ceiling for the chimney has been patched. This area is now covered in mildew. It is possible that when the chimney was removed, this area was not properly sealed against moisture.

The walls of the narthex were in poor condition. Significant cracking was seen in the plaster throughout, as well as peeling paint and mildew. The cracked plaster is due to structural movements, which have been confirmed by measuring the outwards lean of the walls. The peeling paint and mildew are caused by excessive moisture and a lack of ventilation. A ladybug infestation was also seen. Although ladybugs do not cause structural damage, they do prefer damp areas and sometimes feed on mildew.

A boarded-up window was seen in the narthex on the wall next to the furnace room access. If the lean-to is removed this window could be restored; this would provide ventilation and daylight to this area of the building.

Figure 47: Boarded up narthex window

OTHER

CHIMNEY

Overall, the chimney was found to be in poor condition. It was measured and found to be leaning outwards towards the south and east. It has many open and cracked mortar joints needing repair. As a tall slender element, the chimney is subject to structural movements. If the bricks are not secured, there is a risk that they could fall off.

Figure 48: Failed chimney flashing

Also, the flashing between the chimney and roof has failed, which can allow moisture to infiltrate and damage the roof structure. If the chimney is no longer operational, it is recommended that it be removed.

FURNACE ROOM ACCESS

The lean-to adjacent to the narthex on the south wall is in poor condition. The asphalt roof shingles are deteriorated and there is a large gap in the roof which can allow animals and moisture to get into the building and cause damage. Based on the deteriorated paint, it seems that splashing from the roof is causing accelerated weathering on the main building.

Figure 49: Deteriorated shed roof and water damage on wall

At the time of inspection, the door to the furnace room was screwed shut and the interior could not be accessed. The concrete block foundation is severely cracked and failing. The ground slopes towards this building addition, and the resulting excessive moisture can weaken mortar bonds in the concrete block foundation. The furnace room access and its block foundation appear to be detracting from the building's overall condition and appearance. Removal of this previous addition may be beneficial to the building in the long term or it may prove useful to keep it to provide an on-site storage option. In either instance full inspection of the area around the lean-to is needed to determine the impacts of either decision.

Figure 50: Cracked shed foundation

STAINED GLASS

The stained-glass windows are in fair condition but are at risk of worsening to poor condition. While the glazing did not appear to be cracked, it was significantly warped and bulging towards the middle. Additionally, cracks due to structural movements were observed in the wall around the stained-glass windows and in the frames.

Figure 51: Stained glass window

The stained glass has been sealed in with an exterior single pane window to protect it from damage. The secondary window lacks ventilation, and, as a result, when the cavity between the two windows becomes warm, the hot air is trapped due to a lack of ventilation. The heat causes the lead came between the glass panels to melt, which allows the window to slowly warp. The windows are currently stable, however if the issue is not addressed, they will continue to bulge until they break. Ventilating the space between the stained glass and the protective outer window would reduce the heat buildup between the panes, thereby preventing the lead came from softening.

The stained-glass windows embody tremendous cultural and artistic value for the building and the community. The artistic religious imagery showcases traditional craftsmanship and contributes to the heritage character of the building. While they are currently stable, these windows must be conserved and protected to prevent loss.

Figure 52: Cracked stained glass window frame

DISCUSSION

BUILDING USE

The New Maryland Heritage Committee has expressed that they intend to use the current building to showcase art and culture within the community. Additionally, the space may be leased out as a source of income for events such as weddings. The intended use case maintains the heritage of the building as a place for the community of New Maryland to gather and socialize. Opening the building to the public also allows members of the community to appreciate the cultural heritage of this historic building.

How the building will be used will ultimately impact aspects of this project. If the building is to be used year-round, or if there is a change in use, further structural and building envelope evaluation may be necessary. For this report it was assumed the future use will be similar to the prior use, and therefore no insulation will be included in the upcoming conservation work.

It is assumed that no plumbing will be installed in the building.

ACCESSIBILITY

Currently, there is a small step to enter the church, and a few steps from the narthex to the main hall. The steps are in poor condition and should be either repaired or replaced. Replacement with a ramp would make the building more accessible, but would likely have to be steeper than comfortable for walking. An alternative would be to raise the height of the entrance and rebuild a higher narthex floor structure, which may be more practical but will impact masonry repairs and site plans. Retaining the exiting stairs would make the interventions easier but will limit accessibility and make it more difficult to move objects into and out of the church. Doorways are currently sufficiently wide.

There are no washrooms on site. If washrooms are needed for an event, temporary washrooms can be used. However, these should be placed on the site of the previous parish hall or in the parking lot area.

FIRE AND LIFE SAFETY

The church is a one-storey, non-sprinklered building with heavy timber construction and combustible wood finishes. It has small enough building area (less than 150 m^2) that it does not require secondary exits or sprinklers.

Sprinklers are not required. However, they are an effective way to protect such a building from fire. Even without plumbing it is possible to provide sprinkler and alarm services to the building if desired.

SUSTAINABILITY

Adapting historic buildings for new uses is inherently more environmentally sustainable than new construction. New construction materials such as glass, steel, and concrete have a high embodied carbon cost. Embodied carbon is the carbon associated with the extraction, manufacturing, and transportation of construction materials in a building. Embodied carbon significantly contributes to greenhouse gas emissions and climate change. Adapting and reusing existing buildings, such as St Mary the Virgin Anglican Church, is essentially a form of recycling, and by rehabilitating this building, the New Maryland Heritage Association is contributing to the fight against climate change.

Furthermore, St Mary the Virgin Anglican Church is constructed from wood, a naturally occurring, renewable, local material, with no volatile organic compounds (VOC) which are harmful to humans. Currently the building is not connected to the electrical grid and does not have operational plumbing or mechanical systems. Based on the new uses, the building does not need plumbing, however heating may be necessary if the building will be used during the winter. Any interventions to the building's mechanical, plumbing, and electrical systems should aim to be energy efficient to reduce operational carbon emissions.

CONDITIONS OVERVIEW & RECOMMENDATIONS

With a good understanding of the history of the building, its value, and its future use needs, it is possible to reduce the amount of construction work required. Using more design and evaluation to reduce overall project costs requires a more detailed breakdown of what construction work is required. This table provides an overview of condition assessment findings with regards to the building area, and the following recommendations section looks at specific steps to be taken:

Component	Condition	Observations
Site	Fair	Localized areas with poor drainage, gravestones may impede exterior construction interventions
Foundation	Poor	Several collapsed areas, cracked throughout, incompatible repointing with cement-based mortar evident. Lower foundation walls found in good condition.
Roof	Poor	Metal roof near end of service life, no moisture issues observed in interior, however conditions are expected to deteriorate quickly soon. Structure in fair condition with some spreading.
Bell Tower	Fair	Viewed from ground, some flashing that has fallen off and must be replaced, minor interventions would improve appearance
Chancel Arch	Fair	Significant structural movement, mechanical damages such as cracking and splitting observed
Walls	Fair	Evidence of structural movements and joint separation, in need of repainting to protect wood and improve appearance

Floor	Fair	Only viewed from above, appears sound based on past performance, tiles may contain asbestos
Chimney	Poor	Open mortar joints, leaning outwards
Furnace Room Access	Poor	Bad drainage, opening in roof, deteriorated shingles, cracked foundation. Assumed interior issues could not be viewed.
Narthex	Fair	Needs ventilation to prevent mildew, floor failed, significant cracking and structural movements
Stained Glass	Fair	Stable, but will continue to warp and may become damaged if not properly vented

The following summary outlines what interventions should be undertaken for each area of the building. The recommendations have been prioritized based on the urgency of the required repairs.

HIGH PRIORITY RECOMMENDATIONS

The following interventions have been identified as high priority interventions to stabilize the building. These interventions are time-sensitive; the longer it takes to implement them, the worse the problems will become. If these issues are not addressed, they can cause significant damage to the building.

The following recommendations must be undertaken before the building is used:

Recommendation 1. Improve Site Drainage

a. Improve site drainage by creating a swale roughly 1m (3 to 4 ft) away from the building

   i. Based on ground slope, the swale should direct water towards the road or an area with adequate ground infiltration rates to accommodate water.

   ii. Drainage is the highest priority because foundation repairs will not be successful if the drainage is inadequate.

b. It may be possible to combine this under the same contract as foundation repairs.

Recommendation 2. Foundation Repair

a. Foundation repairs will require a skilled craftsperson who has experience with historic stone masonry techniques and materials. Process will require design collaboration and should be undertaken using an integrated design approach with the mason working closely with the design team.

b. Foundation repairs to be conducted on one wall at a time. The process may proceed from the strongest wall to the weakest, in offset sections, or from the weakest to the

strongest depending upon site meetings with mason and engineers. Each approach had advantages and disadvantages depending upon project setup.

c. Repair in place should aim to avoid extensive excavation. Excavating the initial 200 to 300 mm is to be anticipated.

d. Repairs required will likely include a range of techniques, including local rebuilding, deep pointing, crack stitching, tying to the wall core, tamp pointing and repointing.

e. Mortar and new stones must be compatible with existing stones in terms of porosity, strength, and stiffness. The mortar is to be sacrificial, and testing of existing bedding mortar and stones should be part of the repair process.

f. Additional inspection will be undertaken in initial meetings with the mason as part of the masonry project. This would include reviewing the structure from inside the furnace room (inaccessible at the time of this site visit). Additional information on the floor structure and the concrete block to wood structure interface would be available from this visit. It is also anticipated that the best access to the basement crawlspace will be through this space.

g. Restore the door sill at the south entrance to the original stone sill set higher in the opening.

h. If desired the historic brick outer wythe may be restored once the masonry repairs are completed. The client should advise if this is a priority.

Recommendation 3. Wall Stabilization

a. New steel tension ties should be installed at the base of each of the trusses to reduce outwards movement.

b. The separated joints in the sill beam and braces should be pulled and pushed back together. The tension ties and necessary foundation work should encourage this. Site review would discuss and direct during progress.

Recommendation 4. Chancel Arch Repair

a. Two new steel tension ties should be installed at the base of the arch to reduce outwards movement at the top of the walls.

b. Collaborate with master carpenter with training with historic wood joinery.

Recommendation 5. Roof Replacement

a. Replace failed metal roof with appropriate material such as:

a. Stamped metal roof to match current material. It will be difficult to find matching singles, so this will likely have the highest cost.

b. Re-shingle roof with cedar shingles. This should be designed and inspected throughout the construction process.

c. New metal roof. Different metal roofs have different advantages and disadvantages. For the church it would be suggested to use a concealed fastener system selected to have greater than 50-year life expectancy. This should be designed and inspected through the construction process.

b. Remove more recent brick chimney. This chimney no longer serves a function, has deteriorated, and once removed will make roofing repairs simpler.

MEDIUM PRIORITY RECOMMENDATIONS

Following the completion of the high priority recommendations, some design decisions must be made to determine the next steps in the rehabilitation project. These decisions will be based on the findings during phase one. The New Maryland Heritage Association should base these decisions on their specific needs for the building. The following medium priority recommendations would benefit from discussion and further direction to align with site plans.

Recommendation 6. Hazardous Material testing

Due to the buildings history there may be encapsulated lead or asbestos in paint or tiles respectively. These do not pose a current hazard, but when work is undertaken it may disturb the materials. Testing before undertaking work is recommended practice.

Recommendation 7. Exterior Painting

a. Exterior walls are to be repainted using a compatible paint. Use of a traditional linseed oil paint would have a higher initial cost and different application than more commonly used exterior paints, but will provide a longer life than latex paints.

b. Some notes should be provided directing how to effectively undertake painting.

Recommendation 8. Furnace Room and Chimney

The New Maryland Heritage Association must determine if the furnace room or the chimney should remain. The upper chimney is to be removed with roofing. As the chimney no longer serves a functional purpose the remainder should also be removed. Even if unused the furnace room could provide some storage space. Interventions should be designed to separate the concrete block wall from creating stress concentrations into the surrounding structural system.

Recommendation 9. Accessibility Requirements

The New Maryland Heritage Association must evaluate their specific accessibility needs for the building. While the National Building Code outlines accessibility requirements, alternate solutions may be required to overcome the unique challenges seen in this historic building.

LOW PRIORITY RECOMMENDATIONS

The following recommendations are designated as low priority. These interventions have no bearing on the structure but will improve the appearance by restoring some of the historic elements which contribute to the building's character. These interventions may be planned as the funding becomes available.

Recommendation 10. Interior Walls

a. Clean, repair and repaint (with compatible paint) interior walls.

Recommendation 11. Stained Glass Preservation

a. Ventilate the space between the stained glass and the protective window.

b. Repair or restore cracked wood frames.

Recommendation 12. Bell Tower Restoration

a. Remove metal roofing material from bell tower sides.

b. Move the metal mesh to keep birds out from in front of to behind arch frame.

c. Restore missing roof flashing.

Recommendation 13. Restore West Gable Cross

a. Clean and repair wooden cross.

b. Secure to roof.

Recommendation 14. Chain Link Fence

a. Remove chain link fence to improve curb appeal. Install new fence compatible with building character.

Recommendation 15. Restore Sign

a. Create a new sign for the rehabilitated building and install it on the west wall below the decorate trim where the prior sign hung.

COST ESTIMATE & PLANNING

The rough order of magnitude (ROM) estimated total cost for the stabilization and rehabilitation is between $ 55,000 and $ 110,000. These costs have been estimated based on market prices for materials

and labor and represent a rough order of magnitude cost for the restoration of the church. Actual labour or material costs may differ as availability of the best contractors and situations will change actual cost. Design fees and a 30% contingency fee have also been included in the total cost. ROM costs estimated are assumed to be +/- 75%.

PHASE 1: STRUCTURAL STABILIZATION

The first phase of the rehabilitation of St Mary the Virgin Anglican Church will address the necessary structural repairs to ensure the building's longevity. The rough order of magnitude cost for the phase one stabilization is $36,350.

Intervention	ROM Cost
Site Drainage	$ 2,000
Foundation Repair	$ 35,000
Wall Repair	$ 2,000
Chancel Arch Repair	$ 500
Total Repair	$ 39,500
Design Fees	$ 6,000
Contingency	$ 8,500
Total (before tax)	$ 54,000

PHASE 2: REHABILITATION

Prior to the Phase 2 - Rehabilitation, the New Maryland Heritage Association must make some design decisions. Phase 2 will also be based on further inspection of the furnace room and floor structure and the hazardous material testing results.

The Phase 2 costs have been divided into necessary and optional costs. The necessary costs must be undertaken to preserve the building; the optional costs pertain to the building's appearance. The Phase 2 cost is estimated to range between $18,500 and $68,050 + depending on the extent of the rehabilitation. Items which have both necessary ROM costs and optional costs represent more than one possible approach. These either involve additional services that are not required or a trade-off to invest more now to save on future expenses.

Intervention	Necessary ROM Cost	Optional ROM Cost
Roof	$ 5,000	$ 5,500
Exterior Painting	$ 4,000	$ 4,000
Bell Tower Restoration*		$ 5,000

Chimney*	$ 1,000	$ 2,000
Furnace Room		TBD
Floor Repair	$ 1,500	$ 5,000
Accessibility		$ 200
Stained Glass Preservation	$ 500	$ 5,000
Interior Walls		$ 1,000
Appearance		
General Wood restoration		$ 5,000
*Restore West Gable Cross**		$ 1,200
Restore Brick Outer Wythe		$ 5,000
Restore West Gable Sign		$ 750
Replace Chain Link Fence		$ 5,000
Total Repair	$ 12,000	$ 44,650 +
Design Fees	$ 2,500	$ 10,000 +
Contingency	$ 4,000	$ 13,400 +
Total (before taxes)	$18,500	$ 68,050 +

* Items that may require a lift, costs assume they are done together.

Based upon our experience with New Brunswick projects, we foresee that these estimates will depend upon finding the right contractor. This should not be confused with the lowest price contractor, si+nce some are inefficient and create additional costs due to their processes. There tends to be significant price variation among projects of the same scope of work, with the highest priced contractors charging as much as three times the lowest.

CONCLUSIONS

Conservation work for a building such as St Mary the Virgin Anglican Church is best seen as a partnership between the owner, the design team, and the skilled artisans doing the work. Best results will follow from undertaking the project with the understanding that there will be necessary modifications during the process and that there must be good communication between groups to address issues when they arise.

This plan is designed to be achievable, and if challenges arise in execution of the plan it should be revisited and revised as required. Some repairs are more important than others and if repairs must be deferred there should be a review to ensure the proper items are delayed. This plan should be a living document during its use, changing to reflect accomplishments and reality.

St Mary the Virgin Anglican Church is a unique building providing a physical link to our past and a real asset as the community moves into the future. The long history of the building and its importance

to the community should not be underestimated as aspects of what makes New Maryland a better and more vibrant place to live.

The next steps (not including raising funds) for the conservation of this unique and valuable building will be assembling a team of craftsmen and consultants. We would be happy to assist in identifying potential team members from which to discuss and then provide designs.

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