# PAINTER-LEWIS, P.L.C.

CONSULTING ENGINEERS
817 Cedar Creek Grade, Suite 120
Winchester, Virginia 22601

Tel.: Fax.: (540) 662-5792 (540) 662-5793

July 24, 2015

Ms. Martha Mason Semmes Town Administrator Town of Middleburg, Virginia P. O. Box 187 Middleburg, Virginia 20118

Re: Asbury Church 105 North Jay Street Middleburg, Virginia Structural Evaluation

#### Dear Ms. Semmes:

Pursuant to your request, extensive general visual inspections of the existing structural systems were done, during two site visits, to determine the general condition of the church; and if, the structural integrity of the components and systems have been compromised. Additionally, based on these inspections and the subsequent findings, recommendations will be made to stabilize and protect this structure, if needed, for short term preservation of the building.

The following is a summary of the observations and determinations made during the inspection:

## **General Description:**

- This structure is known as Asbury Church and is located at 105 North Jay Street in the Town of Middleburg, Virginia. It is my understanding that this church was constructed around the 1829 time period and the building is currently vacant and not in use. This building is generally a rectangular, one story structure with a standard gable-style roofing system. A small rectangular projection has been constructed on the eastern, gable end of the building that formed the rear of the pulpit area. The roofing system consisting of 2.25"x5.75" rough-cut rafters and 2"x8.5" rough-cut ceiling joists spaced at approximately 26" on center (o.c.) with a standing seam metal roof. There appears to be intermediate roof beams which effectively break the length of the rafter spans that are supported by interior timber frames. The exterior, perimeter wall systems consist of a 22"-26" mortared stone wall section that has been pargetted on the outside faces and plastered on the interior to serve as the finished surfaces. The foundation wall system is a continuation of the stone wall section and extends below grade to solid soil bearing.

- An upper level balcony area surrounds the main sanctuary area. The balcony floor system consists of 1.75"x8.5" rough-cut floor joists spaced at approximately 24" o.c. This floor system is supported by the exterior stone walls and an interior perimeter beam and column system consisting of 6"x10" rough-cut timber beams and eight inch (8") diameter wood columns milled to approximately six inches (6") for aesthetic purposes. These columns bear on interior stone foundation walls below the first floor diaphragm. The first floor diaphragm consists of 8"-9" diameter logs spaced at approximately 26" on center. A crawl space area exists below the main level that is approximately 36" in depth. The area is broken into sections with the installation of the interior stone foundation support walls. A small cellar area has been excavated on the eastern end of the foundation system to house the heating system equipment. Small concrete masonry unit (CMU) foundation walls were constructed to support the crawl space soil backfill on the western and eastern sides of this cellar area. The southern side provides access through a shortened 36" wide exterior door. The northern side is open and the crawl space soil floor was sloped to the soil cellar floor, so that no wall was constructed on that side.
- The perimeter yard areas are gently sloping and typically graded to promote positive drainage away from the structure. The yard area generally drains from west to east in a southeasterly direction. The door to the cellar is on the southeastern side wall to the southern end of the foundation system. There is no evidence that a foundation drainage has been constructed around this structure. Some concrete washes had been installed previously to help divert the water away from the stone foundation but most of these are deteriorated and do not serve their intended function. Previously, vegetation had grown onto and up some portions of the exterior wall system. Most has since been removed but there is currently new growth which is adhering to the portions of the exterior walls. A partial guttering system has been installed on the northern side of the roofing system, only; and no downspouts or piping system is currently installed around this building to convey the roof storm water away from the foundation. This results in the contributing storm water runoff being conveyed away from the church via sheet flow only.

### **Visual Inspection:**

### 1. Observations:

#### - Limitations:

- The church was open and generally accessible. The roof and some of the floor systems structural elements were exposed and could be verified. Areas of the stone walls provided some points of observation of this wall section but not all of the pertinent areas could be observed without destructive testing to remove the finishes. The steeple area has been enclosed with plywood sheathing and was not observed; and therefore, is not part of the scope of this investigation. No load tests, soil tests, nor excavation of the backfill were done as part of these inspections; and therefore, the inspection was limited to the visual review and verification of the existing structural components, only. The observations and opinions expressed herein are therefore limited to the general, cursory review of this church structure, only.

### - Roofing System:

- The roofing system consists of a standing seam metal roof that is installed onto variable width 1"x wood skipped sheathing. The structural system appears relatively sound and functioning satisfactorily. There are areas of deterioration and water damage that should be corrected, but generally the wood structure appears relatively sound. No structural analyses were done of this system or the individual structural components as part of this scope of work. Prior to further occupancy, it is recommended that this system be fully analyzed and reinforced for future use. At this phase,

the damaged elements should be reinforced and the water infiltration should be eliminated to ensure that the structural integrity of this system is maintained until a future use is determined.

- As stated, the roofing system is a standing seam metal roofing system. There are many areas of deterioration and rust that were observed throughout this system. Additionally, there are "pinholes" throughout this roofing system, as well. Exterior light could be seen through very small punctures in the metal roofing at multiple locations. Approximately 12" eaves exist on the sides of this roofing system which project beyond the side perimeter walls. This helps to convey the roof water away from the main side walls and roofing structure; but, there is extensive deterioration in these eaves and severe water infiltration is evident. No eaves or even small roof extensions exist on the gable ends that would help to protect the gable end walls. Water infiltration is occurring along the roof and wall interface resulting in damage to the structural systems on these gable ends. The lack of a proper gutter and downspout system is contributing to the water infiltration and resulting damage, as well. This must be corrected as part of the stabilization phase of this building so further deterioration does not continue.

## - Balcony Floor System:

- This former church structure has a U-shaped balcony around what was the sanctuary area of the building. As stated previously, the balcony floor joists consist of 1.75"x8.5" rough-cut floor joists spaced at approximately 24" o.c. The sheathing consists of 1"x variable width wood floor boards. This floor system is supported by the exterior stone walls and an interior perimeter beam and column system. The wood beams consist of 6"x10" rough-cut timbers that are supported by the approximately eight inch (8") diameter wood columns which have been milled to six inches (6") at various segments throughout the column lengths. There were several areas of this balcony floor system that were subjected to water infiltration. Areas where the wood sheathing and joists had been damaged, were now exposed, which permitted some limited observation to these structural components. Other than the areas where water infiltration has damaged the floor system elements, the floor joists appeared relatively sound. Similarly, the wood flooring was in satisfactory condition and there were no significant separations between the floor boards. The areas subjected to water infiltration show evidence of rot and deterioration of the wood elements and a subsequent reduction in their respective cross-sections. Typically, the damage occurred in the areas where no flashing or protection against the elements existed, such as around the chimneys and under the windows units. The water infiltration must be addressed and then the damaged elements can be repaired, reinforced, or removed and replaced, as needed. This water infiltration has resulted in damage and deterioration of the masonry chimney structures, as well.

# - Main Level Floor System:

- The first floor diaphragm consists of 8"-9" diameter logs spaced at approximately 26" on center. The sheathing appears to be 1"x variable width floor boards similar to what was observed in the balcony area. This sheathing has been covered with a uniform, more modern, 1"x finished wood flooring that serves as the wearing surface of the main level.
- A crawl space area exists below the main level that is approximately 36" in depth at the location of the access hatch. Not all of the crawl space could be observed, but it appears that this area is broken into sections by the installation of the interior stone foundation support walls. These walls align with the spacing of the interior balcony columns and provide support for the log floor joists and the interior columns. As stated, these interior columns frame the balcony floor system and provide support of the intermediate roof beams, as described above. The finish flooring layer has been installed around the columns; but it appears that these columns rest on or penetrate the main level floor system and bear on the interior stone foundation walls. The condition of these

walls could not be verified, but the floor system appears relatively sound and there is not evidence of undue movement or stress in the beam and column system. Some splitting and checking was observed in the interior columns which is typically found in these elements in this application. This condition does not appear to have compromised the structural integrity of these members and therefore they are satisfactory for continued use.

- Similar to the balcony system, there is some deterioration of the log joists where exposure to the elements exist. Additionally, the logs could be observed in the cellar area at the southeastern end of the building. These joists show some damage due to pest infestation and moisture. Not all of the joists could be observed, but it is recommended that prior to future occupancy, this floor system should be analyzed to determine its structural capacity and additional investigations should be made. For the stabilization phase of this project, these elements appear to be sound enough so that immediate reinforcement is not necessary.

## - Perimeter & Foundation Wall System:

- The foundation and perimeter, exterior wall systems of this structure consist of a rubble stone masonry wall section that ranges between 22" and 26" in thickness with partially mortared joints. The mortar appears to be a combination of cementitious and dirt mortar joints which were typically used during this era. No excavation was done to determine the existence of a footing structure; however, based on the age of the structure and the type of construction, it has been assumed that the footing structure consists of dry-stacked stone fill in an excavated ditchline that serves as the base structure of the wall. The walls are constructed integrally with and onto this stone rubble foundation to the roof line of this building. The exterior finish consists of a white stucco surface that is applied directly to the exterior stone wall face. The interior face of the stone wall has been finished with pargetting, or a plaster finish.
- At the time of this inspection, the exterior wall system was found to be reasonably square and plumb. Portions of the stucco finish were missing at various locations around the building. There was some cracking observed in the stucco finish and small portions of the base wall stone and mortar were visible and able to be observed. A portion of the northern and southern walls and a majority of the eastern wall had remnants of old vegetation that were dried and still adhering to the stucco finish. The northern and eastern walls had some new vegetative growth on them, as well. The eastern wall had two areas where the stucco finish was buckled and had pulled away from the wall. This may have been caused by movement in the base wall components where the stones and mortar had separated and shifted. At multiple window locations, the stucco was missing from around the window openings, cracking had developed above and around the windows, and the wood lintels had been exposed above the windows. In most cases, the wood lintels exhibited severe damage due to water infiltration, pest infestation, and were deteriorated such that they were not functioning properly.
- As stated previously, this former church was built on a crawl space foundation system with a depth of approximately 36". It appears that intermediate stone cross walls were constructed to support the floor and roof systems. The crawl space has not been vented and no vapor barrier has been installed on the soil subgrade. A small cellar area has been excavated on the eastern end of the crawl space foundation system to house the heating system equipment. Small CMU foundation walls were constructed to support the crawl space stone walls and the soil backfill on the western and eastern sides of this cellar area. The southern side wall provides the access to the cellar by a shortened 36" wide exterior door. The northern, interior side of the cellar area is open and the crawl space soil floor has been sloped to the soil cellar floor. No wall has been constructed on that side. This area is very damp and mud was observed on the cellar floor at the time of these inspections. The CMU walls appear to be marginal at best to support soil subgrade and

surcharge pressure of the superstructure of the church. There were loose and missing stones in the interior crawl space walls; and large chase openings had been made to permit ducts and service utilities to penetrate the walls.

- Generally, the perimeter stone wall system appeared to be sound and suitable to serve as the exterior structural wall systems for this building. As with other areas of this structure, there was evidence of water infiltration into the perimeter wall and foundation wall systems. Some of the exterior stucco finish was missing, cracking has developed, and there was some spalling of the plaster and loose mortar joints. Efflorescence (the deposit of a white powder on the surface of brick and concrete masonry units (CMU) due to soluble salts in the mortar or brick being drawn to the surface by moisture) was observed to a very limited degree, as well.

# -Exterior: Finished Grading

- The finished grading, around this foundation wall system, has been performed to provide an adequate gradient to prevent ponding and promote positive drainage away from the foundation wall system. Generally, the slope ensures that the storm water runoff will flow from the northwest corner to the southeastern corner of the building and away from the perimeter wall in an easterly direction. The degree of sloping in this area ensures that the water will discharge away from the structure to minimize the adverse effects of infiltration into and along the foundation wall system. The only area that needs to be addressed is the area in front of and adjacent to the cellar area access door.
- As stated, there is no evidence that a foundation drainage system has been constructed around this structure. The concrete washes that had been installed to help divert the water away from the stone foundation have deteriorated and do not serve their intended function. A functional gutter and downspout system needs to be installed to ensure that the roof storm water is conveyed away from the structure. Adequate drainage and the gutter and downspout systems are important to the general maintenance of a structure. These systems ensure that the potential adverse effects of water infiltration and hydrostatic pressure are minimized.

#### 2. Conclusions:

- The structural systems of this assembly use appear to be in relatively good condition with the exception of the damaged elements due to water infiltration. The structural elements used to construct this building may be inadequate for use by the applicable building codes in place today; however, this structure has history on its side. The primary use of this structure was as an assembly use for church services and related activities and events. So by using the historical allowances permitted by the current building codes, there will be some flexibility with the requirements for the future use.
- The roofing system is in need of substantial repairs. There are no eaves on the gable ends and the side wall eaves are severely deteriorated. Water infiltration along the gable ends and through the eaves is clearly evident and must be addressed immediately to ensure that no additional damage occurs to the structural components and systems. It is recommended that at a minimum, the roofing system should be fully covered or repaired to prevent any further water infiltration. A roofing contractor should be contacted to fully review this system and to make recommendations for its temporary repairs. At the future phase of the complete renovation for a specific use, the structural elements must be repaired, reinforced, and extended, as needed, to ensure that the roofing system will function properly. Additionally, a new standing seam metal roofing system should be installed at that time.
- There is evidence of substantial water infiltration in and around the existing windows. The wood lintels are deteriorated from pest infestation, water damage, and exposure to the elements.

The exterior stucco finish and the interior pargetting is cracked and portions are missing in many locations due to water infiltration. At this time, the windows should be boarded shut and properly flashed to prevent any further water infiltration and damage to the surrounding structural elements. At the time of the full renovation of this building, the windows should be removed, repaired, and properly reinstalled; or new windows should be installed to replace the existing ones. New lintels, proper frame work, and the necessary flashing can be installed during the future restoration phase of construction.

- The stone walls are relatively sound and should be functional for continued use with the appropriate repairs, reinforcements, and general maintenance. The building is reasonably square and plumb and there are no indications of undue movements or stress in the wall systems. The only areas that are questionable are the ones that have been subjected to continual water infiltration. For stabilization, the water infiltration concerns must be eliminated and the damaged areas should be repaired. For future use and after the water infiltration concerns are addressed, the walls can be pointed and repaired, as needed; and the stucco can be repaired to preserve the historic nature of the building and to serve as the exterior finish system. The pargetted interior finishes can be repaired, as well, provided the structural components are properly repaired and water infiltration no longer exists. The areas around the windows must be addressed, as stated above, and will require special attention to ensure that no water can penetrate the wall system at these locations.
- The floor systems appear sound and only the damaged members need to be repaired or reinforced at this time. There was damage, due to moisture and pest infestation, observed in the logs in the cellar area. A pest control specialist should examine this building and eliminate any infestation if still present; and make recommendations for the continued pest control maintenance around this structure. The logs should be examined more closely to determine if any repairs, reinforcement, or replacement is warranted at this time. For future use, it is recommended that a complete documentation of these elements and systems be performed which may include the need for some destructive testing. A compete analysis should be done based on the proposed use and then, the member and system repair designs can be prepared accordingly at that time.
- Other than the water infiltration observed throughout this building, the cellar area is of the most concern. Water is flowing into this area, as indicated by the mud on the soil subgrade and the erosion observed on the sloped portions of the crawl space subgrade. The interior CMU walls do not appear to be adequate for this use and there are several areas where the stone walls need extensive repairs and reinforcement. During the stabilization phase of the restoration of this building, the cellar should be addressed completely to ensure that no further damage occurs in this area. A complete documentation and analysis of the wall systems should be done and the walls should be reinforced accordingly. The logs should be adequately reinforced, if needed, and properly supported for current and future use. The door into the space should be removed and replaced with a functional unit that provides entry into the space and keeps water out. If this area is intended to continue to be used for a utility room, then the existing equipment should be removed, repaired, and replaced, as needed; and a concrete floor slab should be designed and installed prior to the reinstallation of this heating system.
- Generally, the grading around the foundation system seems to promote positive drainage away from the structure. The exception is at the cellar doorway area. It is difficult to access the cellar area because sedimentation, vegetation, and improper grading prevents the door from opening fully. The immediate access to the door is not wide enough and the grading slopes toward the door, as well. An underground tank is located directly east of the doorway which has adversely affected the grading in this area. It is assumed that this is the fuel tank for the heating equipment. This area needs to be regraded to provide proper access to the cellar area and to promote positive drainage away from the door and wall structure. This may result in the necessity to relocate the

underground tank. This should be done immediately as part of the stabilization phase of this building.

This is a historic structure that offers a lot of promise. Lack of general maintenance and neglect have resulted in the undue deterioration of the structural systems that needs to be addressed; however, it is still relatively sound and certainly worthy of preservation. If done properly, this structure could service the needs of the Town of Middleburg, Virginia for a long time to come. The restoration analyses and design should be based on the actual future use or the most extensive future use that may be considered for this building.

Please be advised that this report is based upon the general visual inspection of the structural elements and systems, only, and is therefore limited thereto. No certification or warranty either expressed or implied is hereby made for the existing construction, construction materials, or the design of the structural components. The information contained in this report is limited due to the inability to observe the complete structure and the lack of testing performed. Additional investigations and analyses will be necessary to ensure that the repair or reinforcement of these structural components and systems will serve their intended purpose and the future use of this building. It would be best to perform these supplemental investigations at the time when a determination has been made regarding its future use. Please note that this report has been provided for the informational purposes of the client only.

Thank you for the opportunity to work on this project. If you would have any questions or would require any further study or information, please do not hesitate to contact me.

Sincerely,

TIMOTHY G. PAINTER Lic. No. 018260

Timothy G. Painter, P. E

**Enclosures:** 

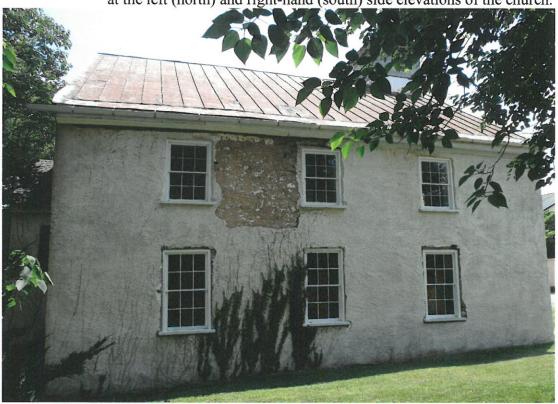
Pictures #1 - #3: Exterior: Pictures showing the exterior finishes and an overview of the conditions at the front (western) and rear (eastern) elevations of the church.







Pictures #4 - #5: Exterior: Pictures showing the exterior finishes and overview of conditions at the left (north) and right-hand (south) side elevations of the church.



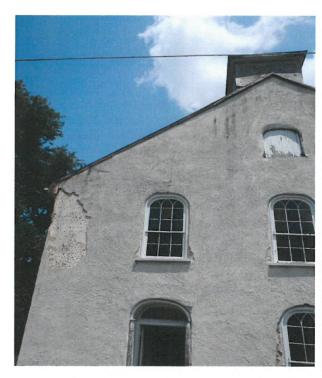


**Pictures #6 - #8:** Exterior: Pictures showing the exterior finishes and overview of the conditions along the walls of the church.





**Pictures #9 - #12:** Exterior: Pictures showing some typical areas of water infiltration that were noted around the elevations of this church.









**Pictures #13 - #16:** Exterior: Pictures showing some typical areas of water infiltration that were noted around the elevations of this church.



Pictures #17- #20: Interior: Pictures showing the roof system of the church.



Pictures #21- #23: Interior: Pictures showing the balcony system of the church.







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Pictures #24- #27: Interior: Pictures showing the water damage in the balcony area.



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Pictures #28- #30: Interior: Pictures showing the first floor area of the church.





Pictures #31- #34: Interior: Pictures showing water damage in the first floor level area.







**Pictures #35- #38:** Interior: Pictures showing the cellar area of the church.



Pictures #39- #42: Interior: Pictures showing the cellar area of the church.



**Existing Layout Plans:** 

TOWN OF MIDDLEBURG, VIRGINIA PROJECT: P. O. BOX 187 ASBURY CHURCH MIDDLEBURG, VIRGINIA 20118 105 NORTH JAY STREET (540) 687-5152 MIDDLEBURG, VIRGINIA EX. PERIMETER STONE FOUNDATION WALLS  $5'-5\frac{1}{2}"$ EX. PERIMETER STONE FOUNDATION WALLS EX. CELLAR AREA EX. CELLAR DOOR FOUNDATION STONE FOUNDATION WALLS EX. INTERIOR STONE FOUNDATION WALLS 40'-4" STONE EX. CRAWL SPACE PERIMETER PERIMETER EX. INTERIOR STONE FOUNDATION WALLS EX. CRAWL SPACE EX. PERIMETER STONE FOUNDATION WALLS -35'-3<sup>1</sup>"-NOTE: ALL DIMENSIONS ARE APPROXIMATE AND FOR GENERAL REFERENCE ONLY FOUNDATION PLAN

817 CEDAR CREEK GRADE, SUITE 120 WINCHESTER, VIRGINIA 22601 (540) 662-5792

Consulting Engineers

PAINTER-LEWIS, P.L.C.

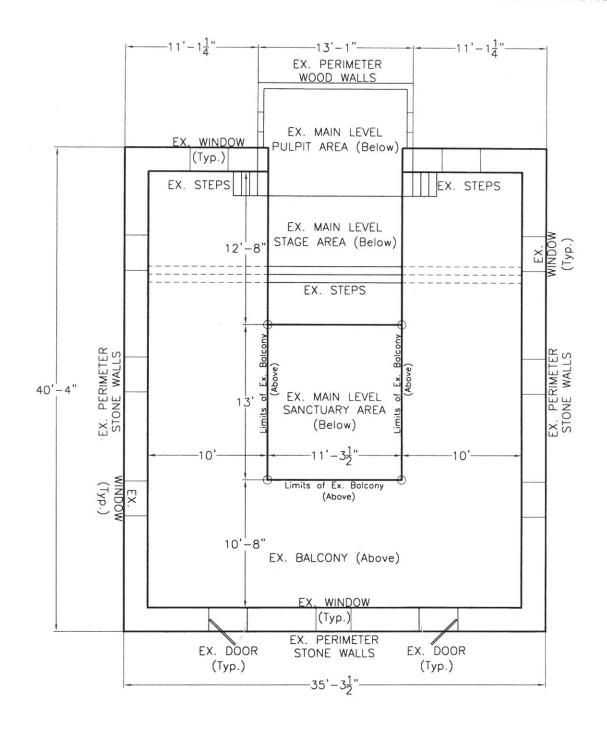
DATE: 07-23-15

SCALE: 1/8"=1'-0"

P-L, PLC NO.: 1505001

TOWN OF MIDDLEBURG, VIRGINIA P. O. BOX 187 MIDDLEBURG, VIRGINIA 20118 (540) 687-5152

PROJECT: ASBURY CHURCH 105 NORTH JAY STREET MIDDLEBURG, VIRGINIA



NOTE: ALL DIMENSIONS ARE APPROXIMATE AND FOR GENERAL REFERENCE ONLY

### MAIN LEVEL & BALCONY PLAN

PAINTER-LEWIS, P.L.C. 817 CEDAR CREEK GRADE, SUITE 120

Consulting Engineers

WINCHESTER, VIRGINIA 22601 (540) 662-5792

07 - 23 - 15DATE:

SCALE: 1/8"=1'-0"

PLATE: PLAN-2

P-L, PLC No.: 1505001