EQUESTRIAN BARN AT AVENEL
CONDITION ASSESSMENT REPORT

Potomac, Maryland

June 2024

GANNETT FLEMING PROJECT NO.: 068805 Task 14 | WSSC JOB NO. 63203316A

Prepared for:
WSSC Water

GANNETT FLEMING

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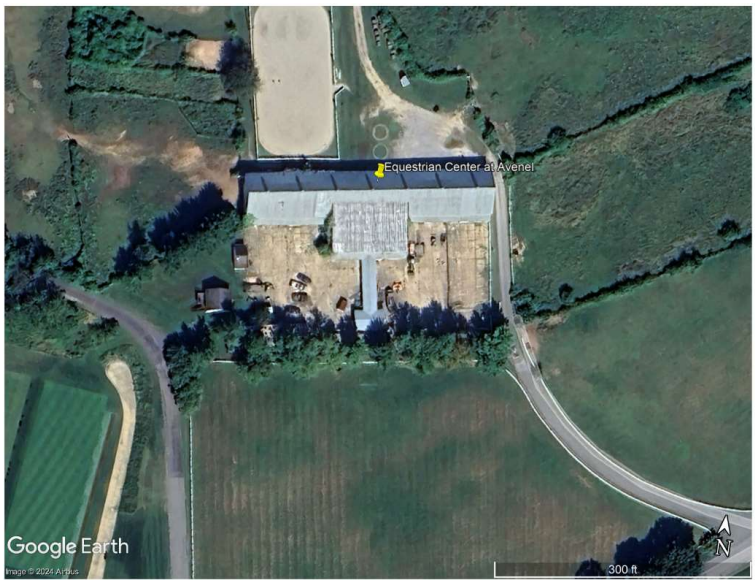
EXECUTIVE SYNOPSIS

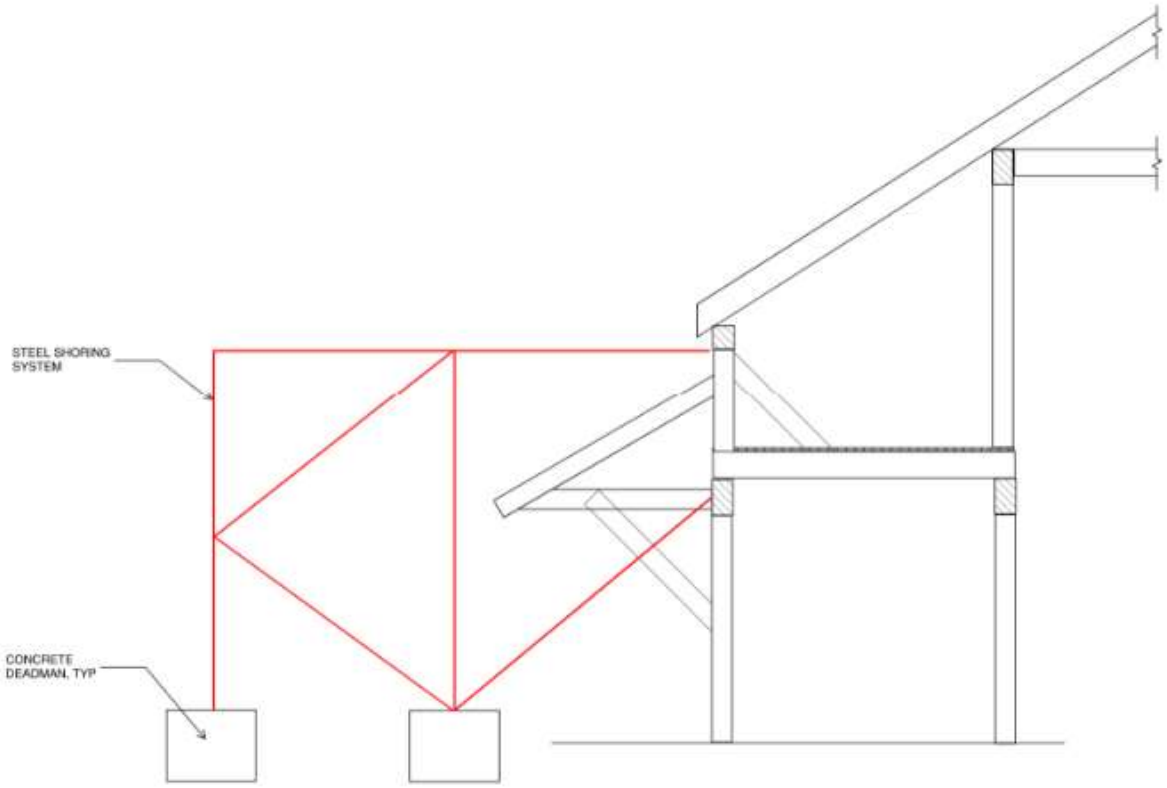
The existing Equestrian Center at Avenel (barn) was inspected by Gannett Fleming (GF) during the January-February 2024 timeframe. The project's scope was to perform a condition assessment of the barn structure, provide conceptual repair details and an Engineer's Opinion of probable costs for the conceptual repairs for bringing the barn to a usable condition. As a result of the condition assessment, the barn was found to be in an unsafe condition. The southwest corner of the barn showed significant structural deterioration. GF alerted WSSC as soon as the unsafe locations were observed. The inspection team recommended the Barn Manager move the horses from the barn. The barn leans to the south between 3 and 7 degrees. Age, water damage and vegetation infiltration have compromised the barn.



ES Figure 1 – Google Earth Image of Barn

The barn should be braced and shored to prevent further movement; work that would need to be done before any repairs could be undertaken. Many areas of the barn are structurally compromised but the southwest corner of the barn was noted to have significant structural deterioration, which prompted the inspection team to move the Barn Manager's horses and eventually recommend restricting access to the barn. The roof system and facade deterioration and openings/windows/doors allow infiltration from rainwater, which has continued to aid in the barn structure's deterioration. Retrofits to the barn have been made over the past 75+ years, some of which are sound and some of which need to be replaced. The existing lateral support system of the barn is compromised and requires significant repair. Construction repairs would require careful sequencing to provide structural stability to the barn during and after construction activities.

The barn would not be plumb or level after renovations. Permanent exterior steel frames to brace the barn must be installed at each column line location on the north and south faces of the barn, which could restrict vehicular traffic flow around it. The permanent exterior steel frames would create a visual impact to the existing barn. A concept for the bracing system is shown below in ES Figure 2 (REF Detail 1: Building Shoring/Bracing Appendix E)



ES Figure 2 – Conceptual Exterior Building Bracing Scheme (cross section)

Permanent interior cable ties would need to be installed in the hayloft to prevent the barn from separating under roof thrust loads.

Three levels of repair are used in conjunction with the barn's condition assessment: Repairs necessary for occupancy, Intermediate, and Aesthetic.

Repairs necessary for occupancy: The interior barn renovations would require temporary shoring for all hayloft and roof members and a temporary work platform on the hayloft level. Interior structural repairs include roof rafter repair and replacement; roof beam repair and replacement; roof purlin repair and replacement; hayloft bracing repair and replacement;

hayloft column repair and replacement; hayloft flooring repair and replacement, hayloft beam repair and replacement, hayloft stringer repair and replacement; ground floor column repair and replacement; roof replacement; façade replacement, and repair of the existing electrical panel board.

Intermediate Repairs: Windows and doors replacement, additional structural non-urgent repairs, and electrical lighting modifications.

Aesthetic Repairs: Minor structural repairs, masonry repairs and floor slab repairs.

The Opinion of Probable Cost for the above repairs to the shell of the building as provided by Gannett Fleming internal cost estimators is $5.6M. The Opinion of Probable Cost for this project is a cost estimate to facilitate budgetary or feasibility determinations.

Equestrian Barn at Avenel Repair – Opinion of Probable Cost - Summary

Repairs	**Cost**
Repairs necessary for occupancy	$4.7M
Intermediate	$510K
Aesthetic	$30K
TOTAL Construction Cost (based on OPC)	**$5.3M**
Engineering/Architectural Fee (high level, estimate based on noted repairs)	$300K
Estimated Yearly Engineering Review Cost (after construction is complete)	$10K (1)
TOTAL Project Cost	**$5.6M**

(1) Total project does not include yearly engineering review costs, any new repairs or replacements or ongoing maintenance costs.
(2) The Opinion of Probable Cost does NOT include interior repairs to the stalls, interior cabinets, or floor; upgrades; or repair/modification of barn appurtenances.
(3) ES Figure 3 is a summary of the Opinion of Probable Cost shown in Appendix C
(4) OPC developed based on April 2024 Cost Data. No inflation factors for future work are included.

The barn is in an unsafe condition and would require significant repairs to maintain operations.

EXECUTIVE SUMMARY

Gannett Fleming, Inc (GF) was contracted by the Washington Suburban Sanitary Commission (WSSC Water) to provide a condition assessment, development of conceptual repair details and Engineer's Opinion of probable cost for the repairs for the barn structure at the Avenel Equestrian Center in Potomac, Maryland. The repair details developed are not for construction of the repairs but for determining the cost of the repairs. Additional engineering work will be required to develop detailed drawings for the repair construction. The existing barn was noted to have significant deterioration. The southwest corner was deemed unsafe. The horses were removed from the barn and a protection fence was installed around the barn.

The GF team consisted of professionals from the following disciplines:

- Architectural
- Structural
- Electrical
- Geotechnical
- Hazardous Materials
- Construction Management
- Cost Estimating

A LiDAR scan -- a method for determining ranges by targeting a surface with a laser and measuring the time for the reflected light to return to the receiver -- of the barn was conducted. Team members spent multiple days reviewing the existing barn structure and components. The assessment results shown below are a summary of the GF findings and needed repairs. More detailed information and documentation can be found in the full report and appendices.

The Equestrian Center at Avenel will be referred to as 'barn' or 'the barn' hereafter for ease of communications. Due to the level of damage to the southern projection of the barn, the area to the south is called the 'lean on' area'. It appears both the barn and lean on area were constructed at the same time. The barn will remain the term for the overall structure.

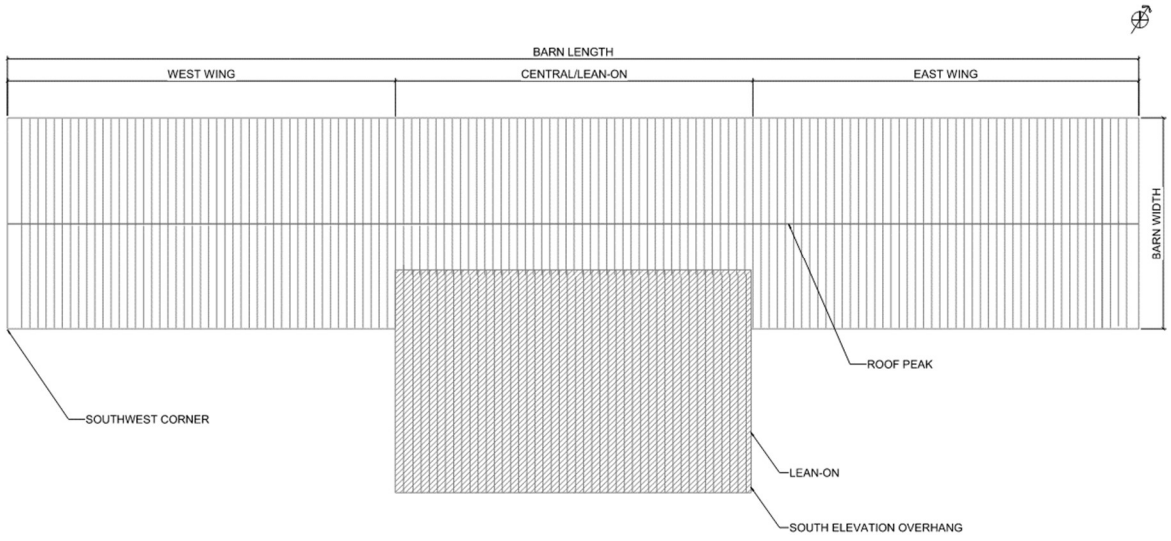


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Figure 4 is a reference plan of the barn.

ES Photo 1: General View of the Equestrian Center Barn (REF Photo G-1: Appendix B1

ASSESSMENT RESULTS:

Overall Barn Condition –

The barn was reportedly constructed in the 1940s and was purchased by WSSC Water in 1988. The exact time of construction is not known. The barn has undergone normal wear from its use as a cattle barn/Equestrian Center but has undergone significant deterioration from normal

wear and tear, rain, wind, and water damage. Modifications or renovations to the barn in addition to the documents provided by WSSC have been made to the barn over the years. The modifications have not been documented and some modifications are detrimental to the overall barn structure such as the spreader beam supporting the roof.

The barn has had to withstand all weather conditions as well as use. Wood support structures of barns are to be protected from wind driven rain and water leaking by the roof and exterior wood façade. The barn has holes in the roof and façade, allowing water to penetrate the structure for years. Water infiltration into the barn such as rain and snow has initiated much of the damage to the barn structure. Roots of vegetative growth are also a factor leading to deterioration. The roots find places to attach to the wood surface as the vines grow. As the vines continue to grow the root system gets deeper into the wood structure. The vines also prevent the wood structure from drying out.

ES Photo 2: Heavy Vegetation pushing up roof deck along southwest corner (REF Photo S113)

Barn Roof and Supporting Structure –

The roof system of the barn structure is leaking. Pin holes in the metal roof were noted at many locations. The main barn roof appears to be a different metal roof than the lean-on structure. The lean-on structure roof appears to be in much worse condition. Roof leaks are much more prevalent allowing water to pond on the hayloft area. Roof purlins and rafters around the leak locations are deteriorating and, in some cases, failing. Roof overhang rafters are in poor condition and in some cases failing (most of the damage is on the south side of the barn). The

roof overhang rafters appear to have been repaired previously and the repairs are deteriorating. In some cases, the repairs have become ineffective or were ineffective from the time of construction. In some locations, wood beams are not bearing and have no attachment to the support columns. Some existing roof beams exhibit excessive rot and water damage; as a result, significant deterioration on the south wall (in the east west direction) has occurred. The barn is leaning to the south. It is not known if the barn was constructed plumb. Significant deterioration continues to occur.

ES Photo 3 Rotting rafters (REF Photo S10 – Appendix B2)

Due to wood deterioration and water infiltration, the lateral force resisting system of the exterior walls (especially the south wall) is compromised. The roof to the hayloft leans to the south. There are numerous ineffective or missing braces along the south wall. The roof beams supporting the rafters are failing and have rotated since the bracing has become ineffective.

ES Photo 4 – Perimeter Roof Rot (REF Photo S21 – Appendix B2)

The interior roof support structure above the hayloft has consistent connection deterioration between the braces and the support posts. Deterioration noted at the joints includes failing brace connections or braces no longer connected. It is not known whether the condition noted is an existing condition from the original construction or deterioration from other damage to the barn. There are three locations where the north/south braces have been removed. It is not known when or why these modifications were performed. These removed braces are north of the two load transfer spreader structures and could have been removed to facilitate hay storage.

ES Photo 5 – General view of the load spreader beam structures in hayloft (REF Photo G10 – Appendix B1)

Hayloft –

The hayloft floor, especially at the lean on section, is in poor condition due to water damage. The floor of the hayloft is generally uneven throughout the barn. In the lean on area, tarps are draped over some floor areas. At floor depression locations such as holes in the floor planks or 'soft spots' in the planking, ponding of water is occurring as well as wet hay sitting directly on the existing floor planking. Consistent rot was noted in the floorboards throughout the structure with the worst damage in the lean on area. In addition, the floor stringers (floor joists) are damaged with water staining but remain in satisfactory condition. Some of the stringers in the south area have been repaired over the years. It is not known when the repairs were undertaken. There are few stringers exhibiting significant rot, primarily on the south side where repairs have been performed, and the repairs are failing. The lean on hayloft area is deteriorated and unsafe.

In other locations of the hayloft outside the lean on area, beams supporting the hayloft show deterioration along the exterior and interior. This is primarily due to water damage. Beams are leaning, with one support column or girder lower than the other. Many beams have at least half of the wood-to-wood bearing missing. In some locations there are gaps between the wood at the bearing locations. Several beams in the north south direction are significantly damaged.

ES Photo 6 – Hayloft looking southwest – post has been added to east existing column., north brace and wind girt are not connected to the post and the east brace is missing. The floorboards adjacent to the column are rotting. (REF Photo S42- Appendix B2)

ES Photo 7 – Hayloft from below – typical rotting/broken/missing floorboards – Lean on structure (REF Photo S68 – Appendix B2)

Two beams on the southwest corner of the structure have extreme (approximately 90%) section loss and are in serious risk of failure. Other beams exhibit significant wood section loss. Upon review of this area, the inspection team alerted WSSC Water to have the occupants of the barn moved.

ES Photo 8 – Critical finding at hayloft floor beam – west end of beam has approximately 90% section loss – (REF Photo S81 – Appendix B2)

ES Photo 9 – Severe rot at floor beam – west end has significant section loss – (REF Photo S82 – Appendix B2)

Columns/Structural Support –

The main floor columns supporting the structure and the hayloft lean south but less than the columns from the hayloft to the roof. Column caps are deteriorated. Some columns exhibit bearing loss at the base, meaning the column is not fully resting on the supporting structure/foundation. Bearing loss can contribute to column and structure tilt. Other non-

structural wood members such as the horse stalls may be contributing to the barn's existing structural stability.

One column in the southwest corner could not be investigated due to the unsafe conditions described above, boards/other debris in the path of observation and exterior vegetation blocking access. What could be observed was a column rotting and deteriorating its full height. This is significant because this column supports a portion of the hayloft and roof structure. Loss of this column would mean the collapse of nearby internal structural elements, potentially propagating throughout the barn as other structural members take on additional loading.

ES Photo 10 – Siding at southwest corner has holes – column appears to be rotting throughout its height – heavy vegetation (REF Photo S114 – Appendix B2).

In 2022, WSSC Water hired an outside engineer to provide construction details for damage to the northwest face of the barn and review the barn’s overall condition. The retrofit framing was not installed plumb, but the framing modifications incorporated the existing tilt in the barn.

ES Photo 11 – New repairs on Northwest corner (REF Photo S100 - Appendix B2)

A few columns were replaced inside the barn at an unknown time. It can be assumed the columns exhibited significant damage to warrant replacement. The replaced columns are in addition to the work WSSC Water recently completed on the northwest face of the barn.

Columns were removed along the north wall to enlarge door openings or create new door openings. Door jambs were installed to supplement the removed columns.

In some locations consisting of the structural bracing between the ground floor and the hayloft, the bracing is partially engaged or not engaged at all. Some braces have been removed in the past to facilitate column replacement in both the north-south and east-west direction.

The south elevation overhang is a wood framed area without exterior columns. The overhang is framed back to the existing building. Braces are broken or missing. This is another area where collapse is possible.

ES Photo 12 – Overhead support diagonal is disconnected at the base and overhang is leaning (REF Photo S140 Appendix B2)

The slab on grade is cracked and failing. In some locations the slab has settled several inches.

Barn Façade --

The building envelope is failing. Water damage to the façade is allowing rain and wind driven rain to enter and impact the barn structure. There are many openings in the existing structure. Originally there were silos at the site with a connector from the silos to the barn. When the silos were demolished and the connector structure removed (before WSSC Water purchased the property), the opening in the barn was not replaced. The windows consistently remain open, allowing wind driven rain to enter the barn. Some wind girts on the barn are disconnected and/or failing.

Vegetation on the barn's exterior is contributing to its damage. Vegetation has taken over significant areas of the barn on its south and southwest elevations. The vegetation has infiltrated the gutter system and prevents adequate drainage of the roof leading to additional damage to the roof and gutter system. The bottom of the rainwater leaders, when present, are not terminating to reasonable means to adequately get the water away from the structure unless the grade is naturally sloped away from the building. The stables inside the barn are non-structural (non-structural: the stable structures were not intended to support the building).

ES Photo 13 – Sections of lifted metal roof panels and missing facia boards (REF Photo A3- Appendix B3)

ES Photo 14 – Gutter clogged with vegetation, deteriorated boards and discontinuous rain leader (REF Photo A14 – Appendix B3)

The gutter system and façade of the barn needs to be replaced. These elements cannot be cost effectively salvaged. Windows and doors appear to be the originals. The doors may be newer due to the retrofitted column installed on the north side of the building. Doors have significant decay from water damage.

Ancillary Reviews --

The electrical review documented unprotected lighting on the second floor and exposed breakers at the exterior panelboard.

Geotechnical exploration for the project showed nothing unusual and was as expected for the area.

A hazardous materials survey was also completed. Caulk, noted in a visual inspection, is likely to include asbestos-containing material (ACM). Lead based paint is likely on the surface of the structure (interior and exterior). Electrically, the ceiling mounted lights require a protection guard, the panel board is missing a knockout which could allow accidental contact with live electrical parts.

NEEDED REPAIRS:

Repairs necessary for occupancy – Structure Stabilization –

Structural repairs are required to the barn. Three levels of repairs have been designated to be undertaken based on the severity of the conditions: Repairs necessary for occupancy, Intermediate and Aesthetic.

The barn **must** be stabilized as the first step of the Repairs necessary for occupancy since the structure is leaning. Proposed steel frames would need to be erected at each column on the barn's exterior to prevent further movement of the structure. The exterior steel frames would need to remain a permanent part of the barn. The frames would **not** be removed after the internal reconstruction has been completed.

A total structure temporary building shoring system to support the roof and hayloft would need to be implemented to retrofit the existing barn (global shoring system). The building shoring system could include pump jacks to temporarily support the existing hayloft and roof during the barn reconstruction. In addition to the global shoring system, additional shoring would be required at specific repair locations due to the complexity of the damage to the barn.

Once the shoring is in place, a steel cable system should be used to support the building laterally at each column line in the hayloft area. The cable system would hold the building together laterally because the missing roof braces are allowing the structure to move and shift due to the sloped roof thrust forces. The barn cannot be brought back to plumb. It is not

known if the barn was ever plumb. The cables would prevent further movement of the structure even after the repairs are completed. The cables would remain in the hayloft.

Once the building is stabilized with frames and cable system, the hayloft would need to be totally vacated so the existing condition of the top of the floor decking could be exposed. A temporary working surface would need to be installed over the work area. The vegetation covering the exterior and interior portions of the barn must be carefully removed. Coordination of shoring installation, cable installation and vegetation removal must be carefully coordinated. If any additional deterioration is discovered after removal, additional similar repairs described in this report may be required.

The existing structural system is not performing as intended due to the deficiencies noted. The horse stalls are not supposed to be structural elements, but there is evidence they are contributing (in some capacity) to the stability of the barn. The horse stalls should not be removed until the lateral and global shoring systems have been installed.

Repairs necessary for occupancy – Structural Repairs and Replacements --

The hayloft floor beam and columns in the southwest corner need to be replaced. The beam and columns support the roof, façade, exterior cantilever roof on south side and hayloft including their structure. The local area at each damaged beam, stringer or girder would need to be shored in addition to the building shoring to remove and replace the existing beam, stringer and/or columns as required.

Main roof rafters exhibiting damage need to be replaced. Vertical shoring from the ground level to the new members need to be sistered to the sound portion of the rafter. Previously sistered rafters from older repairs would need to be sistered again. Rotted wood would need to be removed. Split columns must be repaired but some columns exhibit severe splitting and must be fully replaced. Bearing locations must be repaired as needed for full wood bearing on the support structure. Roof beams along the perimeter of the barn (especially on the south side) are twisting and should be replaced in kind. These beams support the rafters and require significant shoring to support the existing structure during the removal and reinstallation process.

Many lateral bracing structural members in the hayloft have become disconnected, disengaged, or are missing. These supports would need to be reinstalled and reconnected to the existing structure. Hayloft columns and braces should be reconnected, and lateral brace connectors installed at each column. Some bracing at grade level has become disengaged,

disconnected, or is missing. Missing bracing should be replaced. Disconnected and disengaged bracing should be reconnected. A knee brace stabilizer is proposed to be installed at locations designated in the report.

The two hayloft spreader beam structures should have a new column post inserted in the location of the previously removed column with additional strapping. Disconnected wind girts in the hayloft should be reattached.

Selected columns require bearing modification or replacement due to rot, deterioration, modification over time or separation from the foundation. Existing columns with no bearing on the foundation structure should be shimmed or otherwise modified to provide full bearing on the foundation. Also, straps and clips to provide positive connection should be installed. Selected sill plates should be replaced under the exterior bearing walls.

The roof and façade (board and batten vertical wall panels) of the building should be replaced. The purlin system should be repaired as needed to support the roof. The girt system supporting the façade should be replaced. Gutters and downspouts should be replaced. Drainage should be directed away from the building.

The site-mounted panelboards are unsafe and should be brought to safe conditions.

Intermediate Repairs –

Intermediate repairs consist of column-to-column connections not imminently failing, wall to curb connections not affecting the lateral stability of the building or wall system, and uneven floor beam to column cap connections.

The windows and doors of the structure are to be repaired or replaced. New framing is required at each window. Door framing surrounding the doors should be replaced. Window and door head flashing should be installed as part of the work.

Hayloft lighting should be replaced with guards to protect the bulbs.

Aesthetic Repairs –

Aesthetic repairs include repair of the concrete spalls on the concrete pedestals supporting the columns and repairing or replacing missing masonry in the foundation walls.

Post Repairs --

If the proposed barn repairs are constructed and verified, the barn would require frequent structural inspections (every year) to review for new damage to the existing structure. Additional degradation of the structure will continue after the repairs are made. The barn lean or tilt will not be corrected but stability would be preserved with the steel frame system. The permanent exterior bracing would need to be painted every 10 years. The floor slab of the barn is cracked, and future deferred maintenance items would include flooring with traction for horses.

COST ESTIMATE:

An Opinion of Probable Cost was developed by internal GF cost estimators for the project based on the needed repairs.

Equestrian Barn at Avenel Repair – Opinion of Probable Cost – Summary by Area

Repairs	**Cost**
Repairs necessary for occupancy – Stabilization/Shoring/Vegetation Removal	2.78M
Repairs necessary for occupancy – Critical Finding Hayloft Floor Beam	$20K
Repairs necessary for occupancy – Roof and Roof Structure	$1.08M
Repairs necessary for occupancy – Hayloft	$119K
Repairs necessary for occupancy – Grade Level	$436K
Repairs necessary for occupancy – Wall Assembly, Gutter, Downspouts	$293K
Repairs necessary for occupancy – Electrical	1.5K
Repairs necessary for occupancy - TOTAL	$4.7M
Intermediate	$510K
Aesthetic	$30K
TOTAL Construction Cost (based on OPC)	**$5.3M**
Engineering/Architectural Fee (high level, estimate based on noted repairs)	$300K
Estimated Yearly Engineering Review Cost (after construction is complete)	$10K (1)
TOTAL Project Cost	**$5.6M**

(1) Total project does not include yearly engineering review costs, any new repairs or replacements or ongoing maintenance costs.
(2) The Opinion of Probable Cost does NOT include interior repairs to the stalls, interior cabinets, or floor; upgrades; or repair/modification of barn appurtenances.
(3) ES Figure 3 is a summary of the Opinion of Probable Cost shown in Appendix C
(4) OPC developed based on April 2024 Cost Data. No inflation factors for future work are included.

The report does not address the stalls and storage lockers inside the barn. The report does not address any site or grading issues or the ancillary structures on the south side of the barn lean-on structure.

The existing conditions have indicated the barn is unsafe in its current state. Access to the barn is to be restricted until the barn can be stabilized. The inspection of the barn was conducted in the January/February 2024 timeframe; additional damage continues to occur to the barn structure. The order of construction operations is to be carefully considered in order not to cause additional structural distress to the existing barn.

INTRODUCTION

The Washington Suburban Sanitary Commission (WSSC) owns a parcel of land within the Avenel residential community in Potomac, MD. The Equestrian Center Barn at Avenel is a 2-story timber barn structure located on this land. Based on unverified information, the barn was originally built in the 1940s as a cattle barn but was eventually converted to a horse barn. Since purchasing the land in 1988, WSSC has leased the barn to a member of the community who has operated the barn as an equestrian center.

In 2022, WSSC hired a 3rd party engineering firm to provide emergency repair plans to shore up a wall in the northwest corner of the barn and provide a limited structural review of the existing building based on visual observation. Based on this limited structural review, several recommendations were provided, including performing a more in-depth inspection of the barn to identify additional damaged members. WSSC subsequently contracted Gannett Fleming, Inc. (GF) in January 2024 to provide an overall engineering assessment of the main barn structure. There are several outbuildings to the south of the main structure which are not part of the barn structure. The basis of the conditions assessment is to determine defects and deficiencies and provide repair recommendations to maintain this structure as a barn to accommodate animals. This report summarizes the main findings and provides recommendations to restore the structure to a state of good repair.

LOCATION, LAYOUT AND ORIENTATION

The Equestrian Center Barn at Avenel is located adjacent to the TPC Potomac PGA Golf Course at 10010 Oaklyn Dr, Potomac, MD 20854. Access to the barn is off the main driveway to the golf course. GPS coordinates for the barn are approximately 38.992760N, 77.199660W.

Existing drawings for this structure were not available. A LiDAR scan was conducted as part of this investigation and preliminary floor plans were developed based on the information from the scan. These preliminary floor plans can be found in Appendix A. These floor plans were developed to aid in the investigation and should not be used as as-builts or as a basis for any final decisions. The dimensions provided on the floor plans are approximate, and all dimensions should be field verified prior to performing any repairs. General photos of the structure can be found in Appendix B1.

Gridlines were developed to aid in locating the existing columns inside the building and to provide a general orientation of the locations for discussion in the report. The orientation system used in this report best matches true-compass directions. Following this orientation system, the wall along Gridline 1 is considered the north wall.

REVIEW OF EXISTING CONDITION

LiDAR

A Light Detection and Ranging (LiDAR) scan of the barn structure was performed by personnel from Gannett Fleming, Inc. on January 25, 2024. LiDAR is a process that uses lasers to measure distances between fixed points to develop a 3-dimensional (3D) representation of the structure or object in question. LiDAR equipment was set up at multiple stations throughout the interior

and exterior of the barn structure to obtain a 3D representation of the overall structure. Information from this scan was used by the inspection teams to understand the structure before going to the site for the investigation.

Development of BIM Model

A Building Information Modelling (BIM) 3-dimensional model was created using AutoDesk Revit software developed from the LiDAR scan. BIM is a process used to create digital representations of buildings and other structures to aid in decision making and collaboration between multiple teams and stakeholders. In the case of this project, creating a BIM model using Revit was an efficient way to transform the LiDAR scan data into preliminary floorplan drawings since existing drawings of the barn were not available. The floor plans were created as an inspection aid for use by the inspection team to note defects, locate problem areas, mark down typical dimensions, and collect other relevant field data. A column gridline system was developed as part of this BIM model. These floor plans were mainly developed to aid in the investigation and should not be used as as-builts or as a basis for any final decisions. The dimensions provided on the floor plans are approximate, and all dimensions should be field verified prior to performing any repairs. The floor plans developed from the BIM model are in Appendix A.

Existing Building System

The structure is a two-story post and beam timber barn. The structure can be divided into three sections, the west wing, central lean-on region, and east wing. See Photos G-1 to G-3. The barn is approximately 278ft long overall. The east and west wings are approximately 97ft long x 48ft wide with a 6ft overhang at the south end. The central lean-on region is approximately 84ft long x 89ft wide with a 6ft overhang at the south end. The 1st story of the barn is at-grade and houses the horse stables. The 2nd story of the barn is the hayloft level and is where hay is stored. Access between the 1st and 2nd story is via an interior stairway in the east wing or between two exterior stairways at each end of the north elevation. See Photos G-4 to G-6.

The roof consists of a sloped standing seam metal roof deck supported by timber roof purlins and rafters. The west and east wings have a gabled roof with ridge at Gridline 2.5 and supported by roof beams at Gridlines 1, 2, 3, and 4. The central lean-on region is similar to the wings but also includes a large bump-out and lean-to style roof on the south side of the building which is supported by roof beams at Gridlines 4, 5, 6, and 7. See Photos G-1 to G-3.

At the hayloft level, the timber roof beams are supported by a series of braced timber columns. See Photo G-7. A horizontal framing member spanning north/south connects the columns along Gridlines 2 and 3 at the roof bearing location to create a knee braced frame. See Photo G-8. Along the perimeter, the roof beams also bear on intermediate columns that are typically evenly spaced between the main gridlines. See Photo G-9. The columns at the hayloft level are supported by the hayloft floor beams below and act independently from the columns at grade level. At Columns E/2 and Q/2, a load transfer spreader beam and columns are present. Comparing to the typical framing of the structure it appears this transfer framing was added to remove a portion of the column at F/2. This causes a change in the load path for lateral loading by discontinuing the frame column. . See Photo G-10.

The floor of the hayloft consists of timber planks supported by timber floor stringers spanning north/south. The floor stringers carry the loads to floor beams along Gridlines 1, 2, 2.5, 3, 4, 5, 6, and 7. There are also floor beams spanning north/south at the major gridlines which provide lateral support. These north/south floor beams also transfer the lateral loads from the hayloft bracing above. See Photo G-11.

The columns at grade level are located at the major gridlines. Lateral knee braces are typically provided along the south side of the columns along Gridline 2. See Photo G-12. Knee braces in the east/west direction are provided at the end walls along Gridlines A and T for the wings and Gridlines H and N for the central lean-on structure. Similar to the hayloft level, there are intermediate columns supporting the perimeter floor beams along the north wall. S Photo G-13.

The interior columns are typically supported at the finished grade level; however, there are multiple locations where a concrete pedestal or curb was constructed to elevate the base of the column above the finished grade level. It could not be determined at the time of the assessment when these pedestals and curbs were installed. There is no pattern to which columns have concrete pedestals and curbs. It is speculated that these were retrofits installed after the original construction of the structure. These pedestals could have been part of the punch list concrete work that was completed in 1991 as noted in the "Structural Investigation - Other Relevant Information" section below. The foundation below the floor slab could not be determined as part of the investigation without impacting the existing stables and concrete walkways. See Photos G-14 to G-16.

The perimeter columns along the south elevations (Gridlines 4 and 7), are similar to the interior columns and are supported at grade level. These columns also support an exterior cantilever overhang along the south side of the building. See Photo G-17. At some locations along the south elevation, there are non-bearing curtain walls which create bump-outs underneath these overhangs. These non-bearing walls are typically supported on concrete masonry unit (CMU) strip walls or directly on the concrete floor slab. See Photos G-18 to G-19. At the west, north, and east elevations, the perimeter columns are sitting on a timber sill plate and CMU foundation wall and have a concrete strip footing as determined from the geotechnical exploration. See Photo G-20.

The barn's aisles at the first level are a cast-in-place concrete slab-on-ground. Within the stables, the ground consists of bare dirt and rubber mats. See Photo G-21.

The typical connection method for the structure is mortise and tenon joints with wooden dowels. This is common practice for timber framed barn structures. The braces were fabricated with tenon tongue which slide into slots, or mortise holes, in the columns and beams. Similarly, the top and bottom of the columns were designed with tenon tongues which slide into mortise slots in the beams at the top and bottom. These joints were positively connected by inserting a wooden dowel that passes through both members. See Photo G-22.

Along the perimeter of the structure, timber wind girts span between the main columns and intermediate columns to transfer the lateral wind loads to the main lateral resisting system (i.e. the knee braced frames). The wind girts often also act as the sills and headers at the door and

window openings. The perimeter of the structure is clad in an uninsulated, board-and-batten style vertical wood installation with no waterproofing. These exterior walls span vertically and attach directly to the timber wind girts, floor beams, roof beams, and sill plate along the structure's perimeter. There are several openings in the exterior walls for doors, windows, and previous barn conveyor structures. See Photo G-13.

Structural Investigation

Investigation Procedure

A team of two structural inspectors from GF performed a 6-day visual site investigation during the weekdays from February 5th until February 12th, 2024. Measurements were taken of select structural members for reference. The team conducted more in-depth investigations starting at the interior columns at the hayloft level. Over the 6-days, the structural team methodically moved throughout the structure, documenting defects in the structural members. The investigation was generally visual in nature, but where accessible hands-on methods were sometimes used to gain a better understanding of some of the noted defects. Safety was the upmost concern during this investigation and some areas were not fully accessible due to severely rotting/broken floorboards, or other noted safety concerns. An 8ft A-frame ladder was used to get a closer look at some areas when deemed appropriate. A 40-50ft articulating boom lift was used to get a close-up view of the exterior of the structure. Common non-destructive inspection tools were used including standard measuring equipment (25-foot tape measure, 6ft stick rule, electronic laser measurement tool), hammer for sounding, icepick to determine extent of rot, and angle finder to determine degree of tilt of structural members. Temporary lighting was also utilized to supplement the existing lighting at the site. The structural team did not access the topside of the roof structure for safety reasons; however, WSSC obtained a permit and flew a drone overhead on February 15th, 2024, to obtain information on the roof. The GF team was provided access to the drone data for review. Photos taken during the structural investigation are included in Appendix B2.

Other Relevant Information

As part of an investigation, it is important to obtain information from those with knowledge of the history of the structure. The long-term Barn Manager Nancy Evans (Ms. Evans) was present at points during the investigation and was able to provide insight into some aspects of the barn. According to Ms. Evans, there used to be two large silos present to the north of the barn which had been connected to the main structure to facilitate transferring material between the silos and the barn. The foundations for these silos are still visible today. The presence of these silos helps understand why there are portions along the north elevation where the wall is open to the outside elements. In addition, Ms. Evans made known that during large golfing events temporary tents would be connected to the south wall of the east wing of the building. Steel rods were attached through the non-load bearing wall back to the main structure for apparent tent attachment and restraint. At one event, it was reported that the tent blew away into the nearby fields. This may explain the significant defects and movement noted at the non-load bearing curtain wall at this location.

Ms. Evans also provided a punch list of repair items that were completed in November 1991 shortly after WSSC purchased the property. Some notable repairs that were completed include:

- Roof repaired.
- Concrete work in various areas, i.e. barn and outside.
- General, miscellaneous closing in fabricating and installing of doors, etc.
- New hardware on existing doors.
- Created new bi-folding type entry door to barn for safety reasons.

Architectural Investigation

Investigation Procedure

The architectural investigation was limited to a visual observation only. The areas of interest in the assessment include building envelope components and do not include structural members (covered in previous section.)

This report's intent is to identify deteriorated areas of weatherproofing quality by locating opportunities for water and air infiltration into the structure. Building materials which appear to be beyond their useful life have also been noted. The assemblies considered include existing roofing, wall cladding, windows, and doorways. Photos taken during the architectural investigation are included in Appendix B3.

Geotechnical Investigation

Investigation Procedure

A limited geotechnical investigation was completed on February 7, 2024. The investigation consisted of two test pits, designated as TP-1 and TP-2, to identify subgrade soils, determine existing groundwater conditions at the test pit locations, and to determine existing exterior foundation type and depth. The test pits were along the outside of the exterior north wall, with TP-1 about 157 feet from the northeast corner of the building, and TP-2 at the northeast corner. See Photos GT-1 and GT-2. Photos taken during the geotechnical investigation are included in Appendix B4.

Test pit excavations were performed by WSSC personnel using a JCB 3CX Backhoe. The test pit inspection was performed by a qualified inspector, employed by Gannett Fleming. During the test pit excavations, field logs were maintained by the inspector which documented excavation depths, soil descriptions, soil classifications, depositional environment, groundwater observations, foundation notes, and additional remarks. Soils were visually described according to the Burmister Method and were classified according to the Unified Soil Classification System (USCS). The field test pit logs are included in Appendix D1. No test pits were performed inside the structure; therefore, interior column foundation types, depths, and subgrade materials are unknown.

Hazardous Materials Investigation

Investigation Procedure

A visual assessment of hazardous materials was completed on February 8, 2024. The assessor was a Maryland-licensed Asbestos Inspector, employed by Gannett Fleming. The objective of

the assessment was to collect sufficient information concerning the potential presence of the following to allow for abatement, as necessary, prior to renovation and/or demolition of the structures:

- Asbestos containing materials (ACM).
- Lead-based paint.
- Polychlorinated biphenyl (PCB)-containing fluorescent light fixture ballasts,
- Fluorescent bulbs and other universal waste bulbs.
- Tritium-containing Exit signs.
- Transformers.
- Thermostats and mercury switches.
- Batteries (nickel cadmium, lead-acid, lithium); and
- Oil-containing equipment.

During the assessment, an inventory was compiled to document the presence of hazardous and/or regulated materials such as maintenance and cleaning products, old paint cans, drums, refrigerant containing devices, gas cylinders, and other general chemicals. The inventory included descriptions of the materials, their locations, and quantities. All such materials were also photographed.

The assessment included all accessible areas of the barn's interior and exterior structure, including the main floor, the hayloft, and the barn's immediate surroundings. A visual assessment was also performed for the garage/outbuilding south of the barn, the covered storage area connecting the garage/outbuilding to the barn, and the concrete area immediately south of the barn.

The property's long-term Barn Manager, Ms. Evans, was also interviewed briefly during the assessment. Ms. Evans provided details regarding the approximate age of the barn and the timeframe for renovations that were completed.

Electrical Investigation

Existing Electrical System

The electrical investigation was limited to a visual observation only. The electrical service is provided from a pad mounted utility transformer. The existing electrical system is comprised of multiple distribution panelboards, general receptacles and lighting.

Distribution panelboards are mounted on site and on the exterior wall of barn. Electrical conductors associated with site mounted panelboards are routed in PVC conduit. Electrical conductors associated with barn exterior wall mounted panelboard are routed in metallic conduit.

The barn ground floor has wall-mounted receptacles and ceiling-mounted lighting fixtures throughout. The floor of the hayloft has ceiling mounted lighting fixtures located throughout.

DISCIPLINE FINDINGS AND ASSESSMENTS

Structural

The investigation has shown the structure has comprehensive defects along with a global tilt to the south, up to 6 degrees in some locations. Numerous diagonal braces have been removed or become disconnected over time. This may have contributed to the tilt in the structure. It appears the weight of the roof structure and past roof loading has caused the perimeter roof beams to twist and shift. Subsequently, the connection of these perimeter roof beams to perimeter columns has caused the columns to split and the wall to push outwards, up to 18 inches in some locations. This far exceeds typical building drift limitations, especially while not under any lateral loading.

Water damage is prevalent in several structural members throughout the building. The building envelope is failing, and water is infiltrating through the siding and roof. Water damage and rot are typically seen in the wood structure along the building's perimeter where the building envelope failed to protect them. A critical finding was observed in the southwest corner of the structure where the perimeter beam has approximately 90% section loss due to rot. Another perimeter beam along the north elevation has approximately 75% section loss due to rot. The sill plates along the west, north, and east elevations also exhibit severe rotting causing bearing issues at many columns. At the grade level, a considerable number of columns are rotted at the base due to water exposure. Several of these columns have severe section loss leading to 100% bearing loss. This has led to the structure to locally settled and caused the hayloft floor beams and flooring to be uneven. The load is unintentionally being transferred to other framing members as evidenced by the structure still standing.

The following sections provides in-depth findings about the various structural members of the building starting from the roof level and working downwards.

Roof Level Findings

Roof Deck

The roof deck typically exhibits pinholes with leaks throughout. See Photo S-1. From the structure's interior, light could be seen coming through these holes from the outside. There are also isolated areas of rusted roof deck and areas where the roof has been patched in the past, but the patches are starting to show signs of failure. See Photo S-2. The roof deck defects are worse in the lean-on region of the structure. The majority of the lean-on region’s structure appears saturated and there are several tarps on the flooring, some of which are holding standing water. See Photo S-3. Near Column M/4 is a 32-gallon bucket full of water directly underneath a previous roof patch. See Photo S-4.

Along the north elevation there is heavy vegetation which is starting to push up the roof decking between Gridlines D and H. The vegetation is entering the building at the roof. See Photos S-5 to S-7.

Roof Purlins

The roof purlins which support the roof deck are typically saturated or show signs of water damage and rot. There are isolated areas throughout the roof structure where the purlins have completely rotted, are broken, or are missing. See Photos S-8 to S-9.

Roof Rafters

The roof rafters on the main roof typically exhibit water staining throughout but are generally in good condition. There are various areas along the south side of the roof where the rafters exhibit severe rot near the bearing ends. Some of these locations have been previously repaired by sistering new members to the rotting members; however, there are rafters where the sistered members are bolted through the rotted area of the original rafter rather to a sounds portion of the rafter and are thus ineffective. Some of the more affected members are as follows:

- Along Gridline 4 between Gridlines B and C there are rafters with water staining and rot. Access to this area was limited due to safety concerns.
- Along Gridline 4 between Gridlines N and O there are rafters with water staining and rot.
- Along Gridline 4 between Gridlines R and S there are rafters with water staining and rot. The rafters could be penetrated with an icepick through the entire section. See Photo S-10.
- Along Gridline 7 between Gridlines H and I there are previously sistered roof rafters. This entire corner appears to have been repaired in the past with a new roof beam and column. See Photo S-11.
- Along Gridline 7 between Gridlines I and J there are sistered roof rafters where the repair is essentially ineffective since the bolts attaching the new sistered member to the original rafter are through the rotted portion of the original rafter. See Photo S-12.

The roof rafters along the cantilevered overhang are generally in good condition. There is a rafter on the overhang over an entryway with moderate to severe rot between Gridlines F and G at the south bearing. See Photo S-13.

Hayloft Level Findings

Roof Support Beams – Perimeter – East/West

The edges of the main roof are supported by roof beams spanning east/west along Gridlines 1, 4 for the east and west wings, and Gridlines 1 and 7 for the lean-on region of the structure. The perimeter roof beams typically exhibit up to full-length x ¾" wide checks. These checks are typically observed on the bottom faces but there are also checks on the top and side faces of some isolated beams. See Photo S-14.

At the end bearing areas, several beams are twisting as much as 9 degrees in one direction. This is typically observed at the locations where the beams are bearing on split columns or where the exterior walls/columns are not plumb. The following twisting beams were noted:

- Roof Beam between Columns B/1 and C/1: East bearing is twisting 2 degrees towards the north.

- Roof Beam between Columns C/1 and D/1: East bearing is twisting 6 degrees towards the north due to split column. See Photo S-15.
- Roof Beam between Columns D/1 and E/1: West bearing is twisting 6 degrees towards the north due to split column. See Photo S-15. East bearing is twisting 5 degrees towards the south.
- Roof Beam between Columns C/4 and D/4: West end is bearing on a split column but degree of twist could not be determined due to limited access for safety reasons. The east bearing is rotated 9 degrees south and has minimal to no bearing remaining. See Photo S-16.
- Roof Beam between Columns N/4 and O/4: West bearing is twisting 3 degrees north. East bearing is twisting 7 degrees south and has minimal to no bearing remaining. See Photo S-17.
- Roof Beam between Columns S/1 and T/1: East bearing appears to be twisting north but could not access to verify due to debris piled in front of column.

Additionally, there are several locations where the perimeter roof beams are not fully bearing on the supports. At some locations there are up to 1" wide gaps (up to 3" at Column S/4) between the bottom of the beam and the top of the support. This occurs at both the beam-to-beam bearing connection and the beam-to-column bearing connection. The beam-to-beam connection is notched so the upper beam bears on the lower beam "seat", which then bears on the column. There does not appear to be any positive connection between the beams except for nails in some instances. The beam-to-column connections are typically designed with a notch or mortise hole for the column to positively connect with the lower beam using a wooden dowel, therefore, it is expected that there is typically still some bearing remaining at this notch/dowel connection. Bearing issues were noted at the following columns:

- Column G/4: ½" gap between beams and column. Dowel appears intact.
- Column I/1: ½" gap between west beam and east beam. Minimal bearing remains. See Photo S-18.
- Column L/1: ½" gap between beams and column. Dowel not visible from south face.
- Column M/1: ½" gap between west beam and east beam.
- Column N/1: 1" gap between west beam and east beam.
- Column K/7: 1" gap between beams and column. Dowel appears intact.
- Column M/7: 1" gap between beams and column. Dowel appears intact.
- Intermediate Column M.5/7: 1" gap between beam and column. Dowel is deteriorated/missing.
- Column Q/1: ¼" gap between west beam and east beam.
- Column P/4: 1" gap between beams and column. Dowel is not visible from the north face.
- Column S/4: 3" gap between beams and column. The column is rotted and has dropped out of the mortise slot in the beam. The roof beams have minimal to no bearing remaining at this column. See Photo S-19.

There are eight perimeter roof beams along the roof's south side which show areas of significant rot and water damage with up to full icepick penetration. Water issues were noted at the following locations:

- Roof Beam between Columns B/4 and C/4: Beam appears to have moisture stains throughout. This area was not accessible due to safety issues noted in this corner. This area had limited visibility due to debris piles.
- Roof Beam between Columns D/4 and E/4: Bottom face of beam exhibits rot with up to full icepick penetration. See Photo S-20.
- Roof Beam between Columns H.5/7 and I/7: Beam exhibits moisture stains throughout. The east bearing is soft with up to 1/8" icepick penetration.
- Roof Beam between Columns I/7 and J/7: Beam exhibits moisture stains throughout. The west bearing is rotted with full icepick penetration. See Photo S-21.
- Roof Beam between Columns K/7 and L/7: Beam exhibits water damage and rot at west bearing with up to 4" icepick penetration. See Photo S-22.
- Roof Beam between Columns M/7 and N/7: Beam exhibits significant section loss and rot under the roof rafters. The icepick was fully inserted into the top of the beam. See Photo S-23.
- Roof Beam between Columns N/4 and O/4: Top face of beam exhibits rot with up to full icepick penetration at west end for up to 6ft length. See Photo S-24.
- Roof Beam between Columns R/4 and S/4: Top face of beam exhibits rot with up to 4" icepick penetration.

Roof Support Beams - Interior – East/West

There are interior roof beams directly supporting the roof rafters spanning east/west along Gridlines 2 and 3 in the east and west wings, and along Gridlines 2, 3, 4, 5, and 6 in the lean-on region of the structure. These interior roof beams typically exhibit up to full-length x 1" wide checks. See Photo S-25. These checks are typically observed on the bottom faces but there are also checks on the side faces of some isolated beams. The top faces of the interior roof support beams were inaccessible from the hayloft floor and were not assessed. In addition to checks, one split was observed in the east/west face of the roof beam spanning between Columns L/6 and M/6 starting at the west bearing where the dowel connects the beam to the column. See Photo S-26.

Similar to the perimeter roof beams, the interior roof beams are designed to nest on top of each other at the bearing locations. At some locations, there is a gap up to 1.5" wide between the ends of the beams. This typically occurs in the lean-on portion of the structure. This was specifically noted at the following locations:

- Column H/3: Up to 1" wide gap between ends of the roof beams at bearing location.
- Column I/4: Up to 1.5" wide gap between ends of the roof beams. The west beam is not bearing directly on the original column but instead is bearing on the east beam and an additional 3.75"x3.75" post which was added to the west side of the column to help support the beam. See Photo S-27.
- Column I/6: Up to 1.5" wide gap between ends of beams at bearing location. The west beam is twisting towards the north. See Photo S-28.

At Column M/5 a dowel connecting the roof beam to the top of the column is deteriorated/missing. See Photo S-29.

The interior roof support beams exhibit isolated areas of water staining and damage, typically in the lean-on portion of the structure. Some notable defects include:

- Roof Beam between Columns M/4 and N/4: The north face of beam has water damage and rot with minimal 1/8" deep icepick penetration for 1'-6" length at the east bearing location. Water staining is observed throughout.
- Roof Beam between Columns H/6 and I/6 has water staining throughout. The last 2" of the west end of the beam has up to full icepick penetration but the beam still appears to have enough bearing at this support.
- Roof Beam between Column M/6 and N/6: The east bearing end of beam is rotted with up to full icepick penetration. A 5.25" x 5.25" post has been added to the west side of the original column to help support the beam at this location. See Photo S-30.

Roof Support Frame Horizontal Members – North/South

There are horizontal members spanning north/south which connect the roof beams on Gridline 2 to the roof beams on Gridline 3 at each column creating a braced frame. These horizontal members typically exhibit up to full-length x 3/4" wide checks. At the member spanning between Columns G/2 and G/3, there appears to be excessive deflection and checks on both side faces which potentially indicates a full split; however, the member was not accessible for a hands-on review. See Photo S-31.

The south bearing of four of the horizontal members do not appear to be sitting correctly. In the west wing, three of the beams at Gridlines B, C and D appear to be twisting towards the west at the bearing. See Photo S-32. In the east wing at Gridline P, the horizontal framing member appears to be lifted and not fully bearing on the south support. See Photo S-33.

Hayloft Columns at Main Gridlines - Interior

The hayloft columns in the structure's interior are protected from the outside environment and mainly experience typical surface checks. The columns exhibit up to full-height x ¾" wide checks. These checks are typically observed on the east and west faces but there are also checks on the north and south faces of some isolated columns. At Column R/3, there appears to be a full split in the east and west face. See Photo S-34.

The interior columns typically are plumb or have a slight lean towards the south (up to 2 degrees) except for a couple isolated locations in the west wing which have a more pronounced lean. Column D/2 is leaning 3 degrees towards the south. Column E/2 is leaning 4 degrees towards the south.

Column M/3 exhibits water staining throughout. The wood is soft; however, the icepick penetration is minimal (up to 1/8" deep). This column is under a previously mentioned roof leak. See Photo S-35.

Three of the interior columns in the hayloft exhibit small holes likely from insects or animals at the base of the columns. These holes were observed at Columns C/3, M/2 and K/3. See Photo S-36.

Hayloft Columns - Perimeter

Both the main gridline and the intermediate hayloft columns along the perimeter of the structure exhibit up to full-height x ¾" wide checks. These checks are typically observed on the east and west faces but there are also checks on the north and south faces of some isolated columns. Several checks in the east/west faces could develop into splits in the future as the checks are usually worse at the top of the columns where the brace is connected/ retrofitted. There are numerous locations where the columns have already developed splits in the east/west face. Splits were observed at Columns D/1, C/4, L/7 and O/1 along the main gridlines and at the intermediate columns between Columns S/4 and T/4 (Column S.5/4), and between Column M/7 and N/7 (Column M.5/7). As previously reported, the splits in the columns have contributed to the roof beams twisting at the bearing locations. In many of these locations, the walls are being pushed outwards by the split column. See Photos S-15 and S-37.

The perimeter columns in the hayloft typically lean towards the south up to 3 degrees at the north elevation of the barn. In the west wing, the south elevation wall at Gridline 4 is pushed outwards up to 18 inches and the columns are leaning outwards towards the south up to 7 degrees with the worst case at Column F/4. See Photo S-38. In the center lean-on region, the columns along the south wall at Gridline 7 are typically leaning towards the south up to 4 degrees. In the east wing, the columns along the south wall at Gridline 4 are typically leaning towards the south up to 5 degrees.

Several perimeter columns exhibit water staining. In most cases, the exterior cladding of the building is not fully weatherproofing and protecting the interior. Some of the more notable water damaged columns include:

- Column H/4: The corner column has severe rot with full icepick penetration and is deteriorating but a newer post was installed directly adjacent to the original column on the east side. The south and west braces are still attached to the original column. A steel strap was also used to attach the south brace to the newer column; however, the strap is not oriented correctly to transfer loads to the brace. Additionally, two smaller posts were installed nearby to provide vertical support to the wind girts and roof beams. See Photos S-39 to S-41.
- Column H/7: The corner column has severe rot and section loss at the top, but a newer post was installed directly adjacent to the original column on the east side. The north brace and wind girt have no positive connection to the new post or original column allowing the siding to fall away from this area and permitting the members to be exposed to the exterior conditions. There is no lateral brace to the east of the column which was likely removed during the installation of the newer post. Access for a close-up inspection of this area was not permitted due to rotting/missing floorboards. See Photo S-42.

- Column S/4: This column has severe rot and is deteriorated. The column appears to have dropped down and there is an up to 3" gap between the underside of the roof beams and the top of the column. The roof beams have minimal to no bearing remaining at this location. See Photo S-19.

Hayloft Lateral Bracing – Braces in the East/West Direction.

The east and west lateral braces generally exhibit up to full-length x ¾" wide checks. See Photo S-43. Several of the braces also exhibit full splits, typically starting from the ends of the braces near the connections. See Photo S-44. These splits were most notable at the braces of Columns I/2, M/2, J/6, P/2, and R/2; however, several other braces with checks could develop into splits in the future.

The braces are connected to the columns and beams using a mortise and tenon joint positively connected with a wooden dowel. In several locations throughout the structure, the wooden dowel could not be seen from both sides of the column and there was a hole where a dowel would have been expected. See Photo S-45. Due to the consistent nature of this finding, it could not be determined whether this was "as constructed" or if the dowel had deteriorated from one side. Most of the braces have steel straps connecting to the column which appear to have been a retrofit to help keep the braces engaged. See Photo S-46. These straps help keep the braces attached to the columns but are not oriented to help transfer any of the braces' loads. Additionally, the braces are also generally toe-nailed to the columns to help keep them attached. There are several locations where the braces are disconnected and sliding out of the mortise slot or missing altogether. This was observed at the following locations:

- Column F/2 – West Brace: The west brace of Column F/2 is starting to slip out of the mortise slot at the top connection to the roof beam. There is a gap between the end of the brace and the bottom of the beam.
- Column M/3 – East Brace: The east brace of Column M/3 is not positively connected at the base connection to the column. There is a 2" wide gap between the end of the brace and the face of the column. The brace is twisted 7 degrees at this location. The dowel and toenails are ineffective. See Photo S-47.
- Column M/5 – West Brace: The west brace of Column M/5 is out of the mortise slot at the base connection to the column. The brace is held in place with two metal retrofit straps. See Photo S-48
- Column H/6 – East Brace: The east brace of Column H/6 is starting to slip out of the mortise slot at the top connection to the roof beam. There is a ½" gap between the end of the brace and the bottom of the beam. The dowel appears to be intact. See Photo S-49.
- Column R/3 – West Brace: The west brace of Column R/3 is disconnected at the base connection to the column and is sliding out of the mortise slot. There is a 1.5" wide gap between the end of the brace and the face of the column. The dowel at this connection is missing. See Photo S-50.
- Column B/4 – East Brace: There is no east brace at Column B/4 in the west wing. Based on similar geometry in the building's east wing, there is expected to be a brace at this

location. Access to this area for a close-up assessment was not permitted due to safety concerns. See Photo S-51.
- Column H/7 – East Brace: There is no east brace at Column H/7. Based on similar geometry at Column N/7, there would be a brace at this location. It is speculated that the brace was removed during previous repairs in this corner of the building. Access to this area for a close-up assessment was not permitted due to safety concerns. See Photo S-42.

A few of the braces exhibit water damage and rot, mainly at the connection interfaces. Some of the more notable water damaged braces include:

- Column B/2 – East Brace: The east brace of Column B/2 exhibits rot with approximately 20% section loss.
- Column L/4 – West Brace: The west brace of Column L/4 exhibits rot at the base connection to the column with up to 3" icepick penetration.
- Column M/4 – West Brace: The west brace of Column M/4 exhibits rot at the base connection to the column with up to 3" icepick penetration. See Photo S-52.

Hayloft Lateral Bracing – Braces in the North/South Direction.

The north and south lateral braces generally exhibit up to full-length x 1/2" wide checks. The checks are generally in the east and west faces but there are also checks on the top and bottom faces of some isolated braces. At Column P/2, the south brace appears to have a complete split in the east/west face near the base connection to the column. See Photo S-53.

In general, the braces attached to the interior columns are in better condition than the braces attached to perimeter columns. There are three interior columns with braces that exhibit connection issues at their ends. These columns are associated with the load transfer spreader beam structure at Columns E/2 and Q/2 or are directly adjacent to these locations (Column F/2). Specific defects include:

- Column E/2 – South Brace: The south brace of Column E/2 is disconnected at the base connection to the column. The dowel hole in the brace is broken and only a small sliver of the brace is still within the mortise slot. See Photo S-54.
- Column F/2 – South Brace: The south brace of Column F/2 is completely disconnected at the top connection to the horizontal frame member. The brace is no longer within the mortise slot and only held up by a single steel strap. The strap is not oriented along the axis of the brace thus making the brace ineffective at resisting lateral loads. See Photos S-55 and S-56.
- Column Q/2 – South Brace: The south brace of Column Q/2 is slipping out of the mortise slot at the top connection to the horizontal frame member. There is a gap between the end of the brace and the bottom of the member. The dowel is projecting outwards from the dowel slot at this location. See Photo S-57.

The north and south lateral braces associated with the columns along the structure's perimeter typically show connection issues at the top connection. Most of the braces have disconnected

from the column at the top connection and have started slipping out of the mortise joint. A retrofit steel strap was attached between the top of the braces and the top of the columns, but these straps are not always installed to properly transfer the brace loads. See Photo S-58. Other notable connection issues include:

- Column F/4 – North Brace: The north brace of Column F/4 is disconnected at the base connection to the floor beam. The wall at this location is pushed outwards approximately 18 inches and the associated column leans towards the south up to 7 degrees. See Photo S-38.
- Column H/7 – North Brace: The north brace of Column H/7 is disconnected at the top connection to the column. There is no retrofit strap at this location. Access to further investigate this issue was inhibited by missing/rotting floorboards. See Photo S-42.
- Column N/7 – North Brace: The north brace of Column N/7 has no dowel at the top connection to the column. See Photo S-59.
- Column R/4 – North Brace: The north brace of Column R/4 is disconnected at the base connection to the floor beam. The column at this location leans towards the south up to 4 degrees. See Photo S-60.
- Column B/1 – South Brace: The south brace of Column B/1 appears to be rotting at the base connection to the floor beam. Access to this area to check the extent of rot was not permitted due to broken/rotting floorboards. See Photo S-61.

There are three (3) locations in the hayloft where the north/south braces may have been removed during previous renovations. Columns E/1 and Q/1 do not have braces on the south side as would be expected based on the other columns along Gridline 1. There is a mortise slot in these columns which indicate that there was likely a brace in the past. There is also a small portion of wood in the mortise slot with a dowel which indicates that the brace was likely cut off at this slot. These columns are directly north of the load transfer spreader structures, and the braces were likely removed as part of that load transfer spreader structure addition. See Photo S-62. Similarly, at Gridline K/1 there is a door entryway instead of a column with brace. It could not be determined whether this was as originally designed or if the door was installed during a later renovation. See Photo S-63.

Hayloft Load Transfer Spreader Structures at Columns E/2 and Q/2

The two load transfer spreader structures at Gridlines E/2 and Q/2 were installed after the original barn construction. The spreader beams are deflecting up to 2" and exhibit checks up to ½" wide. See Photo S-64. The west column of the spreader beam at Gridline Q/2 exhibits a ¾" wide full-height check in the south face. See Photo S-65.

Ground Floor Level Findings

Hayloft Floor Deck

The hayloft floor deck typically exhibits water stains and rot throughout the floorboards. See Photo S-66. There are several areas where the floorboards are broken or missing. See Photos S-67. The situation is worse in the lean-on portion of the structure where water is ponding on tarps and near the edges of the building where water has infiltrated through the building's

envelope. See Photo S-3. The topside of the floor is typically covered in hay which limited the inspector's ability to inspect the floor from the top. Extreme care must be taken when walking and working in the hayloft due to the noted defects as well as designed openings in the floor. Several areas of the hayloft could not be accessed due to deteriorating floorboards. See Photos S-42 and S-61. In some areas, plywood sheets have been installed to cover some of the openings caused by broken/missing floorboards. See Photo S-68.

Hayloft Floor Stringer

The hayloft floor stringers typically have areas with water staining, most notably in the lean-on portion of the structure and edges of the building where water has infiltrated through the building's envelope but are generally in satisfactory condition. Some of the stringers have been previously sistered as a repair along the south elevation. There is one stringer that has significant rot at the south bearing on the floor beam between Columns R/4 and S/4. This bearing has been previously sistered to a new member; however, the rot appears to be spreading and should be readdressed. See Photos S-69 to S-70.

There are a few areas where the bridging between the floor stringers is disconnected from the stringers and could fall. This was observed at the following locations:

- Bay to the northeast of Column B/4
- Bay to the northeast of Column F/3. This area is over the walkway.
- Bay to the northeast of Column L/5. This area is over the walkway. See Photo S-71.

Hayloft Floor Beams – Spanning East/West

There are floor beams directly supporting the floor stringers spanning east/west between the columns along Gridlines 1, 2, 2.5, 3, 4, 5, 6, and 7. These floor beams typically exhibit up to full-length x 1" wide checks. See Photo S-72. These checks are typically observed on the north and south faces but there are also checks on the bottom face of some isolated beams. The top faces of the floor beams were not visible for assessment. In a few locations, there are full splits observed at the last two feet of the beam where the beam is notched for the adjacent beam to bear. See Photo S-73.

The hayloft floor is generally uneven throughout. Many of the floor beams are visibly leaning with one support lower than the other support. This affects the beam's bearing area and there are gaps and bearing loss at many of the bearing surfaces. Most of the beams have at least 50% bearing remaining. Some of the more notable locations include:

- Column C/2: Cap is twisting. West beam has approximately 8" of bearing remaining. East beam has approximately 2" bearing remaining. Metal straps have previously been installed as a retrofit. See Photos S-74 to S-75.
- Column E/2: West beam is no longer bearing on cap. Only approximately the end 2" of the west floor beam is bearing on the east beam at the notch. See Photo S-76.
- Column F/3: West beam is no longer bearing on cap. The west beam is only bearing on the east beam at the notch. The column cap is split at this location. See Photo S-77.

- Column M/2.5: Both the east and west floor beams have limited contact with the cap. They are only bearing in the area directly over the column. See Photo S-78.
- Column I/3: A thick shim has been installed between the top of the column cap and the underside of the floor beams. See Photo S-79.
- Column M/3: Both the east and west beams have limited contact with the cap. The floor beams are only bearing in the area directly over the column.
- Column P/2: The west beam is no longer bearing on cap. The west floor beam is only bearing on the east beam at the notch.
- Column S/3: The west beam is no longer bearing on cap. The west floor beam is only bearing on the east beam at the notch.

Several beams along the north and south elevation exhibit water staining and areas of rot/deterioration. There are two beams where the extent of the rot is significant and needs to be addressed as soon as possible:

- Floor Beam between Columns B/4 and C/4: The west end of the floor beam is severely rotted and has approximately 90% section loss. **This is a critical finding. WSSC was immediately notified, and this area of the barn was roped off by the Gannett Fleming inspectors. See Photos S-80 to S-81.**
- Floor Beam between Columns I/1 and J/1: The west end of floor beam is severely rotted and has approximately 75% section loss. Rot could only be observed from the exterior of the barn where there is an opening in the siding. The end of the beam appears to be crushing at the column bearing area. This area supports haybales and debris directly above. See Photos S-82 to S-84.

Other notable areas of water damage and rot are found at the following locations:

- Floor Beam between Columns F/4 and G/4: West end of beam has water damage and very soft rot. Supporting column cap has similar rot. See Photo S-85.
- Floor Beam between Columns J/1 and K/1: There is 2" of icepick penetration at the east end. The majority of this floor beam was not visible for assessment due to plywood and siding covering the beam. See Photos S-86 to S-87.
- Floor Beam between Columns H/7 and I/7: Beam has water staining throughout and is slightly soft due to rot.
- Floor Beam between Columns R/4 and S/4: Beam has water staining throughout which is worst near the west bearing. West bearing has soft area due to rot with up to 1" icepick penetration. Supporting column cap has similar rot. See Photo S-88.
- Floor Beam between Column S/1 and T/1: East end of beam is rotting over the column bearing. Visibility to this area was limited due to siding. See Photo S-89.

Hayloft Floor Beams – Spanning North/South

There are floor beams spanning north to south which are parallel to the floor stringers at the main column gridlines. These floor beams provide lateral supports at the top of the columns and support the north/south perimeter bracing in the hayloft. These floor beams typically exhibit up to full-length x 1.25" wide checks. These checks are typically observed in the east

and west faces but there are also checks on the bottom face of some isolated beams. See Photo S-90. The top faces of the floor beams were not visible for assessment.

Along the perimeter, some of these beams exhibit water staining and rot. The most significant locations include:

- Floor Beam between Columns C/3 and C/4: The north end of the floor beam has an area of water damage and rot. There was limited access to this area for a close-up assessment due to the critical finding noted at the adjacent beam. See Photo S-91.
- Floor Beam between Columns I/6 and I/7: There are moisture stains near the south end connection with the lateral brace.
- Floor Beam between Columns S/3 and S/4: The south end of the floor beam has an area of water damage and rot. The adjacent stringers are also rotted. One stringer has been previously spliced. See Photos S-70 and S-92.
- Floor Beam between Columns T/2.5 and T/3: The north end of the floor beam has an area of water damage and rot with approximately 25% section loss. This is observed from the exterior of the structure where there is a hole in the cladding. See Photo S-93.

Grade Level Columns – Main Gridline

The columns at grade level support the hayloft floor beams at the main gridlines. All the interior columns along the main gridlines have a column cap at the top to support the floor beams. These column caps typically exhibit checks in the bottom face up to full length x ¾" wide. See Photo S-94. At Column F/3, the west side of the cap is split, and the supported floor beam has no support. See Photos S-77 and S-95. At Column E/2, the east end of the cap is split, and the cap does not appear to be sitting correctly on top of the column. There is a small gap between the top of the column and the bottom of the column cap with approximately 50% bearing remaining. See Photo S-96.

Four (4) of the caps along the south edge of the structure exhibit water damage and rot.

- Column F/4: East half of cap has water damage and is severely rotted. See Photo S-85.
- Column K/7: South face of cap is exposed to the exterior and has soft rot with up to 1.5" icepick penetration. See Photo S-97.
- Column R/4: East half of cap has water damage and is severely rotted with up to full icepick penetration at east face. See Photo S-88.
- Column S/4: West face of cap has water damage and soft rot with up to ½" icepick penetration.

The columns typically exhibit up to full-height x 1" wide checks. These checks are typically observed in the south and north faces but there are also checks on the east and west face of several columns. Column J/7 and Column S/4 exhibit full splits in the north/south faces. See Photo S-98 and S-99.

The columns at grade level are typically leaning towards the south (up to 3 degrees) except columns in the west wing which have a more pronounced lean. Columns along the north

elevation (Gridline 1) in the west wing are leaning up to 5 degrees south. Columns along the south elevation (Gridline 4) in the west wing are leaning up to 4 degrees south. Interior Columns C/2, E/2.5, F/2.5, D/3, and G/3 are leaning 4 degrees south, Column E/3 is leaning 5 degrees south, and Column E/2 is leaning 6 degrees south. See Photos S-100 to S-101.

The columns typically exhibit water damage and bearing issues, typically at the base of the columns. 17 columns were noted to have up to significant bearing loss at the base of the columns exhibiting between 75% to 100% section loss. Most of the bearing issues are observed in the west wing and central lean-on structure; however, the east wing has some bearing issues typically along the perimeter. These bearing issues are a critical finding since the main load path is interrupted. The load path is unintentionally being transferred to other members as evidence by the fact that the structure is still standing. It is speculated that the load path may be inadvertently going through some of the non-structural timber stables to get to the foundation at locations where the bearing is completely missing. Columns with 75-100% bearing loss include:

- Column D/2: The base is hollow at the interior, but the edges still are bearing. See Photo S-102.
- Column E/2: 90-100% section loss at base. A stick rule can be completely inserted below the column.
- Column F/2: 90-100% section loss at base. A stick rule can be completely inserted below the column.
- Column G/4: 90-100% section loss at base. A stick rule can be completely inserted below the column.
- Column I/2: Approximately 100% section loss at base. A stick rule can be completely inserted below the column. See Photo S-103.
- Column K/2: The base is hollow at the interior, but the edges still are bearing.
- Column J/2: 90-100% section loss at base. A stick rule can be completely inserted below the column.
- Column I/2.5: Approximately 100% section loss at base. A stick rule can be completely inserted below the column. See Photo S-104.
- Column J/2.5: 90-100% section loss at base.
- Column K/2.5: Approximately 90% section loss at base. Note this column is sitting on a pedestal. See Photo S-105.
- Column L/2.5: 90%-100% section loss at base. A stick rule can be completely inserted below the column. See Photo S-106.
- Column M/2.5: Approximately 100% section loss at base. A block of wood was added to the west side to hide the hole. See Photos S-107 to S-108.
- Column J/3: 90%-100% section loss at base. A stick rule can be completely inserted below the column.
- Column T/2.5: 75-90% section loss at base. Only the west edge appears to be bearing on the supporting sill plate. The sill plate that the column is sitting on is also rotting.
- Column T/3: 75-90% section loss at base. Only the west edge appears to be bearing on the supporting sill plate. The sill plate that the column is sitting on is also rotting. See Photo S-109.
- Column P/4: Approximately 100% section loss at base. See Photos S-110.
- Column S/4: 75-90% section loss at base with full icepick penetration.

Other columns with rot and up to 75% section loss at base include:

- Column H/2: 50-75% section loss at base.
- Column D/2.5: Soft rot near base with up to ½" icepick penetration.
- Column F/2.5: Soft rot at base with up to 3" icepick penetration.
- Column H/2.5: Approximately 10% section loss at base with up to ¼" icepick penetration. The column is sitting on the curb and is overhanging slightly.
- Column D/3: Approximately 25% section loss at base.
- Column F/3: Soft rot at base with up to 1" icepick penetration.
- Column G/3: Approximately 25% section loss at base.
- Column C/4: Soft rot at base with up to 3.5" icepick penetration.
- Column J/1: Approximately 30% section loss at base. The sill plate that the column is supported by is deteriorated and missing portions immediately to the east and under the column. The column appears to be partially sitting directly on the CMU foundation wall instead of the sill plate. See Photo S-111.
- Column N/2: 25-50% section loss at base.
- Column I/4: 50-75% section loss at base.
- Column J/7: 50-75% section loss at base.
- Column M/7: Soft rot at base with up to full icepick penetration.
- Column N/7: Soft rot at base with up to 3" icepick penetration.
- Column T/1: 50-75% section loss at base. The sill plate that the column is supported by is deteriorated and rotting under the column. See Photo S-112.
- Column S/2: 50-75% section loss at base. The remaining portion is soft with up to ½" icepick penetration.
- Column T/4: 10-20% section loss at base. The remaining portion is soft with up to 1" icepick penetration.

In addition, Column B/4 could not be easily viewed from the interior of the structure due to boards blocking access and being located adjacent to the previously noted critical finding in the floor beam. From the exterior this column could not be easily accessed due to heavy vegetation on the outside of the structure; however, it did appear that there are holes in the siding and the column is exposed to the exterior conditions and rotting throughout its height. The extent of the rot could not be determined due to limited access. See Photos S-113 to S-114.

Two main columns appear to have been replaced in the past: Column O/2 and Column N/5. At these columns there is no positive connection at the cap or beam member at the top. In addition, the lateral braces that should have been at these columns based on similar geometry are missing. See Photos S-115 to S-117.

In three locations, the top portion of the columns were different than the lower portion. At Columns C/2 and D/2.5 the lower portion consists of a round timber column with timber boards splicing it to the original top column. See Photos S-118 and S-119. Similarly, at Column N/6 a new 5.75"x5.75" square post was added below the original column. See Photo S-120. The original column is notched around the lower post.

Grade Level Columns – Intermediate Columns

Along the north elevation at Gridline 1, there are also intermediate columns which help support the floor beams spanning east to west at this gridline. These columns are centered between the main columns except for where door openings have been installed to access the barn. These columns do not have caps or braces and are used solely as an intermediate support for the floor beam and wind girts. These intermediate columns generally have checks up to full height x ¾" wide in the south face. See Photo S-121. In general, these intermediate columns are leaning towards the south at a similar degree as the adjacent main columns.

In five (5) places along Gridline 1, it appears that some of the intermediate columns were removed in the past when door openings were either installed or enlarged. Door jambs were installed in their place to help support the floor beams. Signs of removed columns for new openings were observed at the following locations:

- The intermediate column between Columns E/1 and F/1 appears to have been removed after the original construction. There is an empty mortise slot in the underside of the floor beam centered between the door jambs. Additionally, the CMU foundation wall appears to have been chipped out to create this opening. The floor beam now spans the entire way between the main columns. There is an up to ¾" wide check in the south face of this beam which is typical of the floor beams along this gridline. There are no other signs of any significant overstress. See Photo S-122.
- The intermediate column between Columns G/1 and H/1 appears to have been removed after the original construction. There is a mortise slot in the underside of the floor beam with what appears to be a cut portion of the original column centered between the door jambs. The floor beam now spans the entire way between the main columns but there are no signs of any significant overstress. See Photo S-123.
- The intermediate column between Columns N/1 and O/1 appears to have been removed after the original construction. There is an empty mortise slot in the underside of the floor beam centered between the door jambs. The floor beam now spans the entire distance between the main columns but there are no signs of any significant overstress.
- The intermediate column between Columns P/1 and Q/1 appears to have been removed after the original construction. There is an empty mortise slot in the underside of the floor beam centered between the door jambs. The floor beam now spans the entire distance between the main columns. There is an up to ¾" wide check in the south face of this beam which is typical of the floor beams along this gridline. There are no other signs of any significant overstress. See Photo S-124.
- The intermediate column between Columns R/1 and S/1 appears to have been removed after the original construction. There is an empty mortise slot in the underside of the floor beam approximately 1ft to the east of the door jamb. Additionally, the CMU foundation appears to have been cut out to create this opening. The door jamb is likely taking the load that the removed column would have taken, and no immediate issues were observed.

Grade Level Lateral Bracing – Braces in the East/West Direction.

A few isolated east/west lateral braces exhibit up to full-length x 1/4" wide checks. These were most notable at Column H/5, Column N/7, and Column T/4. Additionally, several east/west braces exhibit connection issues at their mortise and tenon joints. These issues were observed at the following locations:

- Column H/6 – East Brace: The east brace of Column H/6 is slipping out of the mortise slot at the top connection to the floor beam. There is a retrofit strap that was attached to keep it in place. There is also a ¾" wide gap between the end of the brace and the face of the column at the base connection. See Photos S-125 to S-126.
- Column H/7 – East Brace: The east brace is not positively connected to the column at the base connection. See Photo S-127.
- Column N/4 – East Brace: The east brace exhibits a ¼" wide gap at the base connection to the column.
- Column N/7 – West Brace: The west brace is not positively connected to the column at the base connection. The wind girt at this location is connected to the brace and therefore is not efficiently transferring loads to the column. See Photo S-128.
- Column T/2 – West Brace: The west brace is not connected to the column at the base connection. The dowel is sheared, and the brace is sticking out of the mortise slot up to 2". See Photo S-129.

The west brace at Column N/5 appears to have been removed, likely during the replacement of the column at this location (see "Grade Level Columns – Main Gridline" section above and Photo S-117). Similarly, it is likely that there was an east brace at Column B/1 that was removed at some point based on similar geometry at Column T/1 and an empty mortise slot in the sill plate.

In a few isolated locations, notches were cut out of the bottom face of the braces. This was observed at Columns N/6, T/2.5, and T/3. See Photo S-130.

Grade Level Lateral Bracing – Braces in the North/South Direction.

The north/south lateral braces exhibit up to full-length x 1/2" wide checks in all faces. Additionally, several north/south braces exhibit connection issues at their mortise and tenon joints. These issues were observed at the following locations:

- Column C/2 – South Brace: The south brace of Column C/2 has a strap added to the base connection to the column to keep it attached. See Photo S-131.
- Column G/2 – South Brace: The south brace of Column G/2 has a 1" gap at the top connection to the floor beam where the brace is dropping down. See Photo S-132.
- Column H/2 – South Brace: The south brace of Column H/2 has a 1/2" gap at the base connection to the column.
- Column N/2 – South Brace: The south brace of Column N/2 has a 1/2" gap at the base connection to the column.

- Column H/7 – North Brace: The north brace of Column H/7 has a 1/2" gap at the base connection to the column. At least one nail is disconnected. See Photo S-133.
- Column R/2 – South Brace: The south brace of Column R/2 has a strap added to the base connection to the column to keep it attached.

The majority of the braces in the north/south direction are located along Gridline 2. There are 4 locations along Gridline 2 where the lateral braces in the north/south direction braces are missing. This occurs at Columns E/2, O/2, P/2, and Q/2. At Column O/2, the brace was likely removed when the column was replaced (see "Grade Level Column – Main Gridlines" section above and Photo S-115). At Column Q/2 it appears that the brace was likely removed to install a fixed ladder going to a hatch in the hayloft floor above. See Photo S-134. At the other locations it is possible the braces were removed to install some of the stables as there are stables now blocking the mortise hole in the column.

Cantilevered Overhang at South Elevation

There is an overhang that is cantilevered from the main columns along the south elevation of the building. At the west and east wings, the overhang is supported by the columns on Gridline 4. Along the lean-on portion of the structure, the overhang is supported by the columns on Gridline 7. At each column the cantilever system typically consists of two horizontal members with two diagonals acting as knee-braces. At some locations the horizontal and/or diagonal support members are missing, damaged, or detached. Specific defects were noted as follows:

- Column C/4: The two diagonal supports for the overhang are missing. See Photo S-135.
- Column H/4: There are no diagonal supports for the overhang at this location; however, it appears that the overhang is supported by the wall of the lean-on instead. See Photo S-136.
- Column H/7: The overhang support diagonal has rot at the base connection with up to 4" deep icepick penetration. The diagonal is not connected to the column. The overhang is drooping at this location. See Photo S-137.
- Column J/7: The east overhang support diagonal is missing, and the east overhang support horizontal is damaged at this location. See Photo S-138.
- Column K/7: The west overhang support diagonal is missing at this location. See Photo S-139.
- Column N/7: The overhang diagonal support is disconnected from the column. The overhang is drooping at this location. See Photos S-140 to S-141.
- Column P/4: Both overhang support diagonals and the west horizontal member is missing at this location. See Photo S-142.
- Column S/4: The overhang support horizontals have rot at the column connection with up to 1" icepick penetration. See Photo S-143.

Foundations

Sill Plate

The columns at the west (Gridline B), north (Gridline 1), and east (Gridline T) elevations are sitting on a timber sill plate which rests on a CMU foundation wall sitting on a concrete strip

footing. Access to the sill plate along the north elevation was limited due to storage containers located along Gridline 1. The sill plate has areas of rot throughout. Specific areas of rot include:

- Along Gridline B below Column B/2.5, the sill plate is rotting and hollowed out with 75-90% section loss below the column. A stick rule could be fully inserted below the column. See Photo S-144.
- Along Gridline 1 below Column H/1, the sill plate is rotting with up to full icepick penetration. See Photo S-145.
- Along Gridline 1 below Column I/1, the sill plate is rotting with up to full icepick penetration. There was no access to this sill from the interior of the structure due to storage containers. Rot was observed through a hole in the siding on the exterior. See Photo S-146.
- Along Gridline 1 below and adjacent to Column J/1, the sill plate is completely deteriorated and rotting with 100% section loss. There was no access to this sill from the interior of the structure due to storage containers. Rot was observed through a hole in the siding on the exterior. The column appears to be resting directly on the CMU foundation wall. See Photo S-111.
- Along Gridline 1 at door opening at Gridline K/1, the end of the sill below the east jamb is rotting with full icepick penetration. This appears to be an original opening to the building. See Photo S-147.
- Along Gridline 1 adjacent to Column P/1, the sill plate is rotting with full icepick penetration. There was no access to this sill from the interior of the structure due to storage containers. Rot was observed through a hole in the siding on the exterior. See Photo S-148.
- Along Gridline 1 below Column S/1, the end of the sill is rotting with full icepick penetration. This column also acts as the door jamb at this location. The door at this location does not appear to be part of the original construction due to chipped CMU foundation wall at this location. See Photo S-149.
- Corner of Gridlines 1 and T below column T/1, the sill plate is rotting with 75-90% section loss below the column. See Photo S-112.
- The entire sill plate along Gridline T is rotting with up to full icepick penetration and areas of section loss. The siding along the east elevation is typically broken or missing along the length of the sill plate allowing the sill to be exposed to the external environment. There is a void with 75% -90% section loss under Columns T/2.5 and T/3. See Photos S-109, S-150, and S-151.

Masonry (CMU) Foundation Walls

The sill plates along the west, north and east elevations are supported by ungrouted CMU walls. Only the top few courses of CMU blocks were visible for observation. Based on the geotechnical investigation, the depth of the foundation wall below grade varies. Defects in the CMU foundation wall were typically observed on the west elevation along Gridline B. The top of the CMU wall on the west elevation is typically leaning outwards up to 4 degrees. See Photo S-152. There is one missing CMU block on the west elevation near Column B/2. See Photo S-153. Nine (9) blocks on the west elevation have chips and holes in the exterior faces of the cells. See Photos S-154 to S-155.

Concrete Strip Footings

Geotech explorations were conducted in two locations along the north elevation. Based on these test pits it appears that the west, north, and east elevations have concrete strip footings. Only the footings within the test pit were visible for assessment. No significant defects were observed in the foundation at these two test pits.

Interior Column Foundations

The foundation for the remaining columns could not be determined during this investigation. No geotechnical exploration was conducted in the interior of the barn. In several locations, the interior columns are supported on up to 24" high concrete pedestals. These concrete pedestals appear to have been retrofits as there are steel straps embedded in the concrete and attached to the east and west faces of the timber columns. The pedestals are typically delaminated and/or spalled on the east and west faces. The spalls are up to 3" deep and expose the steel straps. See Photo S-156.

In several other locations, the timber columns are sitting directly on short 4" to 10" high curbs. These curbs are only located in the central lean-on region of the structure. The columns do not appear to have been positively attached to the curbs but are just sitting on top of the curb. The curb at Column L/7 has a 1/8" wide vertical crack in the east face. See Photo S-157

Slab-on-Ground

The walkway between the stables in the barn consists of a concrete slab-on-ground. There are several cracks in the concrete surface. At the northwest corner of the building at the west doorway, the slab has settled several inches. See Photo S-158.

Miscellaneous Defects

Curtain Wall

The south elevation has non-load bearing curtain walls at various locations underneath the overhang. In the west wing there are two separate bump outs; one is located between Gridlines B and C, and the other is located between Gridlines E and F. The bump outs in the west wing typically exhibit rotting and deteriorating siding along the bottom edges. See Photo S-159.

At the central lean-on structure there is one bump out located between Gridlines K and L. This bump out is load bearing as it helps support the gravity load from the roof of the out-of-scope outbuilding structure to the south of the main barn. The siding of this bump out is rotting at the base and the east end post. The sill of the wall appears to have been replaced by 2x6 boards in the past. See Photos S-160 to S-161.

The east wing has one continuous curtain wall between Gridlines N and T. This curtain wall is supported directly on the ground at the north end but is supported by CMU blocks towards the south end to account for the change in grade elevations. At the north end between

Gridlines N and O, the bottom of the siding and the sill is completely rotted. The wall appears to be hanging from the top and moves when pushed. See Photos S-162 to S-163. Similarly, the bottom of the siding and the sill of the wall between Gridlines S and T is rotting.

Between Gridlines Q and R, the CMU blocks are not aligned, and the wall appears to be pulled outwards. There is a split in the sill plate of the wall at this location. Based on discussions with the long-term Barn Manager Ms. Evans, the golf course used to attach a tent to this location using eyehooks during large events. The eyehooks at the top of the wall are attached back to the main framing supports of the structure using steel rods but the eyehooks at the bottom of the wall are only attached to the curtain wall. During one event the tent allegedly blew away from the structure into the nearby fields spooking the horses. This event could explain the misalignment and split in this wall. See Photos S-164 to S-166.

Siding and Wind Girts

Defects in the siding are mainly covered in the architectural portions of this report. In general, there are multiple places where water can infiltrate the siding and reach the structural components on the interior of the barn. Water issues are typically observed in the structural members along the building's perimeter due to poor protection from the siding.

The siding is attached to wind girts which transfer the wind loads to the columns and lateral system for the building. The wind girts have spot areas of rot in many locations, typically near the openings. Some girts/windowsills have up to full icepick penetration. See Photos S-167 to S-169. More significant defects in the girts include:

- At the hayloft level, the wind girt connection from the west wall to Column H/7 is disconnected. The wall is falling away at this location. Access to this area was limited due to poor flooring. See Photo S-42.
- At hayloft level, the wind girts from the west wall to Column B/1 has a poor connection. The girt seems to be connected directly to the roof beam, but the roof beam and end exhibits signs of water damage and rot at the connection interface. Access to this area was limited due to poor flooring. See Photo S-61.
- At grade level, the wind girts are not attached to Column H/7. See Photo S-133.

Door Framing

The door framing is generally in good condition with some typical checks on the jambs and headers. In the west wing at the door between Columns F/4 and G/4, the original header is severely rotted. A new 2” x 11.25” deep member has been sistered to the original member and acts as a new header. See Photo S-170.

Vegetation

There is heavy vegetation growth attached to the building. At some locations the vegetation has found its way through the siding/roof and into the building. Vegetation can further

accelerate damage to structural members by creating wider openings for water infiltration and in some cases moving structural elements. Specific locations include:

- The north elevation between Gridlines D and H has heavy vegetation growth. The vegetation is starting to push up the roof deck and has entered the hayloft level. See Photos S-5 to S-7.
- The southwest corner of building near Column B/4 has heavy vegetation growth which is starting to enter the building. See Photos S-113 to S-114.
- The west elevation of the lean-on structure between Columns H/4 and H/7 has heavy vegetation growth which is starting to enter the building. See Photo S-171.
- The east elevation of the lean-on structure between Columns N/4 and N/7 has heavy vegetation growth which is starting to enter the building. See Photo S-172.

Stables

The stables are non-structural elements; however, due to the bearing issues at the base of the columns and the horizontal displacement of the structure, it is speculated that the load is incidentally being transferred to the ground through some stable members. Extreme care needs to be considered if any stables are planned to be removed or modified in the future or as part of any repairs.

The interior and exterior stairways were found to be in good condition. There were no outstanding structural comments on the stairs. Additionally, the renovations performed by WSSC construction force on the northwest corner of the barn are in excellent condition. The renovations were performed to include the barn leaning. The barn cannot be brought back to plumb without removing the previously constructed renovations. Bringing the barn to plumb is not suggested as a renovation strategy.

Architectural

Roof Level Findings

Roofing Assembly

The roofing systems are an uninsulated standing seam metal panel at the main structure and corrugated metal panel at the lean-on structure. They are showing signs they have exceeded their useful life. Corrosion is apparent throughout the panels and spot repairs are observed at various seams between panels. This suggests the metal roof panels are compromised and are deteriorating. Cavities caused by the corrosion will continue to allow precipitation to enter and damage the interior construction materials. The roof penetration flashing components are also experiencing corrosion and may not be providing the intended seal. See Photos A-1 and A-2.

The edges of the roofing panels, particularly at the roof eaves, are lifting and are not tightly secured to the substrate. The edges of the roof are also absent of flashing or metal fascia which would ordinarily provide a drip edge to protect the roof framing and wall assembly. Wood fascia boards have also deteriorated or are no longer attached. Precipitation is not adequately directed away and is allowing moisture to seep into the assembly. The ridge line

and overlapping roof panels also exhibit moments of lifting, which are being subjected to moisture infiltration from wind driven rain. See Photos A-3 through A-7.

At locations where a sloped roof meets a wall, metal trim is observed transitioning from the wall to the roof. This is intended for covering the roof connection; however, the trim does not adequately prevent moisture infiltration from the top where the seam is left exposed and unprotected. The trim detail is allowing precipitation to enter the roofing assembly and space below. See Photo A-8.

Exterior Wall Findings

Wall Assembly

The wall construction is an uninsulated, board-and-batten style vertical wood installation with no waterproofing. The panels are severely deteriorated with excessive paint peel and wood decay. The locations of damage relate to areas of regular moisture exposure, accumulation of precipitation, and inability to dry. See Photos A-9 and A-10.

The paint has exceeded its useful life and no longer provides surface protection from weather, accelerating the deterioration of the wood. The boards and battens have also experienced decades of weathering and have warped and deteriorated over time. In conjunction, missing battens have exposed the joints between wood boards, allowing moisture to migrate into the wall system. See Photos A-11 and A-12.

The bottoms of the boards are showing deterioration and decay, indicating inadequate drainage away from the building face, rainwater splash back, and snowfall buildup. Rain leaders also appear to be discontinuous and are directing rainwater onto the façade. See Photos A-13 and A-14.

Vegetation and brush have taken root on the building façade and within the roof gutters. The roots of the vegetation are accelerating the deterioration of the wood panels and preventing proper drainage from the roof. As the vegetation grows, the root system continues to expand and separate the wall panels. This is contributing to water infiltration. See Photos A-15 through A-17.

Windows

Most window systems appear original and are deteriorated. Some locations are fully exposed without window systems, while other windows have damaged glazing. The windows also do not exhibit overhead flashing or sill plates to help protect the opening from moisture infiltration. Localized wood decay indicates moisture accumulation and the inability to dry or weep from the wall assembly. See Photos A-18 through A-21.

Doors

Most sliding doors are deteriorated. Select locations have significant wood decay, especially at the lower sections, which is indicative of inadequate drainage away from the building face, rainwater splash back, and snowfall buildup. Some sliding doors appear unpainted and unprotected from the elements, which are contributing to accelerated deterioration. See Photos A-22 and A-23.

Egress, ADA, and Life Safety

Barn egress and ADA requirements were not part of the scope and were not investigated. There were several fire extinguishers noted throughout the building; however, spacing of fire extinguishers and other life safety items were not part of the scope and were not investigated.

Geotechnical

Test Pit Findings

Test Pit 1 (TP-1) Findings

Test Pit 1 was performed along the outside of the exterior north wall, approximately 157 feet from the northeast corner of the building. See Photo GT-1. The excavation was completed to a total depth of 4.1 feet below ground surface (BGS). During the excavation, the following soils were identified (see Photo GT-3):

- 0.0'-0.2': GRAVEL, some Silt, contains Organics, angular, dark brown, damp, fill (gm)
- 0.2'-0.8': SILT, brown, micaceous, non-plastic, damp, residuum (ml)
- 0.8'-3.0': SILT, some fine Sand, trace mica schist Gravel fragments, mottled black and light brown and brown, micaceous, non-plastic, damp, residuum (ml)
- 3.0'-4.1': SILT, little fine Sand, trace mica schist Gravel fragments, mottled brown with black, micaceous, non-plastic, damp, residuum (ml)

No groundwater was encountered during the excavation.

The existing exterior wall foundation was able to be exposed and identified during the excavation. The foundation consists of an approximately 0.9 feet thick concrete spread foundation, with the top of footing located approximately 1.9 feet below existing grade at this location. See Photos GT-4 and GT-5).

Test Pit 2 (TP-2) Findings

Test Pit 2 was performed along the outside of the exterior north wall at the northeast corner of the building. See Photo GT-2. The excavation was completed to a total depth of 6 feet BGS. Due to the excavation depth and equipment limitations, the excavation was completed via mechanical means down to 4.6 feet BGS and then hand dug from 4.6 feet to 6.0 feet BGS where the top of footing was encountered. For safety, the test pit excavation was benched to allow the hand excavation from 4.6 feet to the termination depth of 6.0 feet. See Photo GT-7. During the excavation, the following soils were identified (see Photo GT-6):

- 0.0'-0.5': GRAVEL, little Silt, dark brown, non-plastic, damp, fill (gm)
- 0.5'-2.0': SILT, some fine Sand, light brown, micaceous, non-plastic, damp, residuum (ml)
- 2.0'-6.0': SILT, little fine Sand, trace Clay, reddish brown to brown with black spotting, micaceous, non-plastic, damp, residuum (ml)

No groundwater was encountered during the excavation.

The existing exterior wall foundation was able to be exposed and identified during the excavation. The foundation consists of a concrete spread foundation, with the top of footing located approximately 6.0 feet below existing grade at this location. See Photo GT-7. The foundation wall, consisting of CMU, was observed extending the entire depth and resting on top of the concrete spread footing. See Photo GT-7. Footing protrusion from the exterior wall was measured at approximately 1 foot using a vertical rod and sounding for the edge of the spread footing. See Photo GT-8. Due to the depth of excavation, the footing thickness was unable to be measured at this location.

Geotechnical Interpretation of Findings

Results of the test pits performed indicate the site soils generally consist of residual micaceous SILT (ml) with a thin layer of silty GRAVEL (gm) fill at the surface. Based on online soil mapping provided by the United States Department of Agriculture, Web Soil Survey (March 2024), soils at the project site are indicated to consist of Glenelg silt loam having a parent material of residuum weathered from mica schist. This mapped soil unit is consistent with what was observed during the test pit excavations. See Photo GT-9.

Existing exterior foundations were observed to consist of a concrete spread footing approximately 0.9 feet thick and protruding approximately 1 foot from the exterior wall. It is likely the exterior foundation is a strip footing located below all exterior walls of the structure. Depth to top of footing ranged from 1.9 feet BGS at TP-1 to 6.0 feet BGS at TP-2. It is unknown why depth to top of footing varied at these locations. Based on observations made by the inspector, existing grades at the test pit locations did not appear to significantly differ in elevation.

Hazardous Materials

Long-Term Barn Manager Interview

The property's long-term Barn Manager, Ms. Evans, was briefly interviewed by the Gannett Fleming inspector during the hazardous materials assessment on February 8, 2024. Key findings of the interview are as follows:

- The interviewee approximated that the building was constructed in the early-to-mid 1900's. This coincides with the estimate from others that the barn was constructed in the 1940's. *This is a timeframe when asbestos was commonly used in building products.*
- The interviewee was asked about the potential presence of asbestos insulation in the barn. *The interviewee was unaware of any such insulation.*

- The interviewee was asked about the presence of any heating, ventilation, or mechanical systems in the barn, as asbestos was sometimes incorporated into components of these types of systems. *The interviewee was unaware of any such systems*.
- The interviewee was asked about the age of the electrical system, as asbestos may be incorporated into the wrap/insulation of old wiring. *The interviewee was unaware of the wiring's age but acknowledged that the electrical system had been updated in recent years*.
- The interviewee was asked about the age of paint throughout the barn's interior and exterior, as its age may be indicative of lead paint. *The interviewee stated that the western exterior had recently been renovated. In all other areas, the paint was likely original. This age indicates the potential for lead paint to be present*.

Hazardous Materials Assessment Findings

A visual assessment of potential hazardous materials was completed by Gannett Fleming on February 8, 2024. The findings of the assessment, including descriptions of suspect materials, locations, and quantities are summarized in the following sections. Additionally, complete inventories and mapped locations for all of these materials are included in Appendix D2, and photographs are included in Appendix B5.

Asbestos Containing Materials (ACM)

A Maryland-licensed Asbestos Inspector (Gannett Fleming staff) completed the visual assessment for ACM. Asbestos was commonly incorporated into building materials in the United States prior to the 1980's due to its characteristics of strength, heat resistance, and corrosion resistance.

Two types of potential ACM were identified within the barn, as follows:

- Tan/white caulk associated with exterior windows (good condition, non-friable). See Photo E-1.
- Wire insulation on electrical wiring throughout the barn (insulation was not physically examined due to live power and inaccessibility).

Neither of the above potential ACM are likely to be disturbed during routine operations at the barn.

In the garage/outbuilding located south of the barn, tan/gray corrugated sheets were identified as potential ACM. These corrugated sheets were in poor condition and their use could not be determined. See Photo E-2.

As this was a visual inspection, no samples were collected for laboratory analysis of asbestos content. The potential for these materials to be ACM is attributed to the age of the barn (estimated construction in the 1940's), which aligns with a timeframe when asbestos was commonly used in these building products.

Lead-Based Paint

Lead-based paint was commonly used in the United States until its application was banned in 1978. Based on an interview with the barn's long-term Barn Manager, it is believed that the barn's interior and exterior painted surfaces are original and, therefore, are likely to contain lead. The exception was the barn's west exterior, where renovations were completed in recent years.

In addition to the time of paint application, another characteristic that aids in the identification of lead-based paint is "alligator texture" cracking. This characteristic cracking was observed in multiple areas of the barn's interior and exterior, indicating that lead-based paint was present.

The complete list of suspected lead-based paint locations is included in Appendix D2-2, and photographs are included in Appendix B5. See Photos E-3 through E-12. As this was a visual inspection, no paint samples were submitted for laboratory analysis.

PCB-Containing Fluorescent Light Fixture Ballasts

Fluorescent light fixture ballasts have the potential to contain PCBs if they were manufactured before July 1979. Furthermore, fluorescent light fixture ballasts manufactured before 1979 are considered to be PCB-containing unless they are labeled otherwise.

One fluorescent light fixture was observed in the barn during the inspection (Appendix D2-3). No PCB-related labels were present on the outside of the fixture. The fixture was rusty, in poor condition, with live power connected, and therefore was not opened to allow inspection of the ballast. See Photo E-13. This fluorescent light fixture ballast is presumed to contain PCBs due to its rusty condition indicating pre-1979 installation. As this appeared to be a functional light fixture, its immediate replacement was not considered necessary.

A fluorescent light fixture was also observed in the garage/outbuilding located south of the barn. See Photo E-14. This fixture could be seen, but it was physically inaccessible for thorough examination. Due to its apparent age and lack of access for examination, the ballast was presumed to contain PCBs.

Tritium-Containing Exit Signs

No tritium-containing exit signs were identified during the assessment.

Transformers

No transformers were identified during the assessment.

Batteries (Nickel Cadmium, Lead-Acid, Lithium)

No batteries were observed within the barn interior during the inspection.

Two lead-acid car batteries were observed in plastic battery boxes in the garage/outbuilding located south of the barn (Appendix D2-4). The batteries were covered in dust but appeared to be in good condition with no leaks evident. See Photo E-15.

Oil-Containing Equipment

No oil containing equipment was observed within the barn interior during the inspection. A gasoline-powered snowblower was located immediately adjacent to the barn's south exterior wall. See Photo E-16.

Multiple types of oil containing equipment were observed in the garage/outbuilding located south of the barn and in the covered storage area connection the garage/outbuilding to the barn. The full list of equipment, including descriptions and locations, is provided in Appendix D2-5. See Photos E-16 to E18.

Hazardous and/or Regulated Materials Inventory

Multiple hazardous and/or regulated materials were observed within the barn interior and exterior. Several materials were also encountered in the garage/outbuilding located south of the barn and in the covered storage area connection the garage/outbuilding to the barn The complete list of materials is provided in Appendix D2-6, including location and description. Additionally, photographs are provided in Appendix B5.

Electrical

Hayloft Lighting

Ceiling mounted lights in the hayloft do not have a protection guard over the lighting fixture bulb. Per NEC article 547.8.(B) *"Luminaires exposed to physical damage shall be protected by a suitable guard."* See Photo EL-1.

Site Mounted Panelboards

The site mounted panelboards are missing circuit breaker knockouts which allow accidental contact of live electrical parts. The site mounted panelboards have incorrectly mounted circuit breakers which allow accidental contact of live electrical parts. Per NEC article 110.27.(A) *"Live parts guarded against accidental contact. Live parts of electrical equipment operating at 50 to 1000 volts, nominal shall be guarded against accidental contact by approved enclosures."* See Photo EL-2.

CONCEPTUAL REPAIR CONCEPTS AND DETAILS

The structural findings and defects noted above indicate the structure is unsafe for a variety of factors. The building would need to be stabilized before any focused repairs could safely be made. The order of repairs must be carefully considered as any one repair could have a drastic effect on another portion of the structure. Repairs recommendations are organized as "Repairs necessary for occupancy", "Intermediate", and "Aesthetic". Repairs necessary for occupancy repairs are defined as those repairs that must be completed as soon as possible to help stabilize the structure and mitigate the risk of a sudden collapse. Intermediate repairs are important repairs which should be completed shortly after the repairs necessary for occupancy repairs. Aesthetic repairs are repairs which do not have immediate cause for concern but could eventually lead to issues in the future.

Conceptual repair details for critical items have been included in Appendix E. These repair details have not been engineered for design loads due to the limited scope of the report and are only provided as a conceptual basis for cost estimating purposes. Repairs should not be made to the structure based on these details without further engineering.

Structural

Repairs necessary for occupancy.

Stabilization, Shoring, and Safety Considerations:

Prior to any work being undertaken at this site, the entire structure would require stabilization to prevent any movement or shifting while repairs are made. As previously stated, loads may be passing through non-structural and or unintended members. It is critical that the structure be shored for gravity loading and braced for lateral loading to facilitate repairs. Due to the 'lean' in the structure and several braces missing or disconnected, the building would need to be supported laterally from the outside. The roof level and the hayloft level act independently from each other and would both need to be supported at the same time. While the north/south direction is the most concerning, all sides should be laterally supported prior to repairs being conducted.

Temporary vertical shoring would also be required in order to make any repairs. Due to the widespread nature of the noted defects, it is recommended that the entire hayloft level, including the overhang, be vertically shored from the ground. In most cases, shoring can support the structure at the hayloft floor beam level which would aid in the replacement of the column caps, columns, and sills, however there are some locations where additional shoring or modifications to the shoring would need to be considered including:

- The critical finding hayloft floor beam with 90-100% section loss between Columns B/4 and C/4. This beam and Column B/4 would need to be replaced and should not be used as part of the shoring design. The hayloft floor stringers and the overhang roof rafters would need to be shored at this location to allow replacement of the beam and column.
- The significant finding hayloft floor beam with approximately 75% section loss between Columns I/1 and J/1. This beam would need to be replaced and should not be used as part of the shoring design. The hayloft floor stringers and the cantilevered overhang roof rafters would need to be shored at this location to allow replacement of the beam and column.
- Other hayloft floor beams with rot which are recommended for replacement. These beams would need to be replaced and should not be used as part of the shoring design. The hayloft floor stringers and the cantilevered overhang roof rafters (as applicable) would need to be shored at these locations to allow replacement of the beams. Specific locations include:
  - *Hayloft Floor Beam between Columns F/4 and G/4*
  - *Hayloft Floor Beam between Columns J/1 and K/1*
  - *Hayloft Floor Beam between Columns H/7 and I/7*
  - *Hayloft Floor Beam between Columns R/4 and S/4*
  - *Hayloft Floor Beam between Columns S/1 and T/1*

In addition to vertical shoring on the first level, additional shoring would need to be added to the 2nd level to support the roof rafters along the north and south elevations. This shoring is needed to help aid in the removal and replacement of some of the severely rotted and deteriorated roof beams and columns along the perimeter of the structure. Some additional localized shoring may be needed at the 2nd level to aid in the completion of repairs within the interior of the hayloft level. This 2nd level shoring would need to be designed to transfer the load directly to the ground.

Once all shoring is in place, more permanent roof stabilization needs to be installed to prevent the roof loading from pushing the roof beams and walls outwards even farther at the north and south elevations. Steel cables or threaded rods would need to be attached between the roof beams at Gridlines 1 and 4 in the west and east wings, and between Gridlines 1 and 7 in the lean-on portion. These tension cables or ties are to be installed at every column line and would need to be designed to resist the outwards thrust of the roof. The roof beams at the north and south elevations must also have positive connections to each other at the connection. Shims should be provided to obtain full bearing and plates should be used to connect the two beams together at each nested connection. The goal of these cables is not to pull back the walls to their original plumbness, but to prevent further movement of the walls, rotations of the roof beams, and splits in the supporting columns. Due to the widespread nature of the defects, and the extent of leaning in the structure, any attempt to reorient or adjust the structure to plumbness could possibly have more adverse effects than intended. It is not possible to fully map and understand the load path in the structure after so many decades of movement and shifting.

Safety is paramount and extreme care needs to be taken while working in the building. In the hayloft there are several hatches and openings in the floor designed to make transferring materials (i.e. hay) from the hayloft to the grade level easier. The existing flooring is also rotting, broken, and missing in several locations as previously noted. Some areas in the hayloft are not safe to walk due to the possibility of breaking through the flooring or falling through an opening. A temporary working surface would need to be installed to make working in the hayloft safe. At minimum, the temporary working surface should be installed in the lean-on portion of the structure and along the perimeter of the structure where water damage is most prominent; however, all areas with damaged boards need to be addressed. All of the hay and debris would need to be removed from the hayloft in order to make repairs and install shoring. Additionally, the vegetation covering the exterior of the barn and entering the barn may interfere with the repairs and shoring and would need to be removed during the initial phases of the work. The order of operation for shoring installation and vegetation and debris removal would need to be carefully considered by the contractor due to the nature and degree of damage to the existing building.

The structural system is not working as originally designed due to the number of deficiencies noted. The stables are supposed to be non-structural elements; however, due to the bearing issues at the base of the columns and the horizontal displacement of the structure, it is speculated that both the gravity and lateral loads are incidentally being transferred to the ground through some horse stable and other non-structural members. Extreme care needs to be considered if any of the stables or non-structural members are planned to be removed or

modified in the future or as part of any repairs. Stables should not be removed until proper vertical and lateral shoring has been installed. Shoring should be designed in a manner which allows the stables and other non-structural members to remain in place during the installation process.

Critical Finding Repair at the Hayloft Floor Beam [Beam Between Column B/4 and C/4]:

The hayloft floor beam exhibiting rot with approximately 90% section loss needs to be replaced in kind. This beam is located between Columns B/4 and C/4. This beam supports the hayloft floor stringers, the cantilevered overhang roof rafters, the north/south spanning floor beams at Columns B/4 and C/4, and a lateral brace. These elements would need to be shored and detached prior to replacing the beam. All detached elements would need to be reattached after the beam is replaced.

Column B/4 could not be fully assessed during the site investigation due to heavy vegetation growth and limited access. Based on the limited observation, it is anticipated that this column has significant rot. This column would need to be replaced at the same time as the floor beam. This column directly supports the floor beam, lateral brace, cantilevered overhang supports, and wind girts which would need to be shored and detached prior to replacing the column in kind. All detached elements would need to be reattached after the column is replaced.

Significant Finding Repair at the Hayloft Floor Beam [Beam Between Column I/1 and J/1]:

The hayloft floor beam exhibiting rot with approximately 75% section loss needs to be replaced in kind. This beam is located between Columns I/1 and J/1. This beam supports the hayloft floor stringers and the north/south spanning floor beams at Columns I/1 and J/1. These elements would need to be shored and detached prior to replacing the beam. All detached elements would need to be reattached after the beam is replaced.

Rotting Roof Rafters:

The main roof rafters and overhang rafters exhibiting significant rot would need to be vertically shored from the ground level and new members sistered to the sound portion of the rafter. Some of the previously sistered roof rafters would need to be re-sistered due to rot spreading past some of the bolts connecting the sistered member to the original member. After sistering, the rotted portion of the rafters should be cut off and removed to help prevent the rot from spreading in the member in the future.

Split and Rotting Hayloft Columns at North and South Elevations:

There are several split columns along the north and south elevation in the Hayloft. Most of the splits could be addressed using the typical “split” repair noted later in this section; however, Column D/1 and Column C/4 exhibit severe splits and should be replaced in kind. These columns support the roof beams which are starting to rotate outwards due to the split in the column. The roof beams would need to be shored and the lateral braces detached prior to replacing the column. All detached elements would need to be reattached after the column is replaced.

Similarly, Column S/4 is severely rotting and needs to be replaced in kind. This column is designed to support the roof beams but there is limited to no bearing remaining. The new

column should be installed to also address the bearing issue. The roof beams would need to be shored and the lateral braces detached prior to replacing the column. All detached elements would need to be reattached after the column is replaced.

Rotting and Twisting Roof Beams along Perimeter:

The eight (8) roof beams along the south side of the roof which exhibit areas of significant rot and water damage should be replaced in kind. There are four (4) roof beams along the perimeter which have extreme twisting at the bearing and should be replaced in kind. These beams support the main roof rafters, and lateral braces at some locations. These elements would need to be shored and detached prior to replacing the beams. All detached elements would need to be reattached after the beams are replaced. The contractor would need to coordinate this repair with the roof stability repair previously mentioned.

Bearing Issues at Hayloft North/South Roof Support Frame Horizontal Members:

It is recommended that the twisted and raised hayloft roof support frame horizontal members at the south bearing need to have straps added to mitigate any additional movement. These straps would be connected to the roof beam below.

Disconnected and Missing Hayloft Bracing:

Many of the lateral braces at the hayloft level have become disengaged, disconnected, are completely missing, or there are issues with the mortise and tenon joints. The previous steel retrofit straps are ineffective in many locations. It is recommended that all hayloft columns be reconnected and all missing or removed braces be reinstalled as originally designed. Additionally, the lateral brace connection at all hayloft braces should be strengthened using a knee brace stabilizer to help strengthen the connection and mitigate these types of issues in the future.

Gaps at Interior Hayloft Roof Beams:

A few of the nested roof beams have separated and have gaps up to 1.5” wide between the beams’ ends. It is recommended that all hayloft interior roof beams be positively attached using a steel plate and lag bolts on the north and south faces.

Hayloft Load Transfer Spreader Beam Structures:

At the two (2) load transfer spreader beam structures, a new column support directly under the original column to shore up the deflected beam should be provided. This post support should be positively attached to the underside of the transfer beam and to the top of the floor beam below.

Disconnected or Poor Hayloft Wind Girt Connections:

The wind girts at the hayloft level which are disconnected from or poorly attached to their supporting columns need to be reattached to properly transfer the wind loads to the main lateral system and prevent the wall from falling away from the structure. Clip angles or plates could be used to positively attach the wind girts to the columns.

Rotting Hayloft Floor Beams:

In addition to the two critical and significant hayloft floor beams noted above, there are several other hayloft floor beams which exhibit water damage and rot. These beams should also be replaced in kind while the vertical and horizontal shoring is in place. These beams support the hayloft floor stringers, the overhang roof rafters, the north/south spanning floor beams. These elements would need to be shored and detached prior to replacing the beams. All detached elements would need to be reattached after the beam is replaced.

Rotting/Deteriorating/Broken/Missing Hayloft Deck Floorboards:

The floorboards at the hayloft level which are rotting, deteriorating, broken, or missing need to be replaced in kind once all the repairs to the floor beams and stringers have been addressed. This repair is considered "repairs necessary for occupancy" due to the safety concerns associated with walking over damaged floorboards; however, if the temporary working surface noted in the "Stabilization, Shoring, and Safety Considerations" section above is to remain in place after the repairs necessary for occupancy work is completed, then this could be considered an "aesthetic" repair.

Disconnected Hayloft Floor Stringer Bridging

The disconnected bridging members between the hayloft floor stringers are a safety concern due to the potential of falling on the walking surfaces below. All disconnected bridging should be reattached as originally designed to help stabilize the floor stringers and address the overhead safety concerns.

Rotting Hayloft Floor Stringers

The main floor stringers exhibiting significant rot would need to be vertically shored from the ground level and new members sistered to the sound portion of the stringers. Some of the previously sistered stringers would need to be re-sistered due to rot spread. After sistering, the rotted portion of the rafters should be cut off and removed to help prevent the rot from spreading in the member in the future.

Rotting and Split Grade Level Column Caps

The rotting and split columns caps at the grade level need to be replaced in kind. These caps directly support the hayloft floor beams and are bearing on the columns below. These elements must be shored, stabilized, and detached from the cap before replacing it. All detached elements must be reattached after the column cap is replaced.

Bearing Issues at Bases of Grade Level Columns

There are typically five (5) different column base support conditions at this structure. Column bases are usually bearing directly at the grade elevation, on a short concrete curb, on a concrete pedestal, on a timber sill plate, or on a retrofit timber pedestal. The majority of the column bearing issues are found in columns bearing directly at the grade elevation; however, there are isolated columns that have different base conditions with bearing issues. Repair recommendations are slightly modified based on the type of base support. In all cases, shoring of the floor above and stabilization of the column and braces are required prior to making the repairs. It is recommended that a positive connection between the column cap and top of

column be established using steel plates to align the structure above. Partial demolition of non-structural items such as the stables and concrete walkways may be required to access the columns. It is imperative that lateral and vertical shoring is in place prior to demolishing any elements and conducting the work since some non-structural items may be inadvertently transferring loads in this structure.

Most of the columns bearing directly at the grade level have section loss or rot initiating at the base. It is recommended that columns bearing directly at grade level be repaired by cutting off the bottom of the column with rot up to sound timber, pouring a new concrete pedestal which attaches to and complements the existing column foundation, positively attaching the bottom of the column to the new pedestal with clip angles or post base, and filling in any gaps between the pedestal and column with shims. While this repair is only needed at the columns exhibiting significant section loss and rot, it is recommended that all columns which bear directly at grade are repaired in this manner while the building is shored to mitigate similar issues from occurring in the future. If it is determined that rot exceeds 1/4 of the column's height, it should be replaced in kind.

In the few places where the columns are sitting on a pedestal or curb and exhibiting section loss or rot at the base, it is recommended that the entire column be replaced in kind. These columns are directly supporting the column cap or a floor beam and bearing on the concrete curb or pedestal below. Some of these columns also support lateral braces or wind girts. These connected elements would need to be shored, stabilized, and detached from the column prior to replacement. All detached elements would need to be reattached after the column is replaced.

Where the rotting columns are bearing directly on a timber sill plate, it is recommended that the column be replaced in kind. These columns are directly supporting the floor beam and bearing on the sill plate below. Many of these columns also support lateral braces or wind girts. These connected elements would need to be shored, stabilized, and detached from the column prior to replacement. All detached elements would need to be reattached after the column is replaced. Sill plates that are rotting below the columns would need to be replaced at the same time as the column replacement.

Rotting Sill Plates

The rotting sill plates at the grade level need to be replaced in kind. These sill plates directly support the grade level columns and are bearing on the CMU foundation wall below. These elements would need to be shored, stabilized, and detached from the sill plate prior to replacing. All detached elements would need to be reattached after the column cap is replaced. The existing masonry wall appears to be hollow and has no positive connection to the sill plate. A positive connection should be established by using anchor rods grouted in the cells and attached to the sill plates. Positive connections at the base of the columns should be established by using clip angles.

Disconnected and Missing Grade Level Bracing:

Several of the lateral braces at the grade level have become disengaged, disconnected, are completely missing, or there are issues with the mortise and tenon joints. The previous steel

retrofit straps are ineffective in many locations. All grade level braces should be reconnected and all missing or removed braces reinstalled as originally constructed. Additionally, the lateral brace connection at all grade level braces should be strengthened using a knee brace stabilizer or plates to help strengthen the connection and mitigate these types of issues in the future.

Disconnected Grade Level Wind Girt Connections:

The wind girts at grade level which are disconnected from their supporting columns need to be reattached to properly transfer the wind loads to the main lateral system and prevent the wall from falling away from the structure. Clip angles or plates could be used to positively attach the wind girts to the columns.

Cantilevered Overhang at South Elevation:

All damaged, missing, rotting, or disconnected horizontal and diagonal structural supports for the overhang that is cantilevered from the main columns along the south elevation shall be replaced in kind and reconnected to the main structure.

Splits

Except for the severely split column members previously addressed, split members could be strengthened by sandwiching the member between two steel plates using threaded rods. Split repairs should be performed on the split roof beams spanning in the east/west direction, split roof support frame horizontal members spanning in the north/south direction, split hayloft columns, split hayloft lateral braces, and split grade level columns.

Damaged Roof Decking and Roof Purlins:

The architects are recommending a roof deck replacement which would address the distorted pushed up decking due along the north elevation and the areas of leaking noted. During the roof decking's replacement, it is recommended the significantly rotted, broken, and missing roof purlins as required for attaching the new deck be replaced.

Intermediate Repairs

Timber Column to Timber Pedestal Connection:

There are three (3) locations where the top portion of the column differs from the lower portion. The splices at these locations are minimal and additional positive connections between the original column and the new lower portion should be provided.

Timber Column to Curb Connections:

There is no positive connection between the curb and the base of the grade level columns. It is recommended that bent plates or clip angles to help mitigate the chances of the column sliding off the curb at these locations.

Uneven Floor Beam to Column Cap Connections:

The uneven floor beams which are not fully bearing on the column caps should be shimmed with wood to provide a full bearing area and spread out the load on the cap. A steel strap around the floor beam and column cap to keep them positively attached should be provided. It

is not recommended to level the hayloft floor with the shims as that may adversely affect the tilt of the columns at the hayloft level since they are connected to the floor beam.

Split Hayloft Floor Beams:

The floor beams with splits near the end bearing connections should be wrapped in a steel strap around the floor beam and the column cap, similar to the previously noted "Uneven Floor Beam to Column Cap Connection".

Curtain Wall Framing:

The rotting framing and sills for the curtain walls along the south elevation of the structure should be replaced in kind or spliced as appropriate. Except for the curtain wall at the lean-on structure between Gridline K and L which supports the roof load from the structures to the south of the main barn, these walls are generally intended to be non-load bearing. These walls may inadvertently be supporting gravity loads due to the previously noted issues concerning the overhang. Prior to performing any work, the contractor shall ensure that the overhang roof and the roof of the out-of-scope structures to the south are properly shored and stabilized (or demolished). Modification and/or demolition of the structures to the south of the barn are not included in this report.

At the east wing, the CMU foundation block wall supporting the sill should be straightened and the split sill plate replaced in-kind. The eye hooks on the exterior of the curtain wall at this location should not be used to connect tents or any other items to the structure.

Rotting Wind Girts:

The wind girts which exhibit areas of rot and section loss shall be sistered with new members on the top and bottom faces or a new girt installed directly adjacent to the rotting girt as appropriate.

Aesthetic Repairs

Spalled and Cracked Concrete Pedestals:

The spalled and cracked pedestals should be cleared of any loose materials, roughened, and the exposed steel ties should be cleaned of rust. It is recommended that rebar hoops be placed evenly around the pedestal and repair mortar shall be poured to confine the existing pedestal and steel straps. While this is considered an aesthetic repair, it is recommended that this repair be completed while the building is shored and laterally braced since some of the non-structural stables would need to be removed to access the pedestal.

CMU Foundation Wall:

The missing CMU block in the foundation wall at the west elevation should be replaced in kind. Similarly, any CMU blocks with chips or holes should be replaced in kind. Wall shoring may be required where several adjacent blocks are being replaced at the same time.

Post Repair Recommendations

After repairs have been completed and verified, the vertical shoring could be removed from the structure. Since the tilt of the structure is not recommended to be repaired, it is

recommended that the lateral shoring remains in place to prevent additional lateral movement in the structure. Large lateral movement could be detrimental to structures.

In addition, it is recommended that regular site investigations be completed after the repairs are made in order to monitor the building and ensure that the repairs are working as intended. During these site investigations timber checks should be monitored to ensure they haven't been degraded into full splits, the CMU walls and columns should be checked to see if any additional tilt is occurring, and previous retrofits (i.e. removed intermediate columns, hayloft load transfer structure, notches in braces, etc.) should be observed for signs of overstress.

Architectural

Repairs necessary for occupancy.

Roofing Assembly

The existing roofing system has exceeded its useful life and we recommend a full replacement, including a new standing seam metal roof, insulation, vapor barrier, substrate, and framing as required by structural. Metal caps, trims, fascia edges, and flashing with continuous sealant is recommended at roof edges, transitions, intersections, and penetrations.

Wall Assembly

The board-and-batten style vertical wall panels are severely deteriorated, and we recommend a full replacement, including wood or composite planks to match the existing aesthetic. The new installation is recommended to include insulation, vapor barrier, substrate, and framing as required by structural.

Gutters and Downspouts

The gutters and downspouts are recommended for a full replacement after installation of the new roof and fascia. Downspouts shall be oriented to direct water away from the foundation of the building.

Intermediate Repairs

No architectural repairs are considered Intermediate currently.

Aesthetic Repairs

Windows

The team recommends a full replacement of the existing window system with insulated glazing to match the existing aesthetic. The team recommends window openings receive new head flashing, sill flashing, and membrane flashing around the openings. Openings intentionally without window installations shall be considered for exterior-grade equipment access doors.

Doors

The team recommends a full replacement of the door system with a complementary appearance, including hollow metal doors with a wood-like appearance to match the existing aesthetic. Door openings should also receive new head flashing.

Electrical

Repairs necessary for occupancy.

Site Mounted Panelboards

The existing panelboard shall have circuit breaker blanks installed in areas where circuit breaker knock outs are missing. Circuit breakers that are not correctly mounted shall be reinstalled to alleviate chances of accidental contact of live electrical parts.

Intermediate Repairs

Hayloft Lighting

The hayloft lighting fixtures should be replaced with a fixture that has a guard to protect the fixture bulb.

Aesthetic Repairs

No electrical repairs are considered Aesthetic currently.

ENGINEER'S OPINION OF PROBABLE COST

The Engineer's Opinion of Probable Cost was developed by a Cost Estimator/Construction Manager employed by Gannett Fleming and familiar with this type of work. The cost estimate was also reviewed by another qualified cost estimator from Gannett Fleming. The Opinion of Probable Cost was developed based on the AACE International "Recommended Practice, Cost Estimate Classification System as applied in Engineering, Procurement, and Construction for the Building and General Construction Industries". AACE International indicates Estimate Classes based on the maturity level of the project definition of deliverables. This is considered a conceptual estimate and may vary based on multiple factors. The Engineer's Opinion of Probable Cost is included in Appendix C. The total estimate at this conceptual stage is approximately $5.3 million.

The below table summarizes the Opinion of Probable Cost for the project. An Architectural and Engineering fee for final design of the Barn restoration has been provided for reference. Also, a cost for a yearly engineering assessment after construction has been completed is also included.

Equestrian Barn at Avenel Repair – Opinion of Probable Cost Summary

Discipline	Repairs	Cost
Structural	Repairs necessary for occupancy	$4.4M
Architectural	Repairs necessary for occupancy	$293K
Electrical	Repairs necessary for occupancy	$2K
Summary Repairs necessary for occupancy		*$4.7M*
Structural	Intermediate	$30K

Architectural	Intermediate	$760K
Electrical	Intermediate	$12K
Summary Intermediate		*$510K*
Structural	Aesthetic	$30K
TOTAL Construction Cost (based on OPC)		**$5.3M**
Engineering/Architectural Fee (high level, estimate based on noted repairs)		$300K
Estimated Engineering Review Cost		$10K (1)
TOTAL project		**$5.6M**

(1) Total project does not include yearly engineering review costs, any new repairs or replacements or ongoing maintenance costs.
(2) The Opinion of Probable Cost does NOT include interior repairs to the stalls, interior cabinets, or floor; upgrades; or repair/modification of barn appurtenances.
(3) ES Figure 3 is a summary of the Opinion of Probable Cost shown in Appendix C
(4) OPC developed based on April 2024 Cost Data. No inflation factors for future work are included.

SUMMARY

The structural findings and defects noted above indicate the structure is unsafe in its existing condition. It is recommended that access to the barn be restricted, and any current animals or inhabitants be relocated until the building were to be stabilized and repaired. Safety is paramount and extreme care needs to be taken while working in the barn. The order of operations should be carefully considered and analyzed prior to performing any repairs due to the widespread nature of the findings. Any one repair could have a drastic effect on another portion of the structure if not performed in a wholistic nature. The repair details in this report are conceptual in nature and should only be used for preliminary costing purposes. The scope of this report did not include an overall structural analysis of the building (i.e., structural load calculations etc.). Before repairs are made, additional analysis is required to fully design the repair details and stabilization methods.

The site investigation was visual in nature and did not include destructive and non-destructive testing. There were also several inaccessible areas in the building due to safety concerns as noted in the body of the report. There were several areas of the structure which were not visible for observations due to a variety of reasons, including but not limited to wall coverings, storage units, hay bales, vegetation, etc. The extent of defects is based only on observations of items that were visible to the inspectors at the time of the inspection. During the repair stage, additional items may need to be replaced or repaired as determined by the contractor.

The report does not include the structural or architectural investigation of the structures to the south of the lean-on structure. These structures also have significant deterioration. The report

does not address the stalls or storage lockers inside the barn. The report does not address any site or grading issues.

The information provided in this report is based on the investigation in January/February 2024. The Engineers Opinion of probable costs is based on cost data from April 2024. No escalations or work projected in future years was included in the cost document.

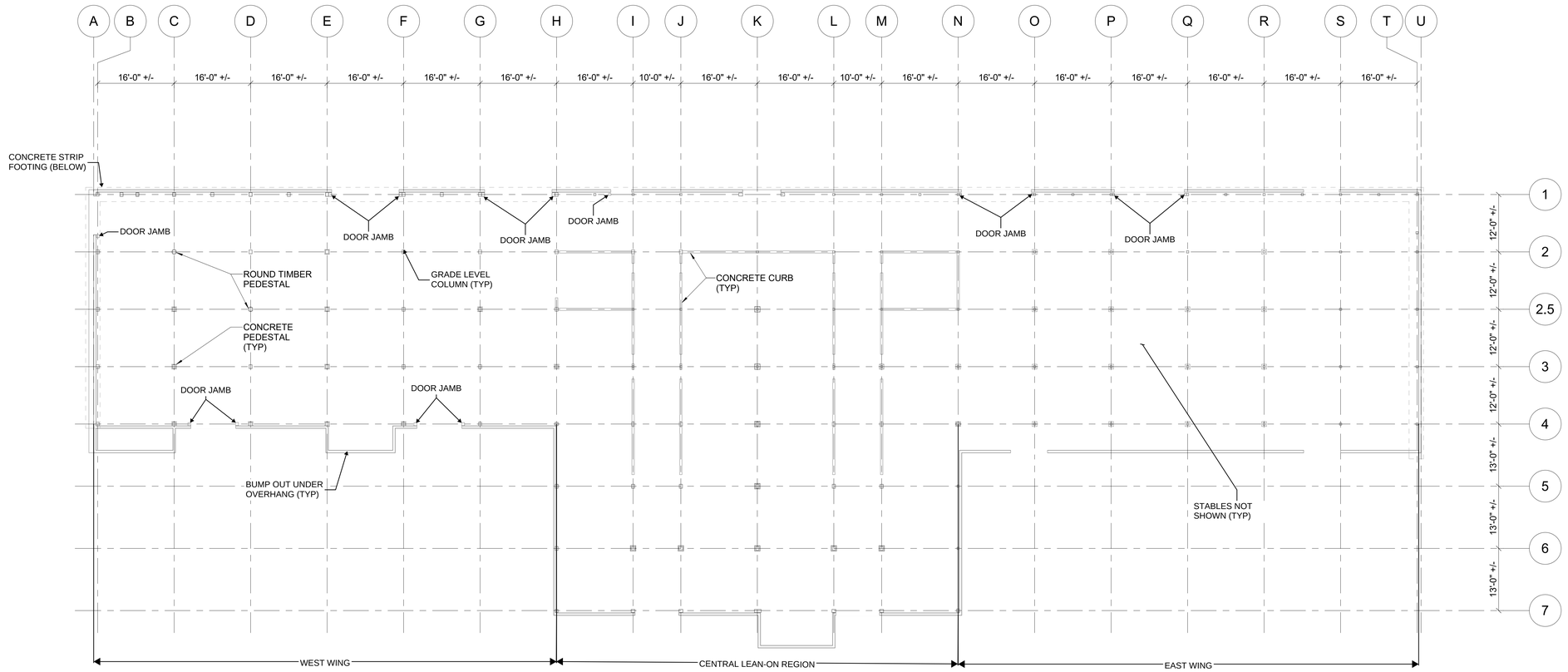
Additional damage continues to occur to the barn.

Architectural and Engineering fees associated with the project are approximately $300,000 in addition to what has already been spent on the project. Multiple engineering disciplines and Architecture are needed to complete this task. The repairs for this project would require a competent contractor well versed in wood construction preferably barn construction. A cost of approximately $10,000 is estimated for a walkthrough assessment of the barn after the repairs have been completed. Additionally, an approximate $10,000 per year engineering assessment walkthrough of the barn should be undertaken to review defects. This cost is not included in the Total project cost because it is not known how many years the investigations would have to take place.

APPENDICES

APPENDIX A

Preliminary Floor Plans



1 **OVERALL FOUNDATION PLAN**
SCALE: 3/32" = 1'-0"

NOTE:
1. THESE DRAWINGS WERE DEVELOPED TO AID IN THE INVESTIGATION OF THE BUILDING. THESE DRAWINGS ARE NOT TO BE CONSIDERED AS-BUILT DRAWINGS OR USED AS A BASIS FOR ANY FINAL DECISIONS. ALL DIMENSIONS ARE APPROXIMATE. ALL DIMENSIONS SHOULD BE FIELD VERIFIED PRIOR TO PERFORMING ANY REPAIRS.

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WASHINGTON SUBURBAN SANITARY COMMISSION

POTOMAC MD, 20854

EQUESTRIAN CENTER BARN AT AVENEL

NO.	DATE	DESCRIPTION

REVISIONS

PROJECT STATUS

PROJECT NUMBER: 68805

DESIGNED:	MODELED:	CHECKED:
MS	MM	GG

DATE: 04/08/24

DRAWING TITLE: EXISTING FOUNDATION PLAN

DRAWING NO.: S-1

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Central File: BIM360_S_central_R20.rvt

Project Number: 68805
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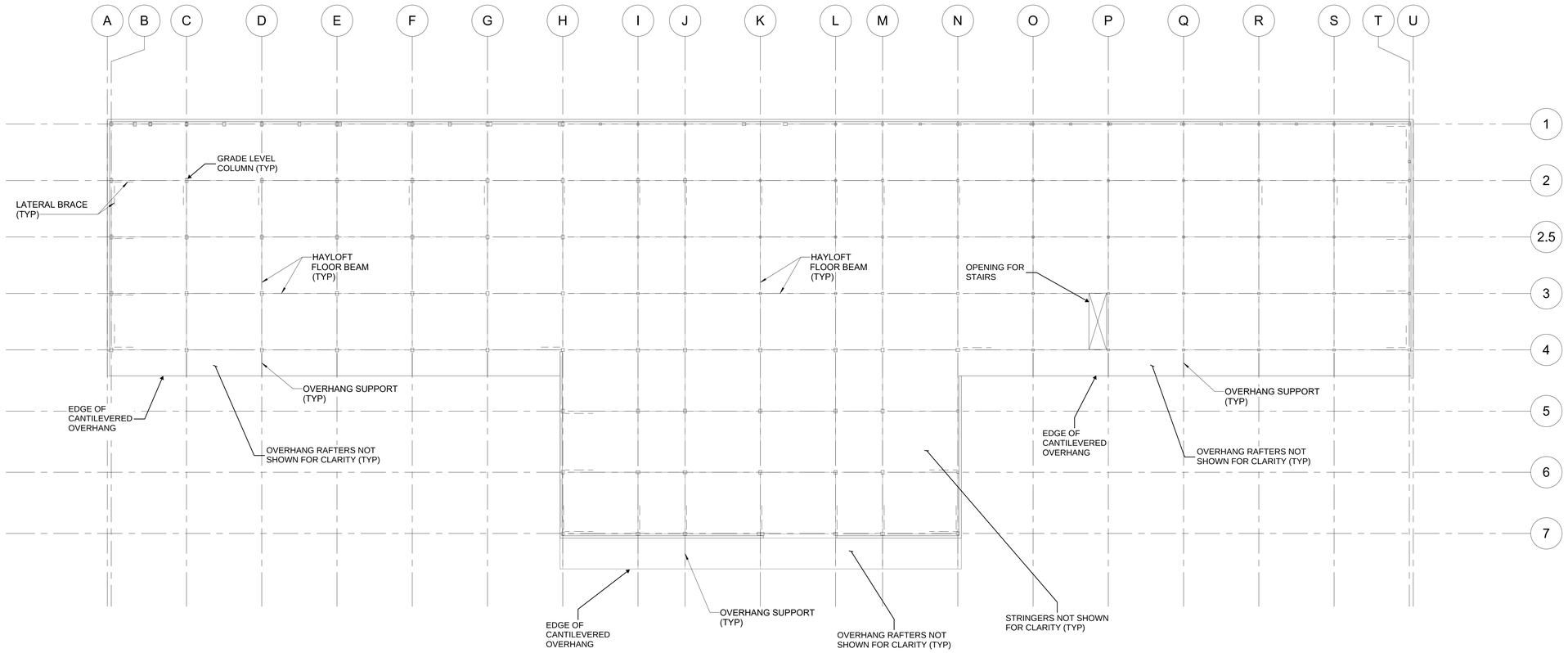

1 OVERALL HAYLOFT FRAMING PLAN

SCALE: 3/32" = 1'-0"

NOTE:
1. THESE DRAWINGS WERE DEVELOPED TO AID IN THE INVESTIGATION OF THE BUILDING. THESE DRAWINGS ARE NOT TO BE CONSIDERED AS-BUILT DRAWINGS OR USED AS A BASIS FOR ANY FINAL DECISIONS. ALL DIMENSIONS ARE APPROXIMATE. ALL DIMENSIONS SHOULD BE FIELD VERIFIED PRIOR TO PERFORMING ANY REPAIRS.

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NO.	DATE	DESCRIPTION

REVISIONS

PROJECT STATUS

PROJECT NUMBER: 68805

DESIGNED:	MODELED:	CHECKED:
MS	MM	GG

DATE: 04/08/24

DRAWING TITLE: OVERALL HAYLOFT FRAMING PLAN

DRAWING NO.: S-2

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Project Number: 68805
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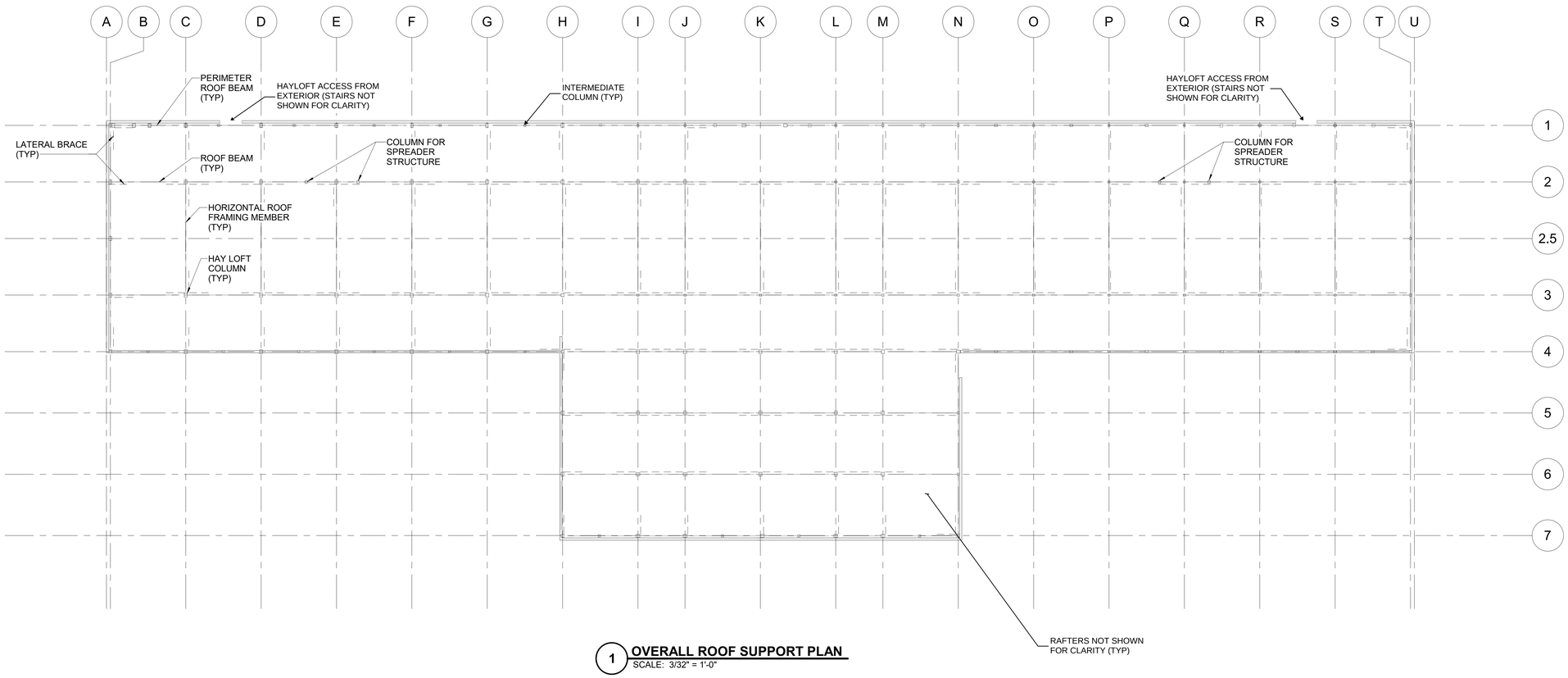

1 **OVERALL ROOF SUPPORT PLAN**
SCALE: 3/32" = 1'-0"

NOTE:
1. THESE DRAWINGS WERE DEVELOPED TO AID IN THE INVESTIGATION OF THE BUILDING. THESE DRAWINGS ARE NOT TO BE CONSIDERED AS-BUILT DRAWINGS OR USED AS A BASIS FOR ANY FINAL DECISIONS. ALL DIMENSIONS ARE APPROXIMATE. ALL DIMENSIONS SHOULD BE FIELD VERIFIED PRIOR TO PERFORMING ANY REPAIRS.

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POTOMAC MD, 20854

EQUESTRIAN CENTER BARN AT AVENEL

NO.	DATE	DESCRIPTION

REVISIONS

PROJECT STATUS

PROJECT NUMBER: 68805

DESIGNED:	MODELED:	CHECKED:
MS	MM	GG

DATE: 04/08/24

DRAWING TITLE: OVERALL ROOF SUPPORT PLAN

DRAWING NO.: S-3

Local File: Autodesk Docs://68805-WSSC_SSSWBpitfirm_TSstS_Womah/68805_WSSC_CENTRAL_R22_2.rvt
Central File: BIM360_S_central_R20.rvt

Project Number: 68805
4/5/2024 11:52:29 AM

APPENDIX B

Photos

APPENDIX B1

General Photos

Photo G-1: General view of Equestrian Center Barn (looking northwest). East wing and central lean-on region are visible.

Photo G-2: General view of Equestrian Center Barn (looking northeast). West Wing and central lean-on region are visible.

Photo G-3: General view of the central lean-on region of the Equestrian Center Barn (looking northeast).

Photo G-4: General view of the stairs to hayloft in the east wing.

Photo G-5: General view of the exterior stairs at the west end of the north elevation.

Photo G-6: General view of the exterior stairs at the east end of the north elevation.

Photo G-7: General view of a typical hayloft braced column. Column R/2 shown looking northeast.

Photo G-8: General view of a knee braced frame at the hayloft level spanning between Gridlines 2 and 3. Frame between Columns D/2 and D/3 shown looking northwest.

Photo G-9: General view of an intermediate column supporting a roof beam along the perimeter in the hayloft. Intermediate column between Columns B/1 and C/1 shown looking northeast. Note an additional intermediate column was added at this location during a previous repair.

Photo G-10: General view of a load transfer spreader beam structures in the hayloft. Structure at Column Q/2 shown looking southwest.

Photo G-11: General view of the hayloft flooring system.

Photo G-12: General view of a knee braced column at the grade level. Column F/2 shown looking northeast.

Photo G-13: General view of an intermediate column supporting the perimeter floor beam along the north wall. Intermediate Column Between Columns F/1 and G/1 shown. Note the wind girts span between the columns and also act as the header and sill for the window.

Photo G-14: General view of a grade level column supported by a concrete pedestal. Column C/3 shown looking southwest.

Photo G-15: General view of a grade level column supported by a concrete curb. Column J/4 shown looking east.

Photo G-16: General view of a grade level column supported at finished grade. Column F/3 shown looking northwest.

Photo G-17: General view of the cantilevered overhang supported by the perimeter columns along the south elevation. Overhang supports at Column M/7 shown looking northwest.

Photo G-18: General view of non-bearing curtain wall bump outs under the cantilevered overhang along the south elevation. Bump outs at the west wing shown looking north. Note the walls are sitting directly on the concrete floor slab.

Photo G-19: General view of non-bearing curtain wall bump out under the cantilevered overhang along the south elevation. Bump out at the east wing shown looking north. Note the bump out is sitting on a CMU wall.

Photo G-20: General view of a perimeter grade level column supported by timber sill plate and CMU foundation wall. Column B/1 shown looking northwest.

Photo G-21: General view of the concrete slab-on-ground walkway within the aisles of the barn. Walkway at the west wing between Gridlines F and G shown looking north.

Photo G-22: General view of a typical mortise and tenon joint. Column N/1 in the hayloft shown looking northeast. Note the column is slipping out allowing the mortise slot to be seen. The tenon tongue is not visible.

APPENDIX B2

Structural Photos

Photo S-1: Typical pinhole leak in roof metal deck. Deck near Column L/6 shown.

Photo S-2: Typical area of rusted roof deck and failing patch. Deck near Column L/6 shown.

Photo S-3: Tarps with standing water on the hayloft flooring underneath the lean-on region of the structure. Floor shown looking northwest along Gridline 6.

Photo S-4: 32-gallon bucket near Column M/4 full of water under previous roof patch.

Photo S-5: Heavy vegetation pushing up roof deck along north elevation between Gridlines D and H (looking southeast).

Photo S-6: Close up of heavy vegetation pushing up roof deck along north elevation (looking south).

Photo S-7: Heavy vegetation inside the building along the north wall between Gridlines D and H at the hayloft level (looking northeast).

Photo S-8: Typical water saturated and broken roof purlins. Roof near Column F/4 shown looking southwest.

Photo S-9: Broken/missing roof purlin. Roof deck near Column L/2 shown looking north.

Photo S-10: Rotted rafters with full icepick penetration along Gridline 4 between Gridlines R and S.

Photo S-11: Previously sistered roof rafters along Gridline 7 between Gridlines H and I.

Photo S-12: Previously sistered roof rafter along Gridline 7 between Gridlines I and J. Note the bolts are only through the rotted portion of the rafter.

Photo S-13: Rotting overhang roof rafter between Gridlines F and G at south bearing (looking west).

Photo S-14: Typical check on bottom face of perimeter roof beam. Roof beam between Column B/1 and Column C/1 shown.

Photo S-15: Perimeter roof beam twisting on split column at hayloft level. Bearing at Column D/1 shown.

Photo S-16: Perimeter roof beam between Column C/4 and D/4 is twisting 9 degrees south at east bearing and has minimal to no bearing remaining.

Photo S-17: Perimeter roof beam between Column N/4 and O/4 is twisting 7 degrees south at east bearing and has minimal to no bearing remaining.

Photo S-18: Column I/1 at hayloft level has ½" gap at bearing between west beam and east beam with minimal bearing remaining.

Photo S-19: Column S/4 at hayloft level has 3" gap at bearing between beam and column with minimal to no bearing remaining. The column is rotted and is dropping out of the mortise slot in the roof beam.

Photo S-20: Roof beam between Columns D/4 and E/4 exhibits rot with full icepick penetration.

Photo S-21: Roof beam between Columns I/7 and J/7 exhibits rot with full ice pick penetration at west bearing.

Photo S-22: Roof beam between Columns K/7 and L/7 exhibits rot with up to 4" deep ice pick penetration at west bearing.

Photo S-23: Roof beam between Columns M/7 and N/7 exhibits rot with significant section loss under roof stringer. Note the icepick is fully inserted in top of beam.

Photo S-24: Roof beam between Columns N/4 and O/4 exhibits rot with up to full icepick penetration in top face at west bearing over a 6ft length.

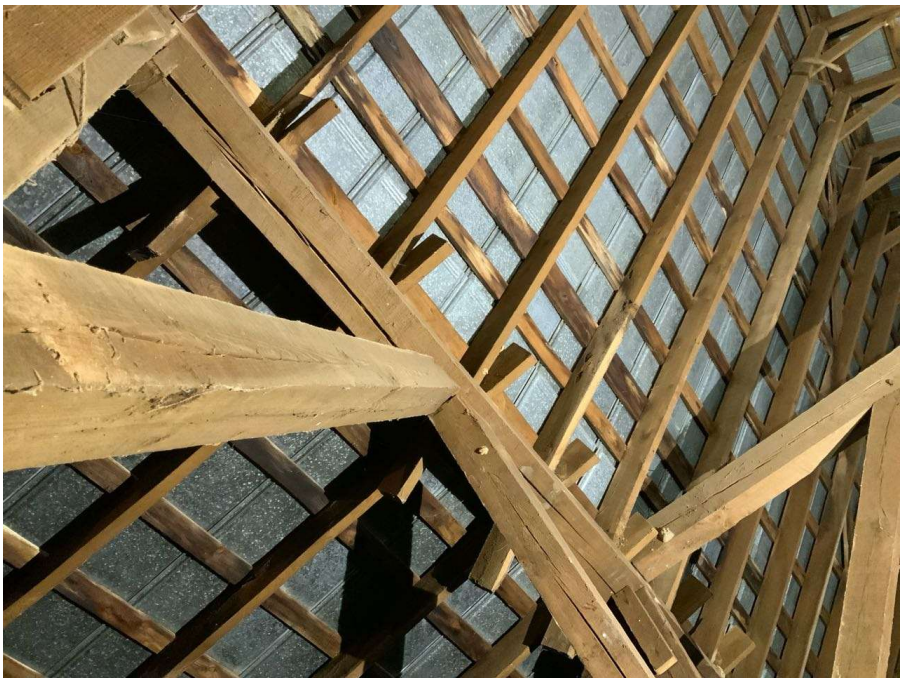


Photo S-25: Typical check on bottom face of interior roof beam. Roofbeam between Columns I/3 and J/3 shown.

Photo S-26: Split in the east/west face of the roof beam spanning between Columns L/6 and M/6 at the west bearing.

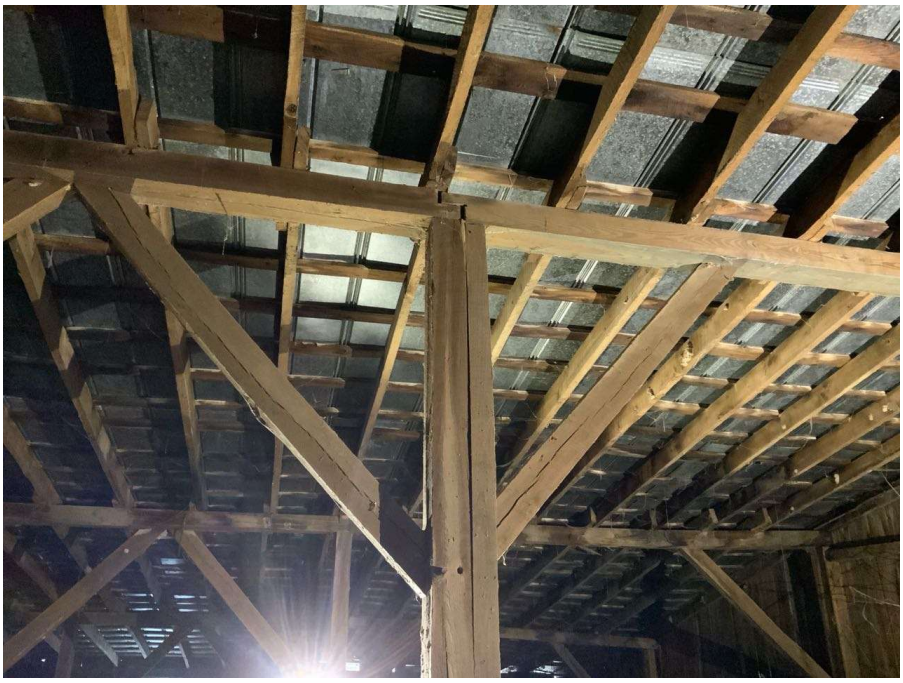


Photo S-27: Gap between roof beams at Column I/4 bearing location (looking south). Note the extra post added to west side of column to support the beam.

Photo S-28: Gap between roof beams at Column I/6 bearing location (looking northeast). Note the west beam is twisting towards the north.

Photo S-29: Roof beam dowel is deteriorated/missing at Column M/5 (looking south).

Photo S-30: Beam between Column M/6 and N/6 exhibits rot with full pick penetration at east bearing. A 5.25" x 5.25" post has been added to the west side of the column to help support the beam.

Photo S-31: Potential split at horizontal frame member between Columns G/2 and G/3 in the hayloft (looking east). The member appears to have excessive deflection compared to other similar members.

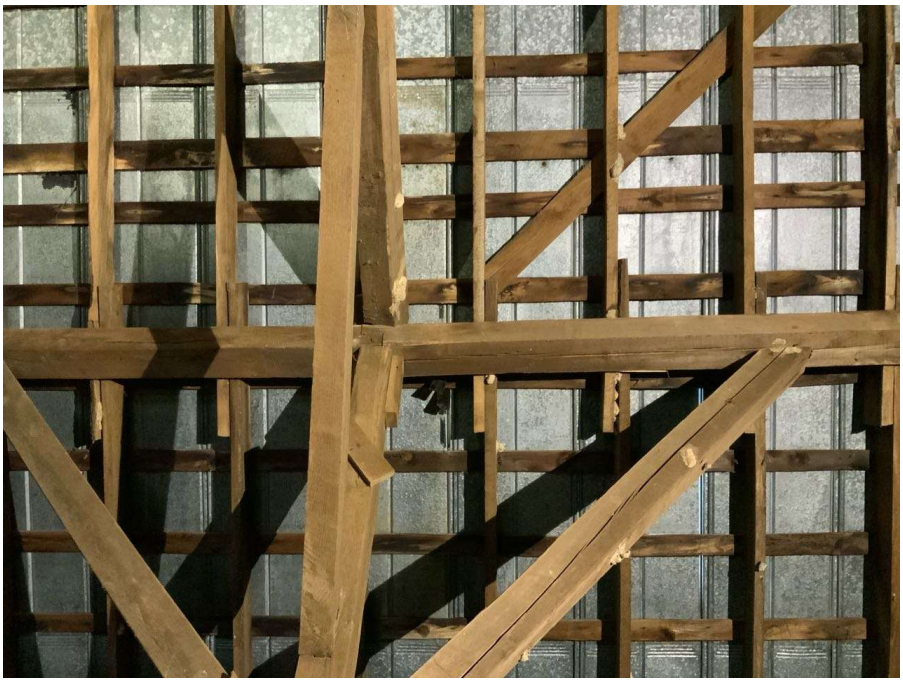


Photo S-32: Horizontal framing member in west wing of hayloft is twisting towards the west at the south bearing. Member at Gridline C looking south shown.

Photo S-33: Horizontal framing member south end is lifted up and not fully bearing at support in hayloft. Member at Gridline P looking southeast shown.

Photo S-34: Split in east/west face of Column R/3 in hayloft (looking west)

Photo S-35: Column M/3 in hayloft exhibits water staining and soft rot with minimal ice pick penetration (looking northwest).

Photo S-36: Small holes at the base of the columns in the hayloft likely from insects or animals. Column C/3 looking northwest shown.

Photo S-37: Split in the east/west faces at Column C/4 in the hayloft (looking west).

Photo S-38: Hayloft wall is pushed out up to 18 inches along Gridline 4 in the west wing and Column F/4 is leaning up to 7 degrees towards the south (looking west). The lateral brace is disconnected at the base connection to floor beam.

Photo S-39: Severe rot at original Column H/4 in hayloft (looking south). Note a newer column has been installed to the east of the existing column.

Photo S-40: New column and posts supporting wind girt and roof beam at Column H/4 in hayloft (looking southwest). Note the south brace is connected with an ineffective strap to the new column.

Photo S-41: New column and posts supporting wind girt and roof beam at Column H/4 in hayloft (looking south). Note the west brace is connected to the base of the original column.

Photo S-42: Severe rot at top of original Column H/7 in hayloft (looking southwest). A new post has been installed to the east of the existing column. The north brace and wind girt are not connected to the new post and the east brace is missing. The floorboards adjacent to the column are rotting.

Photo S-43: Typical check in the east/west knee braces in hayloft. West brace at Column C/3 shown looking south.

Photo S-44: Typical split starting at brace connection in the east/west braces in hayloft. East brace at Column I/2 shown looking north.

Photo S-45: Typical empty dowel hole in brace to column connection in hayloft. Column P/2 shown looking northwest. Note the icepick can fully penetrate the opening with no resistance.

Photo S-46: Typical steel strap retrofit at hayloft brace to column connection. Column S/3 shown looking north.

Photo S-47: Disconnected and twisted east brace at Column M/3 in hayloft (looking west).

Photo S-48: Disconnected west brace at Column M/5 in hayloft (looking northeast).

Photo S-49: East brace at Column H/6 in hayloft is slipping out of the mortise slot at the top connection to the roof beam (looking south).

Photo S-50: The west brace at Column R/3 in hayloft is disconnected at the base connection to the column. The dowel at this connection is missing.

Photo S-51: The east brace at Column B/4 in hayloft appears to be missing based on similar geometry in other portions of the building (looking south).

Photo S-52: The west brace at Column M/4 in hayloft exhibits rot at the base connection to the column (looking north).

Photo S-53: Split in the south brace of Column P/2 in hayloft (looking west)

Photo S-54: South brace at Column E/2 in the hayloft is disconnected at the base connection to the column. The dowel hole is broken and only a small sliver of the brace is still within the mortise slot.

Photo S-55: South brace at Column F/2 in the hayloft is disconnected at the top connection to the horizontal frame member. The brace is no longer within the slot and held up by a single steel strap (looking east).

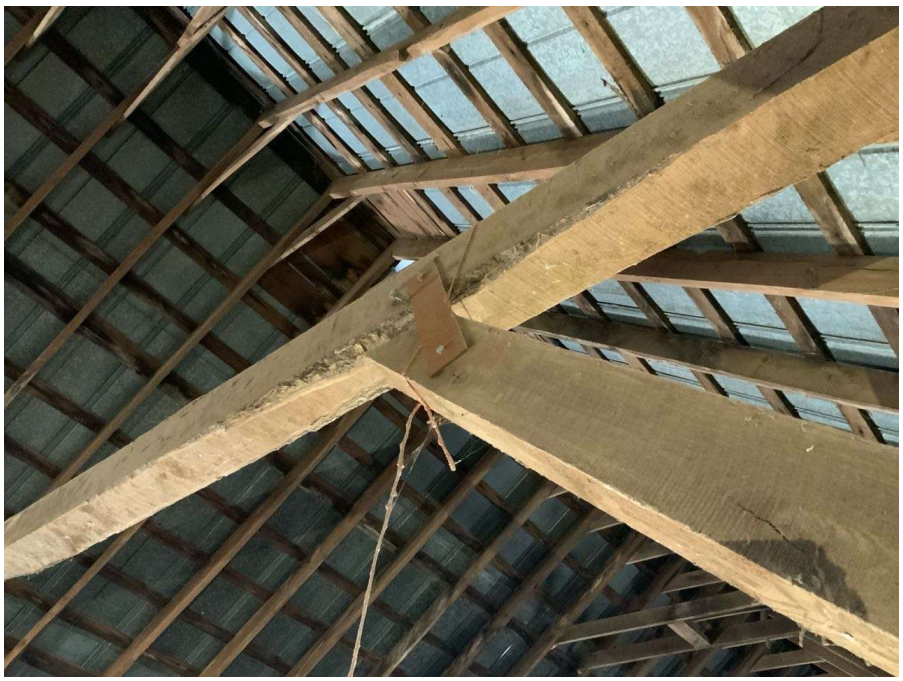


Photo S-56: South brace at Column F/2 in the hayloft is disconnected at the top connection to the horizontal frame member. The brace is no longer within the slot and held up by a single steel strap (looking west).

Photo S-57: South brace at Column Q/2 in hayloft is slipping out of the mortise slot at the top connection to the horizontal frame member. The connecting dowel is projecting outwards from the member.

Photo S-58: Typical disconnected brace slipping out of the mortise joint at top connection to column at perimeter of structure in hayloft. Column C/1 shown looking northwest. Note the retrofit strap is not oriented correctly to effectively transfer the brace loads.

Photo S-59: North brace at Column N/7 in hayloft has no dowel at the top connection.

Photo S-60: North brace at Column R/4 in hayloft is disconnected at the base connection to the floor beam.

Photo S-61: South brace at Column B/1 in hayloft exhibits rot at base connection to the floor beam. The wind girt and roof beam also exhibit signs of rot at the connection interface. Note broken floorboards in the region preventing hands-on access.

Photo S-62: South brace at Column Q/1 in the hayloft appears to have been cut off and removed, likely at the same time that the load transfer spreader structures were installed.

Photo S-63: There is a door entryway at Gridline K/1 instead of a column with brace. It is unknown whether this was designed as part of the original construction or installed as a renovation.

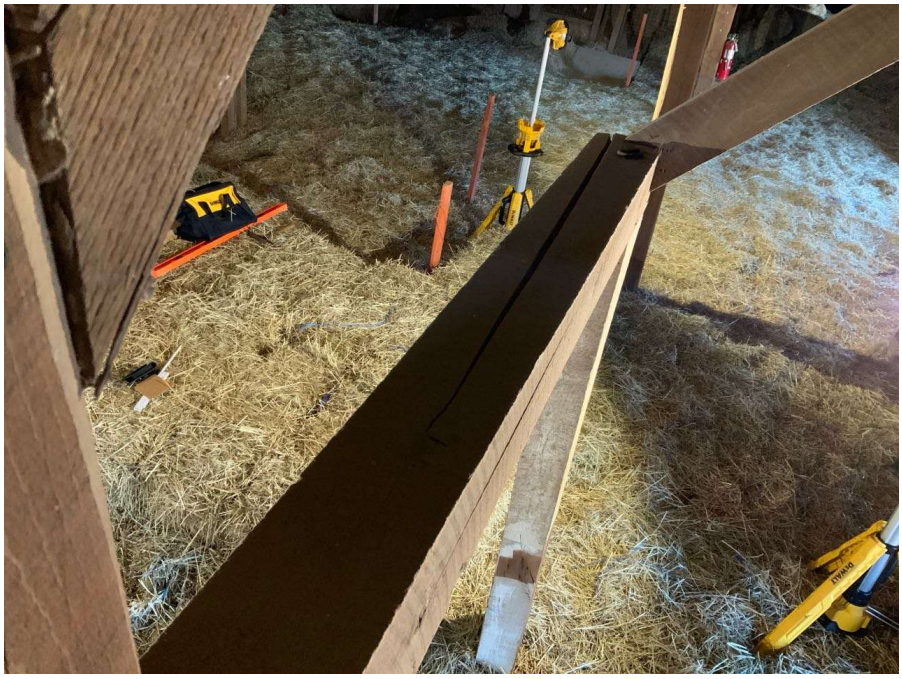


Photo S-64: Up to ½" wide check in the top face of the load transfer spreader beam at Gridline Q/2.

Photo S-65: Up to ¾" wide check in the south face of the west load transfer spreader column at Gridline Q/2.

Photo S-66: Typical rotting floorboards. East wing near Gridline 4 shown looking south.

Photo S-67: Typical rotting/broken/missing floorboards. Lean-on portion of structure near Gridline 7 shown looking west.

Photo S-68: Typical rotting/broken/missing floorboards. Lean-on portion of structure near Gridline N shown looking southeast. Note plywood has been installed to cover some openings.

Photo S-69: Rotting floor stringer bearing on floor beam spanning between Column R/4 and S/4 (looking west).

Photo S-70: Rotting floor stringer bearing on floor beam spanning between Column R/4 and S/4 (looking east). Note a sistered member has been added to this stringer.

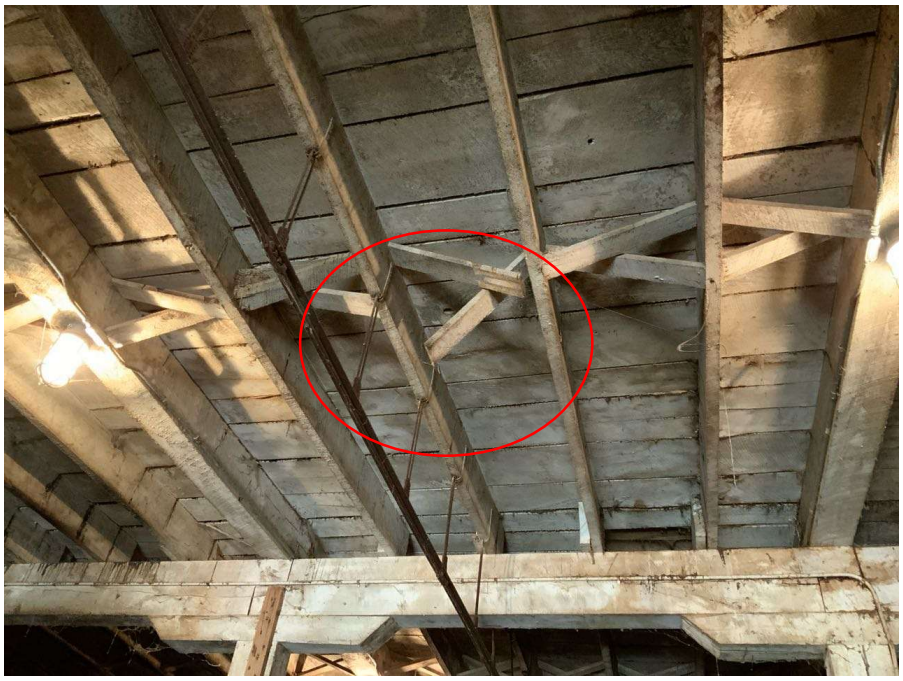


Photo S-71: Disconnected member of floor bridging. Bay to the northeast of Column L/5 shown.

Photo S-72: Typical check in the floor beams spanning east/west. Beam between Columns C/2 and D/2 shown looking north.

Photo S-73: Split at end of floor beam at bearing location. Floor beam between Column S/2.5 and T/2.5 shown looking south.

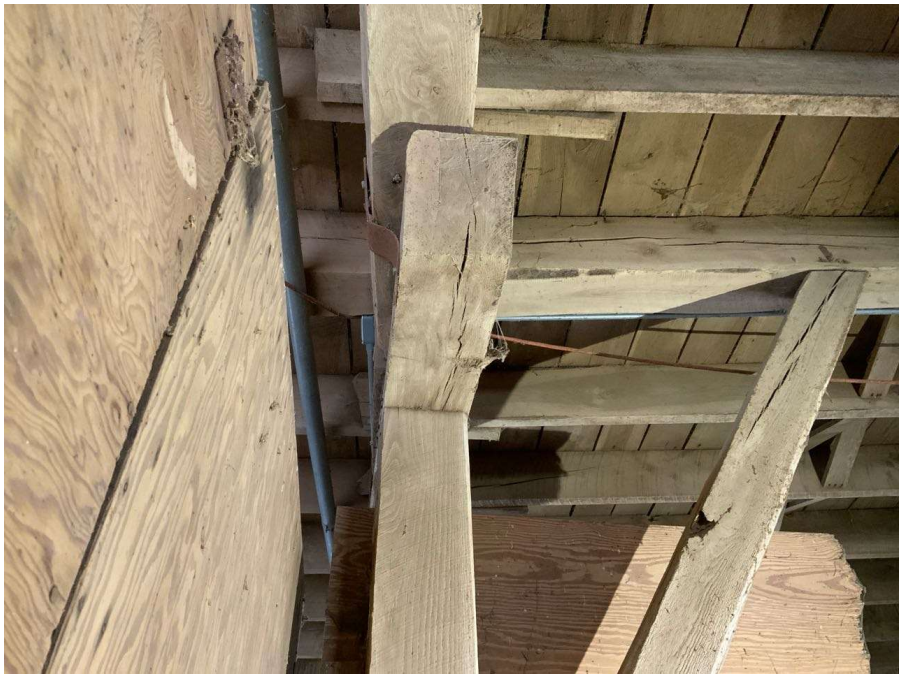


Photo S-74: Column C/2 cap is twisting causing bearing loss of the hayloft floor beams (looking east).

Photo S-75: Retrofit straps at the grade level Column C/2 cap. Note gaps in bearing surface of beam to column cap.

Photo S-76: Uneven floor beam at Column E/2 (looking south). The west beam is not bearing on the cap and only has approximately 2″ bearing on the east beam at notch.

Photo S-77: Uneven floor beam at Column F/3 (looking south). West beam is not bearing on the cap and is only bearing on the east beam at notch. The column cap is split.

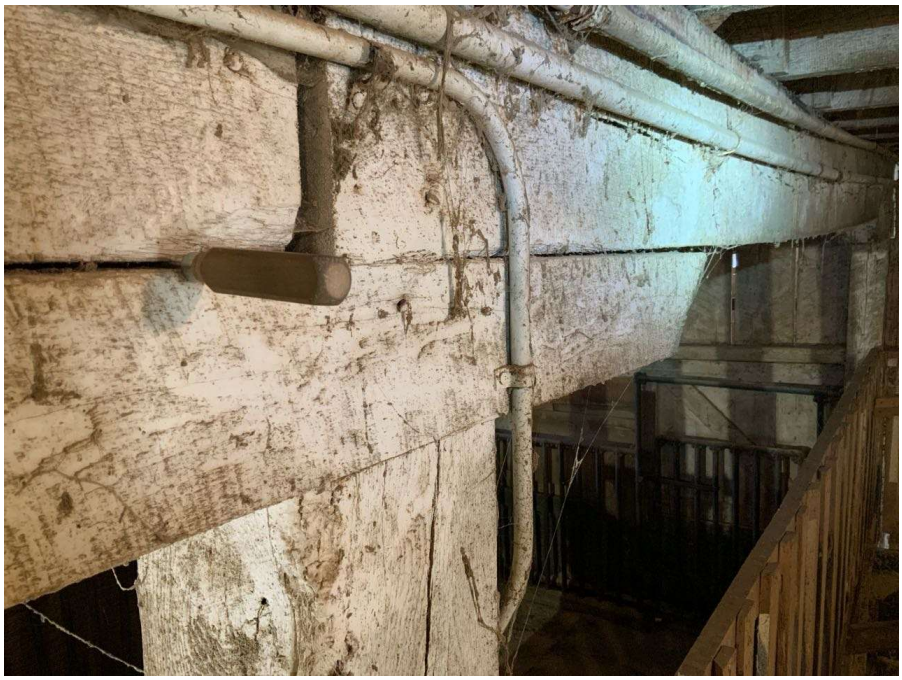


Photo S-78: Both floor beams at Column M/2.5 have limited contact with column cap and are only bearing directly over the column (looking southwest)

Photo S-79: Shim installed at Column I/3 between the top of the at-grade column cap and bottom of the floor beams (looking south).

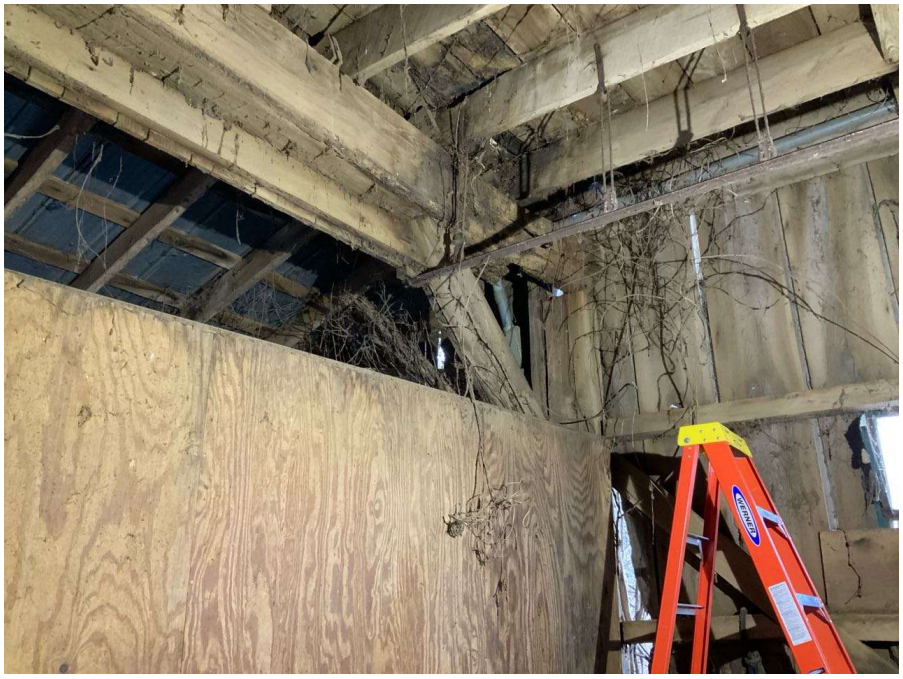


Photo S-80: Critical Finding at floor beam between Columns B/4 and C/4. The west end of the beam has approximately 90% section loss.

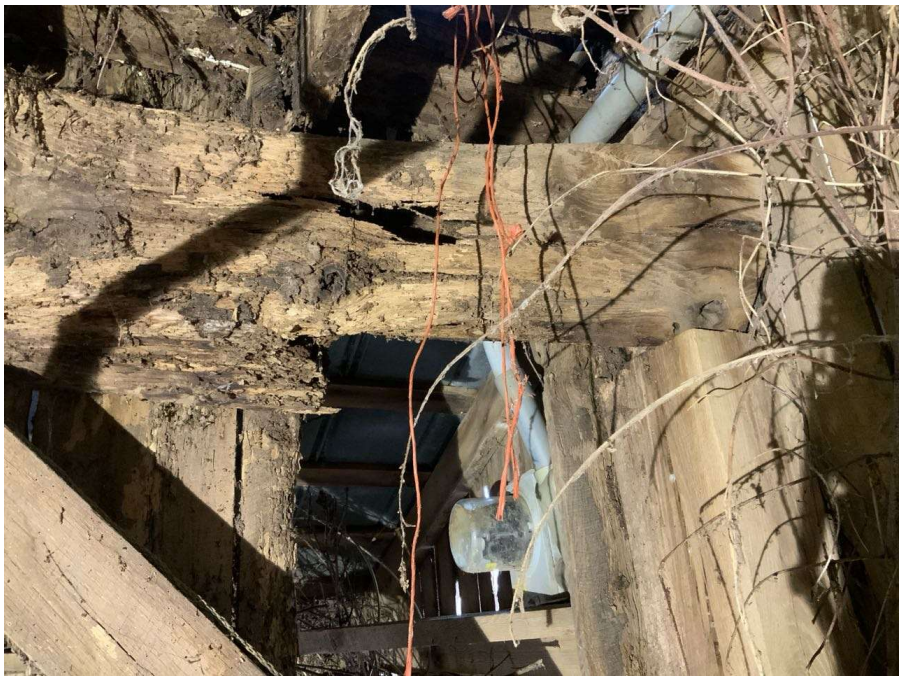


Photo S-81: Critical finding at floor beam between Columns B/4 and C/4. The west end of the beam has approximately 90% section loss.

Photo S-82: Severe rot at floor beam between Columns I/1 and J/1. The west end of the beam has approximately 75% section loss.

Photo S-83: Severe rot at floor beam between Columns I/1 and J/1. The west end of the beam has approximately 75% section loss. Beam crushing is observed at the bearing location.

Photo S-84: Haybales and debris directly above severely rotted beam between Columns I/1 and J/1 in hayloft (looking northwest).

Photo S-85: Water damage and rot at west end of floor beam between Columns F/4 and G/4 (looking south). Supporting column cap at Column F/4 has severe rot.

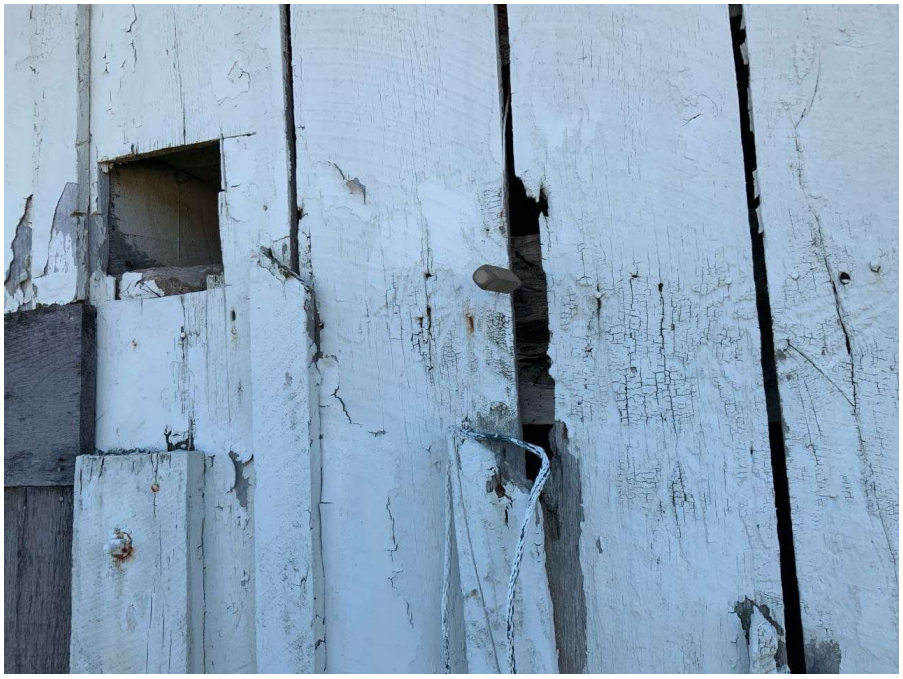


Photo S-86: Rot with 2″ icepick penetration at east end of floor beam between Column J/1 and K/1 (looking south from exterior).

Photo S-87: Rotted floor beam between Column J/1 and K/1 could not be observed from the interior due to plywood obscuring the view (looking north).

Photo S-88: Water damage and rot at west end of floor beam between Columns R/4 and S/4 (looking southwest). Supporting column cap at Column R/4 has similar rot.

Photo S-89: Rot at east end of floor beam between Columns S/1 and T/1 (looking northeast).

Photo S-90: Wide check on the bottom face of the north/south spanning hayloft floor beam. Beam between Columns D/2.5 and D/3 shown looking north.

Photo S-91: Area of water damage and rot near north end of floor beam. Beam between Columns C/3 and C/4 shown looking west.

Photo S-92: Area of water damage and rot near south end of floor beam. Beam between Columns S/3 and S/4 shown looking west.

Photo S-93: Area of water damage and rot with approximately 25% section loss near north end of floor beam. Beam between Columns T/2.5 and T/3 shown looking west.

Photo S-94: Typical check in the bottom face of the at-grade column cap. Column O/3 shown.

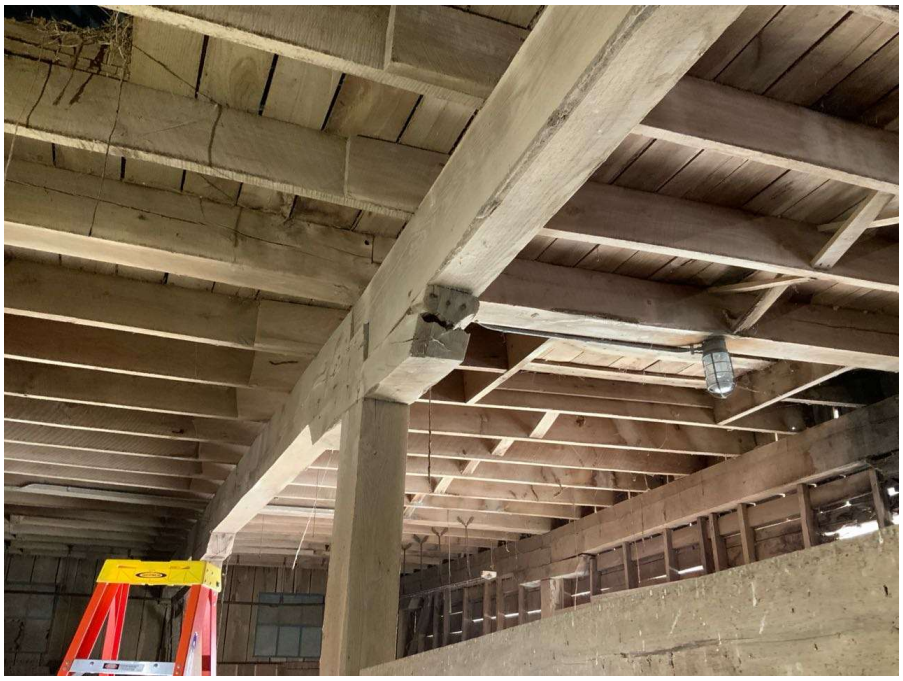


Photo S-95: Split west end of at-grade column cap at Column F/3 (looking east)

Photo S-96: At-grade column cap at Column E/2 is split and not sitting correctly on top of column. There is a small gap between the top of column and base of cap with approximately 50% bearing remaining.

Photo S-97: South face of the at-grade column cap at Column K/7 is exposed to exterior and has soft rot with up to 1.5″ icepick penetration.

Photo S-98: Split in Column J/7 at grade level (looking north).

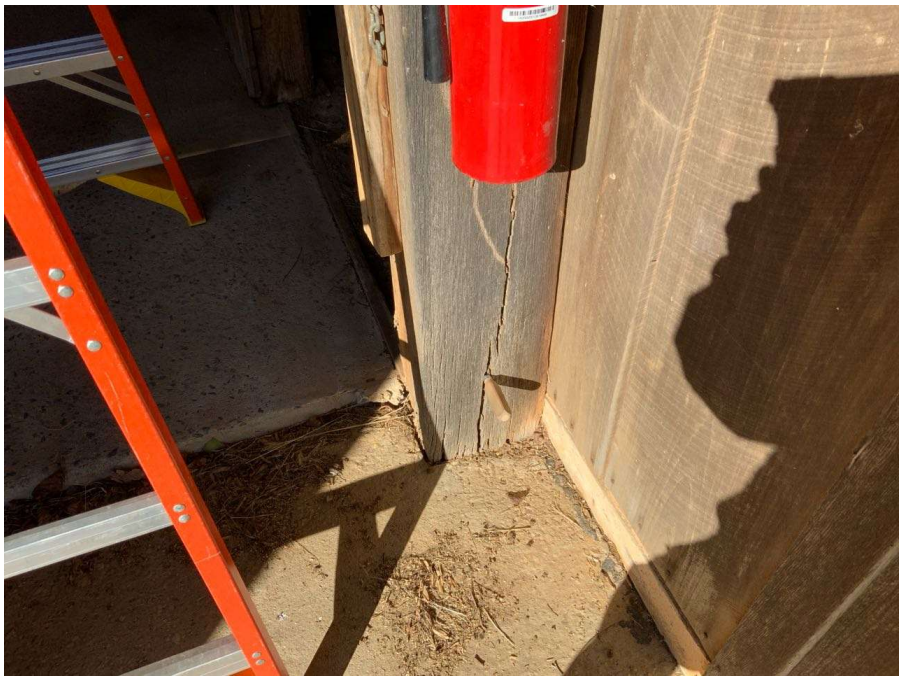


Photo S-99: Split in Column S/4 at grade level (looking north).

Photo S-100: View looking west down Gridline 1 in the west wing at the newly repaired northwest corner of structure. The new columns are plumb. The original columns are leaning up to 5 degrees to the south.

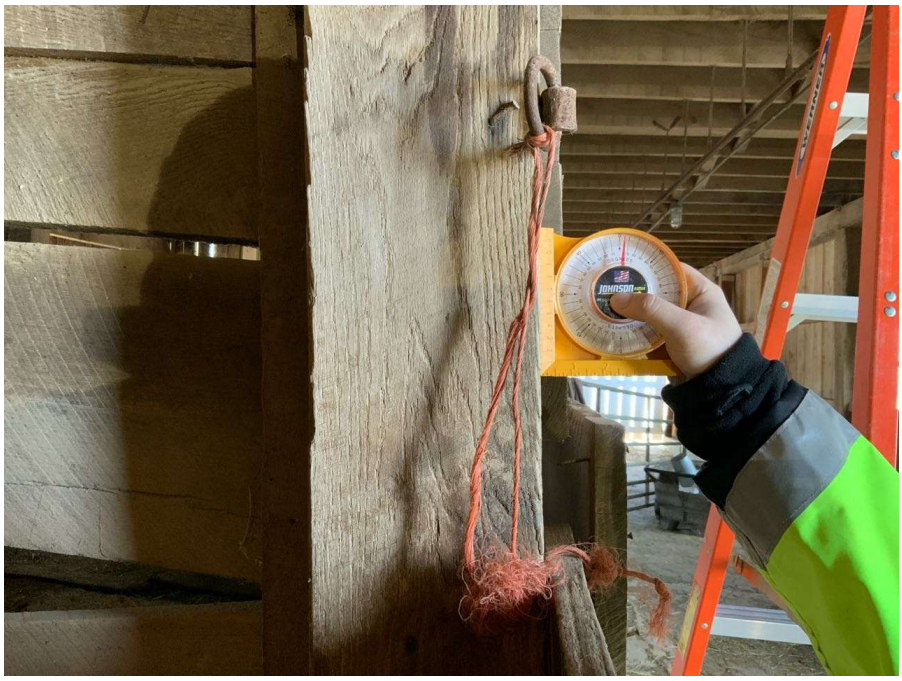


Photo S-101: Column E/2 at grade level is leaning up to 6 degrees towards the south.

Photo S-102: Bearing loss at Column D/2 at grade level.

Photo S-103: Bearing loss at Column I/2 at grade level. Note stick rule is poking through from the other side.

Photo S-104: Bearing loss at Column I/2.5 at grade level. Note stick rule is poking through from the other side.

Photo S-105: Bearing loss at Column K/2.5 at grade level. Note this column is sitting on a pedestal.

Photo S-106: Bearing loss at Column L/2.5 at grade level.

Photo S-107: Bearing loss at Column M/2.5 at grade level (looking northwest).

Photo S-108: Bearing loss at Column M/2.5 at grade level (looking east). A block of wood was added to hide hole.

Photo S-109: Bearing loss at Column T/3 at grade level (looking southeast). Supporting sill plate is also rotting.

Photo S-110: Bearing loss at Column P/4 at grade level.

Photo S-111: Bearing loss at Column J/1 at grade level. The column has approximately 30% section loss. The sill plate is completely deteriorated under and to east of column and the column is sitting directly on the CMU foundation wall.

Photo S-112: Bearing loss at Column T/1 at grade level. The column has 50-75% section loss. The sill plate is deteriorated and rotting under the column.

Photo S-113: Heavy vegetation on southwest corner of structure preventing access to Column B/4.

Photo S-114: Siding at Column B/4 has holes and column appears to be rotting throughout its height. Access to column was limited due to heavy vegetation and the critical finding in the floor beam at this location.

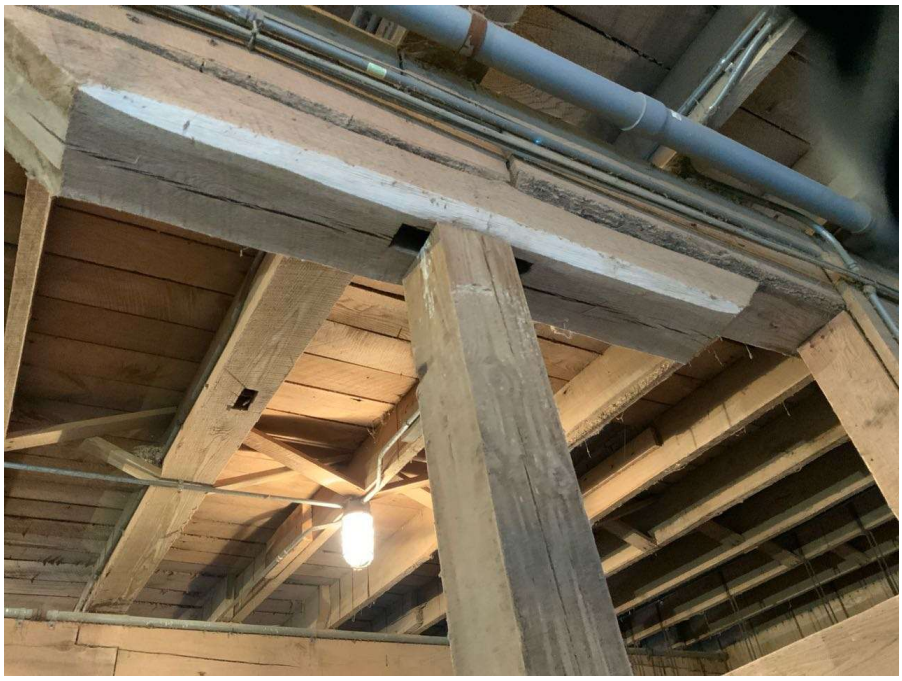


Photo S-115: Replaced column at Column O/2 at grade level has no positive connection to the cap at the top. Note the empty mortise slot in the floor beam indicating that the brace for this column is missing.

Photo S-116: Replaced column at Column O/2 at grade level has no positive connection to the cap at the top.

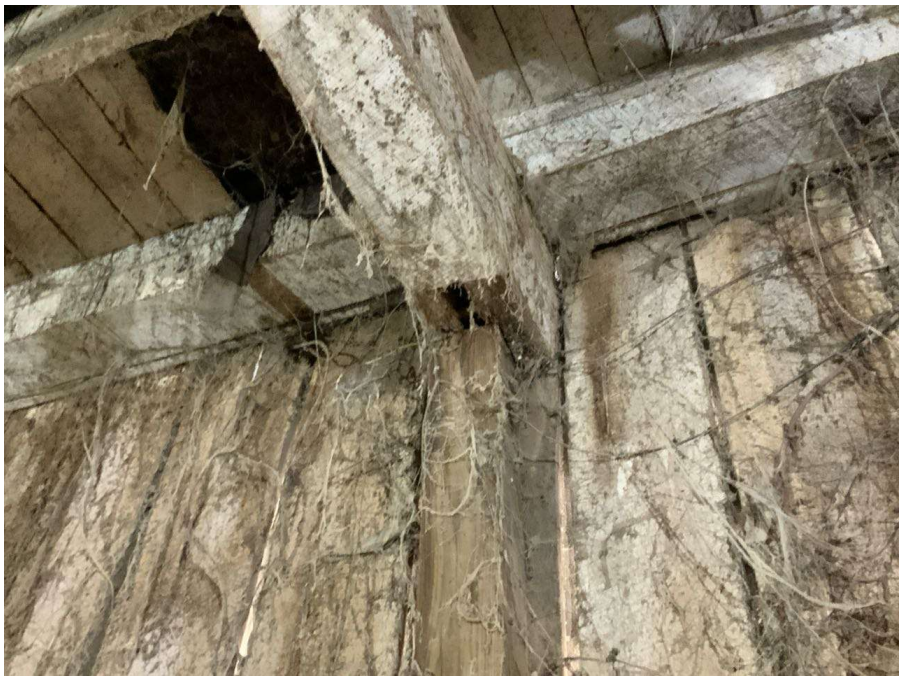


Photo S-117: The replaced column at Column N/5 at grade level has no positive connection to the cap at the top. Note the west brace is missing.

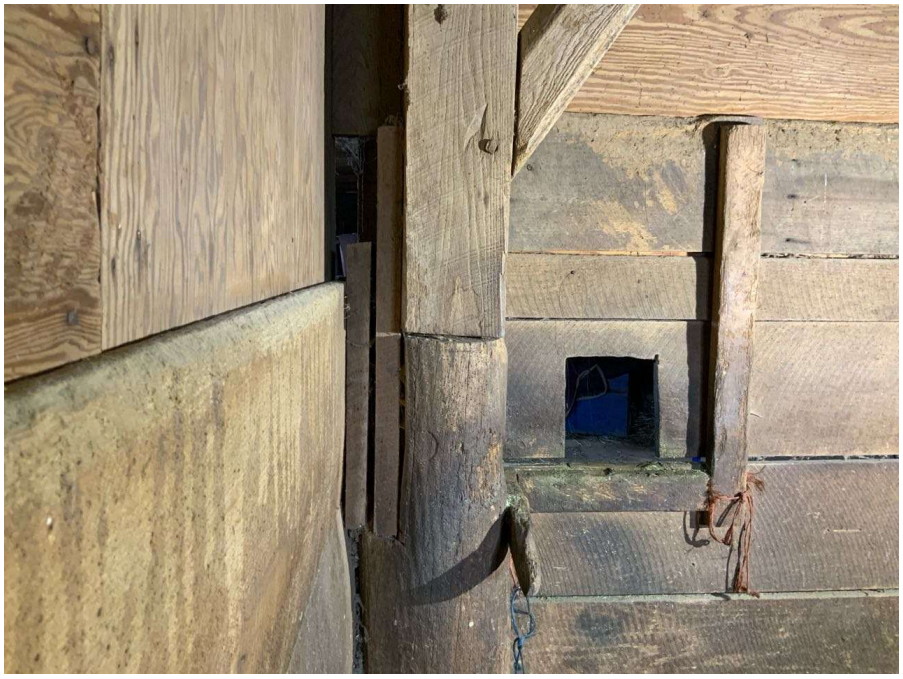


Photo S-118: The bottom portion of Column C/2 at grade level consists of a round post spliced to the original column using timber boards.

Photo S-119: The bottom portion of Column D/2.5 at grade level consists of a round post spliced to the original column using timber boards.

Photo S-120: The bottom portion of Column N/6 at grade level consists of a 5.75”x5.75” post supporting the original column above.

Photo S-121: Typical check on south face of intermediate column at grade level along Gridline 1. Column Q.5/1 shown looking north.

Photo S-122: Chipped out masonry foundation wall indicating door was likely installed or widened after the original construction. Door between Columns E/1 and F/1 shown.

Photo S-123: Cut portion of intermediate column still in mortise slot with dowel. Door between Columns G/1 and H/1 shown.

Photo S-124: Empty mortise slot in floor beam indicating the intermediate column was likely removed to install the door. Door between Columns P/1 and Q/1 shown.

Photo S-125: The east brace at Column H/6 at grade level is slipping out of the mortise slot at the top connection to the floor beam (looking south). A retrofit strap has been added to keep it in place.

Photo S-126: The east brace at Column H/6 at grade level has a gap at the base connection to the column (looking north).

Photo S-127: The east brace at Column H/7 at grade level is not positively connected to the column at the base connection (looking south).

Photo S-128: The west brace at Column N/7 at grade level is not connected to the column at the base connection (looking south). Note the wind girt is connected to the brace and cannot efficiently transfer loads to the column.

Photo S-129: The west brace at Column T/2 at grade level is not connected to the column at the base connection (looking south). Note the dowel is sheared and the brace is sticking out of the mortise slot.

Photo S-130: West brace at Column T/3 at grade level has a notch cut out of the bottom face (looking south).

Photo S-131: The south brace at Column C/2 at grade level has a retrofit strap at the base connection to keep the brace attached (looking northeast).

Photo S-132: The south brace at Column G/2 at grade level has a 1" gap at the top connection to the floor beam where the brace is dropping down (looking east).

Photo S-133: Typical brace separation at base column connection. Column H/7 shown at grade level. Note the wind girt is disconnected at this location.

Photo S-134: Missing brace at Column Q/2 at grade level. Note the empty mortise slot in the floor beam above. A ladder to a hatch is in the place where the brace should be located.

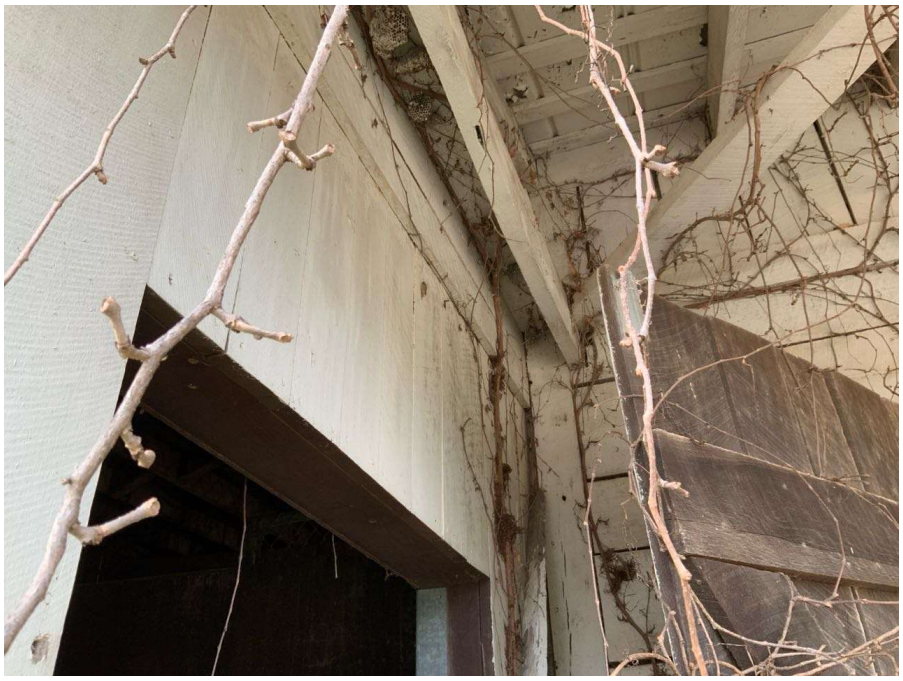


Photo S-135: Missing overhang diagonal supports at Column C/4.

Photo S-136: The overhang at Column H/4 does not have any diagonal support but the wall of the lean-on structure appears to be supporting the overhang instead.

Photo S-137: The overhang support diagonal at Column H/7 exhibits rot at base connection with up to 4″ deep icepick penetration. The diagonal is not fully connected to the column.

Photo S-138: The east overhang support diagonal is missing, and the horizontal member is damaged at Column J/7.

Photo S-139: The west overhang support diagonal is missing at Column K/7.

Photo S-140: The overhang support diagonal is disconnected at the base connection to Column N/7.

Photo S-141: The overhang support diagonal is disconnected at the base connection to Column N/7.

Photo S-142: Both overhang support diagonals and the west horizontal member is missing at Column P/4.

Photo S-143: Rot at the overhang support horizontal member connection to Column S/4.

Photo S-144: Rot with section loss in the sill plate below Column B/2.5 at grade level.

Photo S-145: Rot with full icepick penetration in the sill plate below Column H/1 at grade level.

Photo S-146: Rot with full icepick penetration in the sill plate below Column I/1 at grade level.

Photo S-147: Rot with full icepick penetration in the sill plate below east jamb near Gridline K/1 at grade level.

Photo S-148: Rot with full icepick penetration in the sill plate adjacent to Column P/1at grade level.

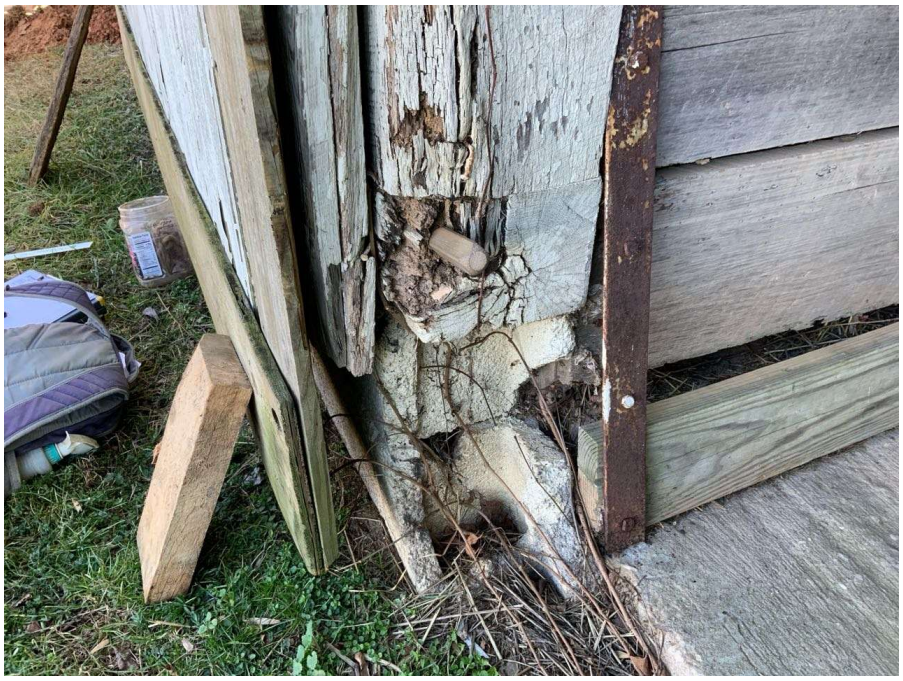


Photo S-149: Rot with full icepick penetration in the sill plate below Column S/1. Note the CMU wall is chipped out at this location indicating that this door is likely not part of the original construction.

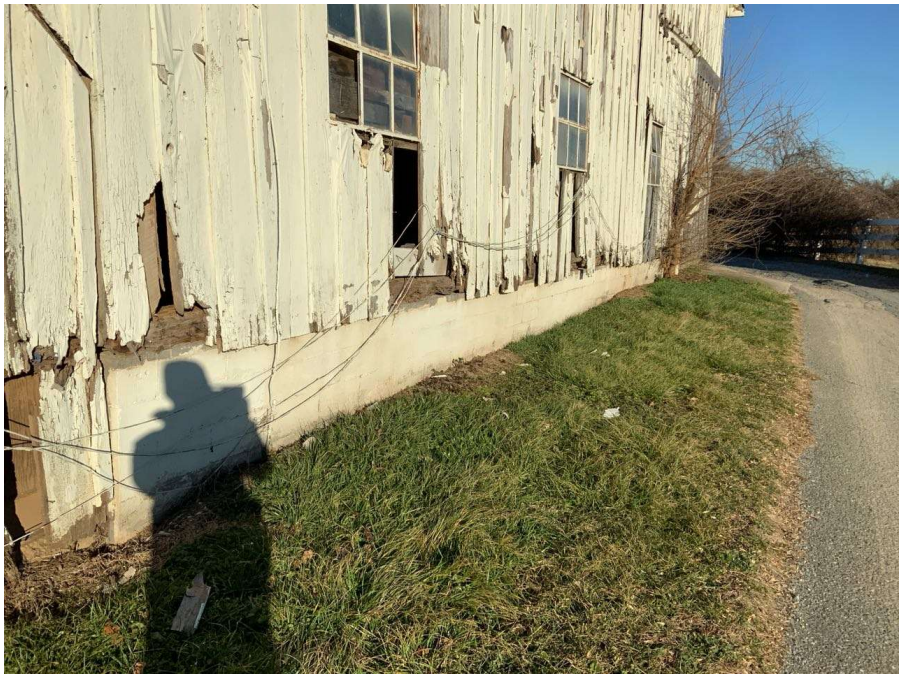


Photo S-150: Siding along east elevation is broken or missing exposing the sill plate along Gridline T to the external environment. The sill plate is rotting.

Photo S-151: The sill plate along Gridline T is rotting with up to full icepick penetration.

Photo S-152: Tilt in west elevation CMU foundation wall (looking south).

Photo S-153: Missing block in CMU foundation wall at the west elevation (looking southeast).

Photo S-154: Typical chips in exterior faces of the cells of the CMU foundation wall blocks at the west elevation.

Photo S-155: Typical chips in exterior faces of the cells of the CMU foundation wall blocks at the west elevation.

Photo S-156: Typical pedestal with spalled faces exposing the embedded steel straps. Column O/2.5 shown.

Photo S-157: Vertical crack in east face of the concrete curb supporting Column L/7 at grade level. Note that the column does not appear to be positively attached to the concrete curb.

Photo S-158: Settled walkway slab at northwest corner of building.

Photo S-159: Rotting siding along the bottom of the curtain wall bump out between Gridlines B and C.

Photo S-160: The wall bump out between Gridlines K and L supports the gravity load from the roof of the out-of-scope outbuilding structures to the south of the main barn.

Photo S-161: The wall bump out between Gridlines K and L has rotting siding near the base and a rotting east end post.

Photo S-162: The curtain wall between Gridline N and O has rotting siding and sill plate near the base. The wall moves when pushed.

Photo S-163: The curtain wall between Gridline N and O has rotting siding and sill plate near the base. The wall moves when pushed.

Photo S-164: The curtain wall between Gridline Q and R is pulled outwards and has misaligned CMU wall and split sill plate (looking west).

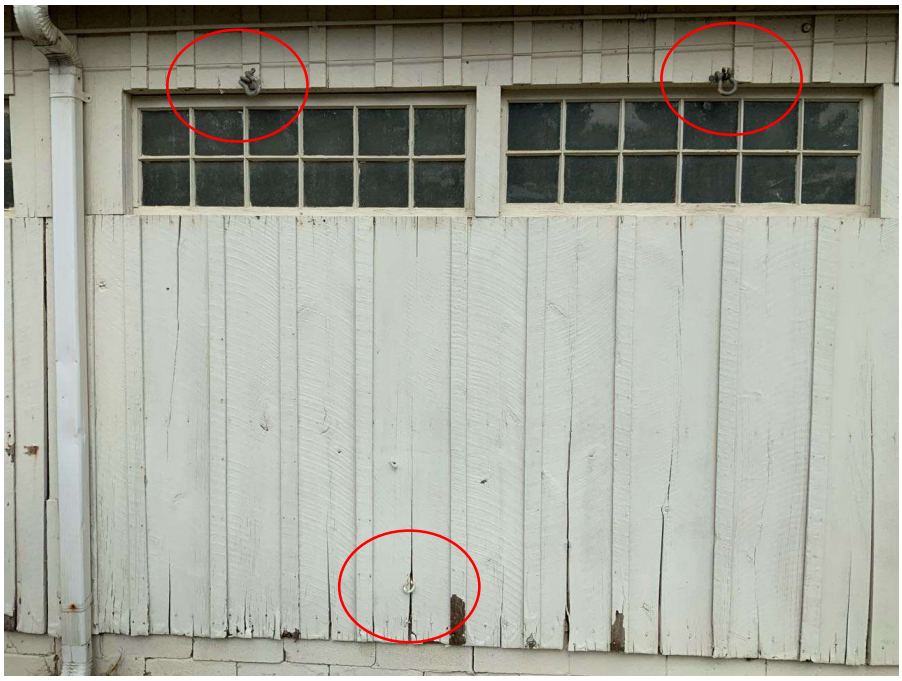


Photo S-165: Eyehooks in curtain wall between Gridline N and T where golf course allegedly attached tents during large events.

Photo S-166: The eyehooks in curtain wall between Gridline N and T where the golf course allegedly attached tents during large events are attached back to main framing at the top of wall using steel rods.

Photo S-167: Typical area of rot in the wind girt under the window opening. Wind girt between Columns M/1 and N/1 at grade level shown.

Photo S-168: Typical area of rot in the wind girt under the window opening. Girt between Columns T/3 and T/4 at grade level shown. Icepick penetration at this area is up to 3.5" deep.

Photo S-169: Typical area of rot in the wind girt under the window opening. Wind girt between Columns N/4 and N/5 at grade level shown. There is up to full icepick penetration at this location.

Photo S-170: A new member has been sistered to the original rotting header at the door between Columns F/4 and G/4.

Photo S-171: Heavy vegetation growth on west elevation of lean-on structure.

Photo S-172: Heavy vegetation growth on east elevation of lean-on structure.

APPENDIX B3

Architectural Photos

Photo A-1: General exterior view of roofs.

Photo A-2: Underside of metal roof panels with open cavities.

Photo A-3: Sections of lifted metal roof panels and deteriorated/missing fascia boards.

Photo A-4: Deteriorating roof edge and inadequate waterproofing at corrugated roof.

Photo A-5: Close-up view of deteriorated/missing fascia board and lack of edge flashing.

Photo A-6: Lack of edge coverage and wood deterioration.

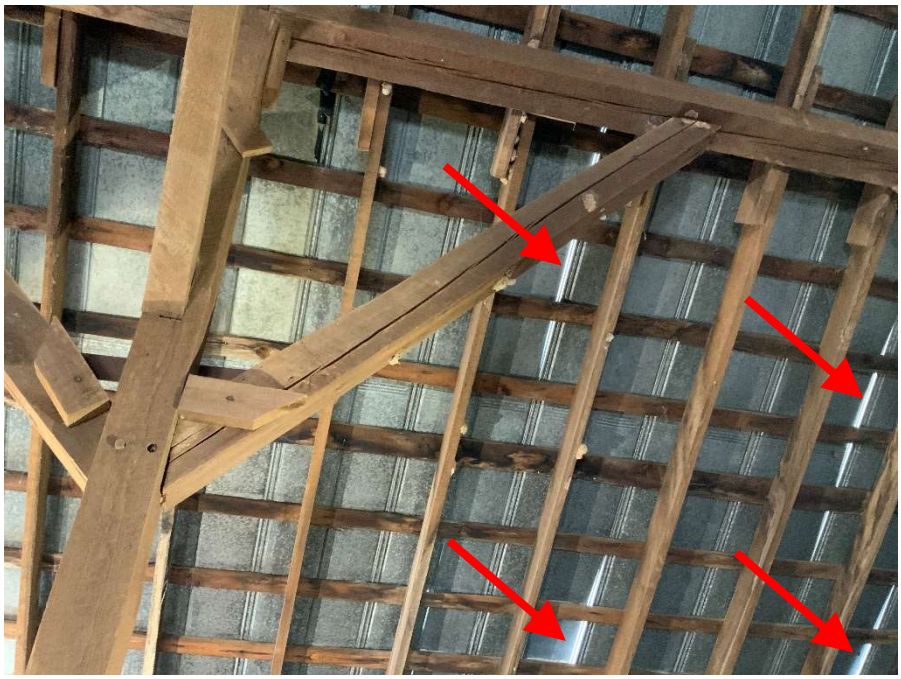


Photo A-7: Underside of metal roof panels with separated seams.

Photo A-8: Metal trim between the roof and wall connection lacking adequate sealing properties.

Photo A-9: General exterior photo of paint peeling and deteriorated siding.

Photo A-10: General exterior photo of wood decay and overgrowth.

Photo A-11: Paint peel, missing battens, and exposed wood joints.

Photo A-12: Interior photo of unprotected wood siding joints.

Photo A-13: General exterior photo of deteriorated and decaying boards.

Photo A-14: Deteriorated boards and a discontinuous rain leader.

Photo A-15: General exterior photo of vegetation overgrowth and clogged gutters.

Photo A-16: Close-up photo of wood deterioration and overgrowth.

Photo A-17: Interior photo of vegetation overgrowth compromising the building envelope.

Photo A-18: General exterior photo of window damage and localized deterioration.

Photo A-19: General exterior photo of unprotected window openings.

Photo A-20: Window damage and deterioration at sill.

Photo A-21: Window damage and deterioration at head.

Photo A-22: General exterior photo of sliding door deterioration and decay.

Photo A-23: General exterior photo of unpainted door.

APPENDIX B4

Geotechnical Photos

Photo GT-1: Test Pit 1 (TP-1) location along exterior north wall.

Photo GT-2: Test Pit 2 (TP-2) location at exterior northeast corner wall.

Photo GT-3: TP-1 soil profile (0.0 feet to 4.1 feet).

Photo GT-4: Exposed concrete foundation at TP-1 measuring 0.9 feet thick.

Photo GT-5: Exposed foundation at TP-1 with top of footing measuring 1.9 feet BGS and bottom of footing at 2.8 feet BGS.

Photo GT-6: TP-2 soil profile (0.0 feet to 4.6 feet).

Photo GT-7: Top of concrete footing at TP-2 measuring 6.0 feet BGS with CMU foundation wall extending full depth and resting on top of spread footing.

Photo GT-8: Sounding rod used at TP-2 to locate edge of spread footing foundation. Foundation protrudes 1.0 foot from exterior foundation wall.

Photo GT-9: Soil from TP-1. Likely residual soil part of the Glenelg silt loam soil unit.

APPENDIX B5

Hazardous Material Photos

Photo E-1: Tan/white caulk associated with the barn's exterior windows. Identified as potential ACM. Windows are present in all exterior walls.

Photo E-2: Corrugated sheets in the garage/outbuilding south of the barn. Identified as potential ACM.

Photo E-3: Cracking/peeling white paint along barn exterior walls and fascia boards. Identified as potential lead-based paint.

Photo E-4: Peeling/blistering gray paint on metal roof and roof vents/cupolas. Identified as potential lead-based paint.

Photo E-5: Faded/peeling gray paint on wooden exterior window shutters. Identified as potential lead-based paint.

Photo E-6: "Alligator texture" cracking observed on white paint on exterior window frames. Identified as potential lead-based paint.

Photo E-7: "Alligator texture" cracking on green interior paint located throughout barn. Identified as potential lead-based paint.

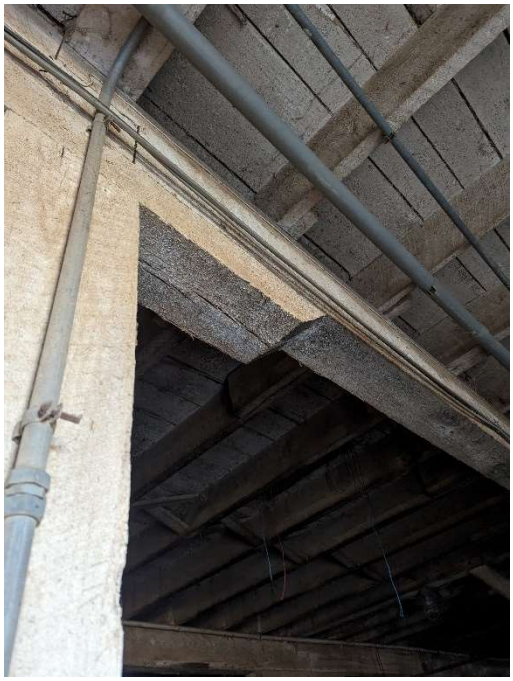


Photo E-8: Flaking white paint on interior walls and timbers. Identified as potential lead-based paint.

Photo E-9: Cracking gray paint behind apparent former interior electrical panel area on north barn interior wall. Identified as potential lead-based paint.

Photo E-10: Cracking/flaking white paint on interior wooden window sills throughout barn. Identified as potential lead-based paint.

Photo E-11: Cracking/flaking white paint on conduit and junction box located on north barn interior wall. Identified as potential lead-based paint.

Photo E-12: "Alligator texture" cracking green paint on exterior window frames. Numerous windows are present in barn exterior walls. Identified as potential lead-based paint.

Photo E-13: Fluorescent light fixture in barn interior room along northern building wall. Ballast identified as potentially containing PCBs. Fixture was not opened for inspection due to its condition.

Photo E-14: Fluorescent light fixture in garage/outbuilding south of the barn. Fixture could not be opened to allow inspection of the ballast due to its location. Identified as potentially containing PCBs.

Photo E-15: Lead-acid batteries in plastic battery boxes. Located in garage/outbuilding south of the barn. No leaks were evident.

Photo E-16: Gasoline-powered snow blower along barn's south exterior wall. Identified as oil-containing equipment.

Photo E-17: Tractor, hydraulic floor jack, transmission/hydraulic oil containers, and grease canister located in covered storage area connecting barn to the garage/outbuilding.

Photo E-18: Tractor located in garage/outbuilding, located south of barn. Identified as oil-containing equipment.

Photo E-19: Mercury thermometer attached to barn's north exterior wall.

Photo E-20: Transmission/hydraulic fluid in plastic bottles and buckets. Located in concrete area south of barn's southeast corner.

Photo E-21: Tires stacked adjacent to barn's south exterior wall.

Photo E-22: Electronic/computer devices stored in plastic bin along barn's south exterior wall.

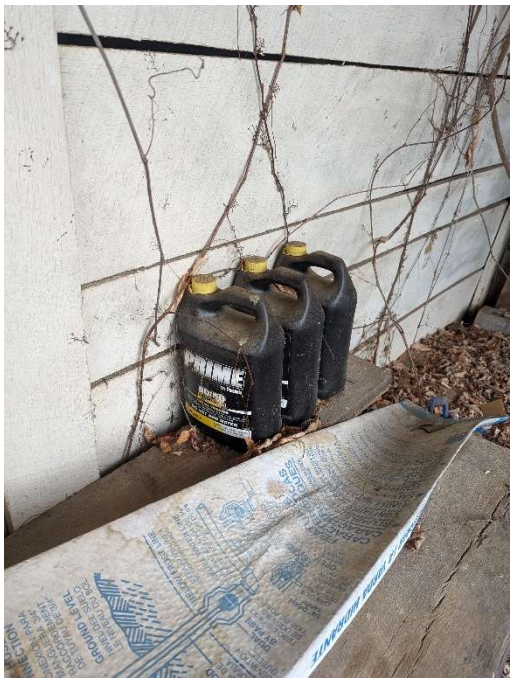


Photo E-23: Antifreeze bottles stored beneath overhang near barn's southwest exterior corner.

Photo E-24: Aerosol wasp/yellowjacket killer spray cans located in barn interior aisle.

Photo E-25: Aerosol insect repellant located in interior barn stall.

Photo E-26: Silicone coating/paint in covered storage area connecting barn to garage/outbuilding.

Photo E-27: Propane tank (assumed 100-pound tank) located in covered storage area connecting barn to garage/outbuilding.

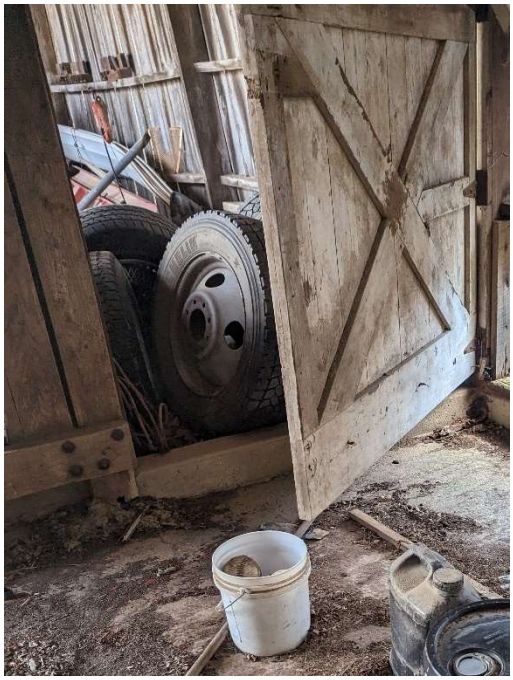


Photo E-28: Tires piled inside covered storage area connecting barn to garage/outbuilding.

Photo E-29: Tires, heating and air conditioning/mechanical equipment stored at the northeast corner of the garage/outbuilding.

Photo E-30: Hydraulic/transmission oil containers, windshield washer fluid, and car batteries located inside the garage/outbuilding, along south interior wall. Stained soils were evident.

Photo E-31: Hydraulic/transmission/gear oil containers and plastic gasoline cans located inside the garage/outbuilding, along north interior wall.

Photo E-32: Hydraulic/transmission oil containers located inside western portion of the garage/outbuilding.

Photo E-33: 5-gallon bucket of Benjamin Moore paint located inside west end of garage/outbuilding.

Photo E-34: Apparent used engine oil in plastic jug and 2′ x 2′ x 4′ steel tank. Located inside western portion of the garage/outbuilding.

Photo E-35: Above ground fuel tank (approximately 275 gallons capacity) located on west exterior wall of garage/outbuilding.

APPENDIX B6

Electrical Photos

Photo EL-1: Ceiling mounted lights in hayloft do not have protection guard over the light fixture bulb.

Photo EL-2: Site mounted panelboards are missing circuit breaker knockouts.

APPENDIX C

Engineer's Opinion of Probable Cost

Trade	Categories	Task	Subtask	Description	Grand Total Amount
1				**Structural**	
	1			**Repairs Necessary for Occupany**	
		1.01		**Stabilization, Shoring and Safety Considerations**	
			1.01.a	Lateral Bracing on Exterior [N/S/E/W faces]	$2,406,140
			1.01.b	Vertical Shoring - Level 1	$206,542
			1.01.c	Vertical Shoring - Level 2 - N/S Elevations	$10,149
			1.01.d	Temporary plywood/walking area at Hay Loft	$33,978
			1.01.e	Shim and provide positive connection plates at hayloft perimiter columns	$7,465
			1.01.f	Install Roof ties between columns and roof beams in north/south direction	$51,951
			1.01.g	Remove debris from hay-loft as needed to perform work	$20,256
			1.01.h	Remove vegetation from building	$46,688
				Stabilization, Shoring and Safety Considerations	$2,783,170
		1.02		**Critical Finding repair at the Hayloft Floor Beam (Beam Between Column B/4 and C/4)**	
			1.02.a	Make sure floor stringers are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.02.b	Disconnect (2) Girts and (1) brace from column and floor joists from beam. Remove rotted beam and column, replace in kind, reconnect girts and braces, and floor joists.	$10,880
				Critical Finding repair at the Hayloft Floor Beam (Beam Between Column B/4 and C/4)	$11,900
		1.03		**Significant Finding Repair at the Hayloft Floor Beam (Beam Between Column I/1 and J/1)**	
			1.03.a	Make sure floor stringers are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.03.b	Disconnect floor joists from beam. Remove rotted beam, replace in kind, reconnect floor joists	$6,165
				Significant Finding Repair at the Hayloft Floor Beam (Beam Between Column I/1 and J/1)	$7,185
		1.04		**Rotting Roof Rafters**	
			1.04.a	Sister Roof Rafter - Main Structure	$2,733
			1.04.b	Sister Roof Rafter - Overhang	$162
				Rotting Roof Rafters	$2,894
		1.05		**Split and Rotting Hayloft Columns at North and South Elevations**	
			1.05.a	Make sure roof beams are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.05.b	Disconnect Brace, Cut out Column from beams, replace in kind, reconnect brace	$7,693
				Split and Rotting Hayloft Columns at North and South Elevations	$8,713
		1.06		**Rotting and Twistinf Roof Beams Along Perimiter**	
			1.06.a	Make sure roof rafters are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.06.b	Disconnect Roof rafters and braces(as needed), remove beam, replace in kind, reattach rafters and braces	$63,910
				Rotting and Twistinf Roof Beams Along Perimiter	$64,930
		1.07		**Bearing issues at Hayloft North/South Roof Support Frame Horizontal Members**	
			1.07.a	Provide steel straps around the twisted and raised horizontal frame members	$1,514
				Bearing issues at Hayloft North/South Roof Support Frame Horizontal Members	$1,514
		1.08		**Disconnected and Missing Hayloft Bracing**	
			1.08.a	Install simpson strongtie kneebrace stabilizer on each side of brace at each end.	$9,556
			1.08.b	Install new braces where braces have been removed in the past	$2,104

				Disconnected and Missing Hayloft Bracing	$11,660
		1.10		**Gaps at Interior Hayloft Roof Beams**	
			1.10.a	Provide plates on the north and south faces of the interior roof beams at the hayloft level	$11,315
				Gaps at Interior Hayloft Roof Beams	$11,315
		1.11		**Hayloft Load Transfer Spreader Beam Structures**	
			1.11.a	Provide a post midspan underneath the original column to shore up the deflected beam	$1,930
				Positively attach the post to the transfer column and floor beam below	
				Hayloft Load Transfer Spreader Beam Structures	$1,930
		1.12		**Disconnected or Poor Hayloft Wind Girt Connections**	
			1.12.a	Provide a simpson strongtie clip angle from girt to column	$24
				Disconnected or Poor Hayloft Wind Girt Connections	$24
		1.13		**Rotting Hayloft Floor Beams**	
			1.13.a	Make sure floor stringers are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.13.b	Disconnect floor joists from beam. Remove rotted beam, replace in kind, reconnect floor joists	$27,164
				Rotting Hayloft Floor Beams	$28,184
		1.14		**Rotting/Deteriorating/Broken/Missing Hayloft Deck Floorboards**	
			1.14.a	remove rotting floorboards and replace in kind	$53,984
				Rotting/Deteriorating/Broken/Missing Hayloft Deck Floorboards	$53,984
		1.15		**Disconnected Hayloft Floor Stringer Bridging**	
			1.15.a	Renail the bridging which has become disconnected between the Hay Loft floor beams	$347
				Disconnected Hayloft Floor Stringer Bridging	$347
		1.16		**Rotting Hayloft Floor Stringers**	
			1.16.a	Sister Floor Stringers - Main Structure	$976
				Rotting Hayloft Floor Stringers	$976
		1.17		**Rotting and Split Grade Level Column Caps**	
			1.17.a	Make sure floor beams are shored at this location (should have been addressed when stabilizing building). Stabilize column during work.	$1,020
			1.17.b	Cut out Column Cap and replace in kind	$2,098
				Rotting and Split Grade Level Column Caps	$3,118
		1.18		**Bearing Issues at Bases of Grade Level Columns**	
			1.18.a	Make sure floor beams are shored at this location (should have been addressed when stabilizing building). Also ensure columns are shored or remove. Add Positive connection at top of all columns per Detail 11.	$87,052
			1.18.b	At Columns not currently sitting on Concrete Pedestal or Curb: Cut off bottom portion of column exhibiting rot. Pour Concrete pedestal	$207,432
			1.18.c	At rotting columns that are sitting on concrete pedestal or curb: replace column in kind and provide positive connection at top and bottom.	$7,695
			1.18.d	At rotting columns that are sitting on sill: Replace column in kind and provide positive connection at top and bottom. Replace sills that are rotting at same time (see next repair)	$16,533
				Bearing Issues at Bases of Grade Level Columns	$318,712
		1.19		**Rotting Sill Plates**	
			1.19.a	Make sure floor beams and columns are shored at this location (should have been addressed when stabilizing building)	$1,020
			1.19.b	Remve portion of sliding, disconnect columns and braces which are attached to sill, replace sill in kind, reattach columns and braces.	$73,406
				Rotting Sill Plates	$74,426

		1.20		**Disconnected and Missing Grade Level Bracing**	
			1.20.a	Install new braces where braces have been removed in the past	$4,580
			1.20.b	Install simpson strongtie kneebrace stabilizer on each side of brace at each end.	$21,570
				Disconnected and Missing Grade Level Bracing	$26,150
		1.21		**Disconnected Grade Level Wind Girt Connections**	
			1.21.a	Provide a simpson strongtie clip angle from girt to column	$48
				Disconnected Grade Level Wind Girt Connections	$48
		1.22		**Cantilevered Overhang at south elevation**	
			1.22a	replace missing/damaged horizontals	$431
			1.22.b	replace missing/damaged diagonals	$1,292
			1.22.c	Repalce rotted/disconnected diagonals in kind	$431
			1.22.d	replace rotted horizontal in kind	$215
				Cantilevered Overhang at south elevation	$2,368
		1.23		**Splits**	
			1.23.a	Split repair - Roof Beams Spanning E/W	$669
			1.23.b	Split repair - Roof Beams Spanning N/W	$1,675
			1.23.c	Split repair - Hayloft Columns at North and South Elevations	$1,726
			1.23.d	Split repair - Hayloft Interior Columns	$2,008
			1.23.e	Split repair - Hayloft Bracing	$3,686
			1.23.f	Split repair - Grade Level Columns	$1,339
				Splits	$11,103
		1.24		**Damaged Roof Decking and Roof Purlins**	
			1.24.a	Demo existing roof and replace existing roof with a new standing seam metal panel roof, insulation, vapor barrier, and substrate.	$1,000,853
			1.24.b	Replace rotted/damaged/missing purlins during roof replacement	$12,240
				Damaged Roof Decking and Roof Purlins	$1,013,093
				Repairs Necessary for Occupany	$4,437,743
	2			**Intermediate Repairs**	
		2.01		**Timber Column to Timber Pedestal Connection**	
			2.01.a	Provide (4) steel plates at each face of column	$849
				Timber Column to Timber Pedestal Connection	$849
		2.02		**Timber Column to Curb Connections**	
			2.02.b	Provide (2) steel bent plates/angles with expansion anchor at each column base	$7,207
				Timber Column to Curb Connections	$7,207
		2.03		**Uneven Floor Beam to Column Cap Connections**	
			2.03.c	Provide wood shims as needed to achieve full bearing. Provide a simpson strongtie heavy duty strap around the beam and column cap at location of shim	$3,558
				Uneven Floor Beam to Column Cap Connections	
		2.04		**Split Hayloft Floor Beams**	
			2.04.d	Shim and Provide Simpson Heavy Strap over beam per detail 6	$508
				Split Hayloft Floor Beams	$508
		2.05		**Curtain Wall Framing**	
			2.05.a	Prior to working on curtain wall at center lean-on sturcture, ensure roof to south of barn is shored	$1,020
			2.05.b	Replace sill at base of non-bearing wall. Splice rotten members of wall studs as required where rotting/deteriorating (assume 30LF of splicing material)	$9,765
			2.05.c	Shore wall	$1,012
			2.05.d	Straighten CMU block foundation wall and replace split sill in kind	$6,169
				Curtain Wall Framing	$17,966
		2.07		**Rotting Wind Girts**	
			2.07.a	Sister the top and bottom of the wind girts which exhibit rot	$484
				Rotting Wind Girts	$484
				Intermediate Repairs	$30,573

	3			**Aesthetic Repair**	
		3.01		**Patch Spalls in the Concrete Pedestals**	
			3.01.a	Make sure columns are shored at this location. While an aesthetic repair, recommend this is done while building is shored. Will need to remove some stables during repair	$1,020
			3.01.b	Remove loose mateerial, clean rusted steel tie, install (3) hoops of #3 rebar spaced at 12", use (8) #3 vertical bars evenly spaced around pedestal, pour repair mortar around existinf pedestal	$23,777
				Patch Spalls in the Concrete Pedestals	$24,797
		3.02		**Replace missing CMU block in foundation wall at west elevation**	
			3.02.a	Install 1 standard 8" wide block in CMU wall	$160
				Replace missing CMU block in foundation wall at west elevation	$160
		3.03		**Replace chipped CMU foundation wall blocks in west elevation**	
			3.03.a	Remove chipped blocks and replace in kind. Shore wall as required.	$2,329
				Replace chipped CMU foundation wall blocks in west elevation	$2,329
				Aesthetic Repair	$27,286
				Structural	**$4,495,602**
2				**Architectural**	
	1			**Repairs Necessary for Occupany**	
		1.24		**Damaged Roof Decking and Roof Purlins**	
			1.24.a	Demo existing roof and replace existing roof with a new standing seam metal panel roof, insulation, vapor barrier, and substrate.	
				Damaged Roof Decking and Roof Purlins	
		1.25		**Wall Assembly**	
			1.25.a	Demo exsiting siding and replace with a new wood or composite plank siding	$257,831
				Wall Assembly	$257,831
		1.26		**Gutters and downspouts**	
			1.26.a	Replace Gutters and Downspouts	$34,914
				Gutters and downspouts	$34,914
				Repairs Necessary for Occupany	$292,746
	3			**Aesthetic Repair**	
		3.04		**Windows**	
			3.04.a	Full replacement of windows with insulated glazing to mach existing aesthetic. New head flashing, sill flashing, amd membrane flashing around openings.	$178,855
			3.04.b	Opening intentially without windows shall be considered for exterior access door	$13,791
				Windows	$192,645
		3.05		**Doors**	
			3.05.a	Full replacement of doors with complementary appearance. Hollow metal doors with wood-like appearance to match existing aestheric. Door openings should receive new head flashing	$274,824
				Doors	$274,824
				Aesthetic Repair	$467,469
				Architectural	**$760,214**
3				**Electrical**	
	1			**Repairs Necessary for Occupany**	
		1.27		**Site Mounted Panelboards**	

			1.27.a	Existing panelboard shall have circuit braker blanks installed in areas where circuit breaker knockout are missing. Circuit breakers that are not correctly mounted shall be reinstalled to alleviate chances of accidental contact with live electrical parts	$1,497
				Site Mounted Panelboards	$1,497
				Repairs Necessary for Occupany	$1,497
	2			**Intermediate Repairs**	
		2.08		**Damaged Roof Decking and Roof Purlins**	
			2.08.a	Hayloft Lighting	$12,125
				Damaged Roof Decking and Roof Purlins	$12,125
				Intermediate Repairs	$12,125
				Electrical	**$13,622**
TOTAL					**$5,269,439**

APPENDIX D

Finding Summaries

APPENDIX D1

Geotechnical Test Pit Field Logs (February 7, 2024)

GANNETT FLEMING

TEST PIT LOG

TEST PIT NO.	TP-1
PROJECT NO.	068805
DATE STARTED	02/07/2024
DATE FINISHED	02/07/2024

PROJECT/LOCATION	WSSC Avenel Equestrian Center - Potomac, MD
GEOLOGIST/ENGINEER	Ben Harlacher, EIT (Gannett Fleming)
EXCAVATION CONTRACTOR	Washington Suburban Sanitary Commission (WSSC)
FOREMAN	Justin
EXCAVATION EQUIPMENT	JCB 3CX Backhoe
PHOTOGRAPHIC LOG	Soil Profile Photographs Taken
SURFACE ELEVATION	Ground Surface Elevation Unknown
GROUNDWATER OBSERVATION (Date, Time, Level)	Dry (not encountered)

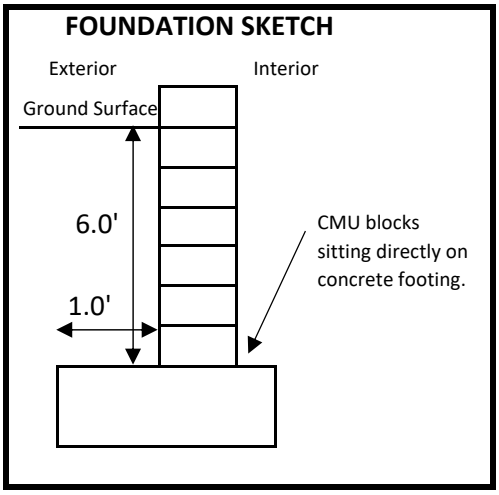
DEPTH (ft)	SAMPLE NO. & TYPE	DESCRIPTION OF MATERIALS (Density, Consistency or Rock Hardness; Color; Classification; etc.)	USCS	PP/TOR (tsf)	REMARKS
0.2		0.0'-0.2': GRAVEL, some Silt, contains organics, dark brown, angular, non-plastic, damp, fill.	gm		0.0': Existing Ground Surface
0.8		0.2'-0.8': SILT, brown, micaceous, non-plastic, damp, residuum.	ml		
1.0	S-1 (bag) 1.0'-3.0'	0.8'-3.0': SILT, some fine Sand, trace mica schist Gravel fragments, mottled black, light brown ,and brown, micaceous, non-plastic, damp, residuum.	ml		1.9': Top of concrete footing.
2.0					
3.0					2.8': Bottom of concrete footing.
4.0		3.0'-4.1': SILT, little fine Sand, trace mica schist Gravel fragments, mottled brown with black, micaceous, non-plastic, damp, residuum.	ml		
4.1		Bottom of TP-1 @ 4.1'			
5.0					
6.0					

GENERAL REMARKS: Location: Along north wall, outside of structure, 157' from NE building corner.

- Exposed bottom of exterior wall foundation at 2.8', then moved away and excavated down to 4.1'.

GANNETT FLEMING			
		PROJECT/LOCATION	WSSC Avenel Equestrian Center - Potomac, MD
		GEOLOGIST/ENGINEER	Ben Harlacher, EIT (Gannett Fleming)
		EXCAVATION CONTRACTOR	Washington Suburban Sanitary Commission (WSSC)
TEST PIT LOG		FOREMAN	Justin
TEST PIT NO.	TP-2	EXCAVATION EQUIPMENT	JCB 3CX Backhoe
PROJECT NO.	068805	PHOTOGRAPHIC LOG	Soil Profile Photographs Taken
DATE STARTED	02/07/2024	SURFACE ELEVATION	Ground Surface Elevation Unknown
DATE FINISHED	02/07/2024	GROUNDWATER OBSERVATION (Date, Time, Level)	Dry (not encountered)

DEPTH (ft)	SAMPLE NO. & TYPE	DESCRIPTION OF MATERIALS (Density, Consistency or Rock Hardness; Color; Classification; etc.)	USCS	PP/TOR (tsf)	REMARKS
0.5		0.0'-0.5': GRAVEL, little Silt, dark brown, anglular, non-plastic, damp, fill.	gm		0.0': Existing Ground Surface
1.0		0.5'-2.0': SILT, some fine Sand, light brown, micaceous, non-plastic, damp, residuum.	ml		
2.0					
3.0		2.0'-6.0': SILT, little fine Sand, trace Clay, reddish brown to brown with black spotting, micaceous, non-plastic, damp, residuum.			
4.0	S-1 (bag) 4.0'-4.6'		ml		4.6'-6.0': Unable to collect photo of subsurface materals. Hand dug.
5.0					
6.0					
		Bottom of TP-2 @ 6.0'			

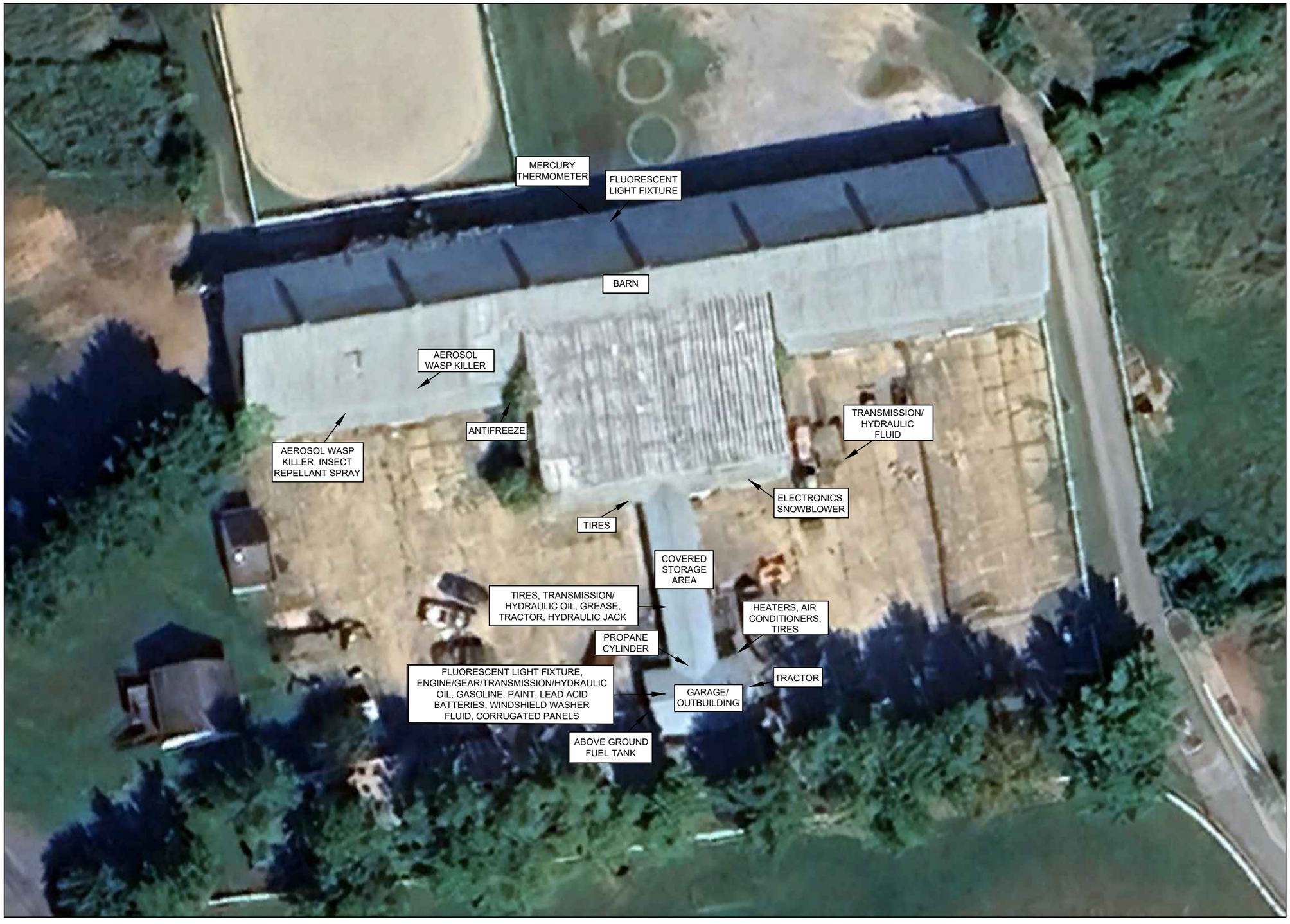


GENERAL REMARKS: Location: At NE corner of structure against North wall, outside of building.

- Hand dug from 4.6'-6.0' against CMU wall. Top of exterior wall concrete footing at 6.0'.
- Toe of footing measured at 1.0' from exterior wall.
- Unable to measure thickness of footing due to depth of excavation.

APPENDIX D2

Hazardous and Regulated Materials Identified during Visual Assessment (February 8, 2024)



NOTES:

1. SEE APPENDIX D2-1 THROUGH D2-6 FOR DETAIL DESCRIPTIONS OF THE IDENTIFIED MATERIALS.
2. BACKGROUND AERIAL IMAGE OBTAINED FROM GOOGLE EARTH.
3. SUSPECTED LEAD PAINT WAS OBSERVED THROUGHOUT THE INTERIOR AND EXTERIOR OF THE BARN, AND EXTERIOR OF THE GARAGE/OUTBUILDING AND COVERED STORAGE AREA.

GANNETT FLEMING
10200 GRAND CENTRAL AVE, SUITE 310,
OWINGS MILLS, MD 21117

PROJECT:

EQUESTRIAN BARN AT AVENEL
POTOMAC, MARYLAND

TITLE:

MATERIALS IDENTIFIED
DURING VISUAL ASSESSMENT
(FEBRUARY 8, 2024)

GRAPHIC SCALE:

NOT TO SCALE

DRAWING SOURCE:

Appendix D2-1
Potential Asbestos Containing Materials (ACM)
Equestrian Barn at Avenel
Condition Assessment

Category	Description	Condition	Location	Amount	Photograph
Miscellaneous	Tan/white caulk - associated with exterior windows.	Good condition. Non-friable.	Windows installed in exterior walls	Approximately 12 linear feet per window. Approximately 43 windows.	Appendix B5, Photo E-1
Miscellaneous	Wire insulation (panel present on barn's east exterior wall, toward northeast corner). A tree has grown around the panel, encompassing it and preventing access for inspection.	Unknown	East exterior wall, near northeast barn corner. Panel is encompassed within tree branches.	Unknown - panel could not be opened	---
Miscellaneous	Wire insulation (rusted metal is stuck shut and could not be opened for inspection).	Unknown	North exterior wall, near northeast barn corner, behind wooden steps.	Unknown - panel could not be opened	---
Miscellaneous	Wire insulation (metal electrical panel/breaker box).	Unknown	North exterior wall, inside wooden enclosure next to payphone.	Unknown - panel opened, but wire insulation not visible.	---
Miscellaneous	Tan/gray corrugated sheets.	Poor condition. Severely damaged. Friable.	Garage/outbuilding located south of barn.	Approximately (5) 4 ft x 8 ft sheets	Appendix B5, Photo E-2

Appendix D2-2
Potential Lead-Containing Paint
Equestrian Barn at Avenel
Condition Assessment

Color	Description	Location	Photograph
White	Cracking/peeling paint on exterior walls and fascia boards. Continues approximately 1.5 feet up underside of roofing.	Entire barn exterior. Also present on the garage/outbuilding and covered storage area connecting to barn.	Appendix B5, Photo E-3
Gray	Peeling/blistering paint on metal roof and roof vents/cupolas.	Entire barn roof. Also present on the garage/outbuilding and covered storage area connecting to barn.	Appendix B5, Photo E-4
Gray	Faded/peeling paint on wooden exterior window shutters.	South exterior wall	Appendix B5, Photo E-5
White (rusted)	"Alligator texture" cracking paint on exterior window frames.	All exterior walls, including 4 windows on east wall, 16 windows on north wall, 3 windows on west wall, and 20 windows on south wall.	Appendix B5, Photo E-6
Green	"Alligator texture" cracking on green interior paint located throughout barn. Observed on timbers, railings, and doors. Barn user indicated that interior paint is the original paint from when the barn was constructed.	Throughout entire building interior	Appendix B5, Photo E-7
White	Flaking white paint on interior walls and timbers.	Throughout entire building interior	Appendix B5, Photo E-8
Gray	Cracking gray paint behind apparent former interior electrical panel area (approximately 8 ft x 8 ft overall dimensions).	North interior wall, directly inside from payphone and bench.	Appendix B5, Photo E-9
White	Cracking/flaking white paint on interior wooden window sills.	Windows installed in building exterior walls	Appendix B5, Photo E-10
White	Cracking/flaking white paint on conduit and junction box.	North interior wall, directly inside from payphone and bench.	Appendix B5, Photo E-11
Green	"Alligator texture" cracking paint on exterior window frames.	Windows installed in building exterior and interior walls. Also, includes windows that are sitting, uninstalled, in the hayloft.	Appendix B5, Photo E-12

Appendix D2-3
Potential PCB-Containing Light Fixture Ballasts
Equestrian Barn at Avenel
Condition Assessment

Description	Location	Additional Information	Photograph
Flourescent light fixture ballast	Interior room located at the approximate midpoint of the north building wall, directly inside from payphone and bench.	Light fixture contains 2 fluorescent bulbs/tubes. Internal components could not be accessed to inspect for PCB-related labeling.	Appendix B5, Photo E-13
Flourescent light fixture ballast	Garage/outbuilding located south of barn.	Light fixture is approximately 2 ft x 4 ft and contains 4 bulbs. Light fixture is disconnected and stored in an obstructed location. Internal components could not be accessed to inspect for PCB-related labeling.	Appendix B5, Photo E-14

Appendix D2-4
Batteries (Nickel Cadmium, Lead-Acid, Lithium)
Equestrian Barn at Avenel
Condition Assessment

General Location	Detailed Location	Description	Brand	Quantity	Photograph
Garage/outbuilding	Garage interior	Lead-acid car batteries	Unknown	2 batteries	Appendix B5, Photo E-15

Appendix D2-5
Oil-Containing Equipment
Equestrian Barn at Avenel
Condition Assessment

General Location	Detailed Location	Description	Quantity	Photograph
Barn exterior	Adjacent to central bump-out on southern barn exterior wall	Gasoline-powered snowblower	1 unit	Appendix B5, Photo E-16
Covered storage area connecting barn to the garage/outbuilding	Southeast portion of covered storage area	Tractor	1 unit	Appendix B5, Photo E-17
Covered storage area connecting barn to the garage/outbuilding	Southeast portion of covered storage area	Hydraulic floor jack	1 unit	Appendix B5, Photo E-17
Garage/outbuilding	Garage interior	Tractor	1 unit	Appendix B5, Photo E-18

Appendix D2-6
Hazardous and/or Regulated Materials Inventory
Equestrian Barn at Avenel
Condition Assessment

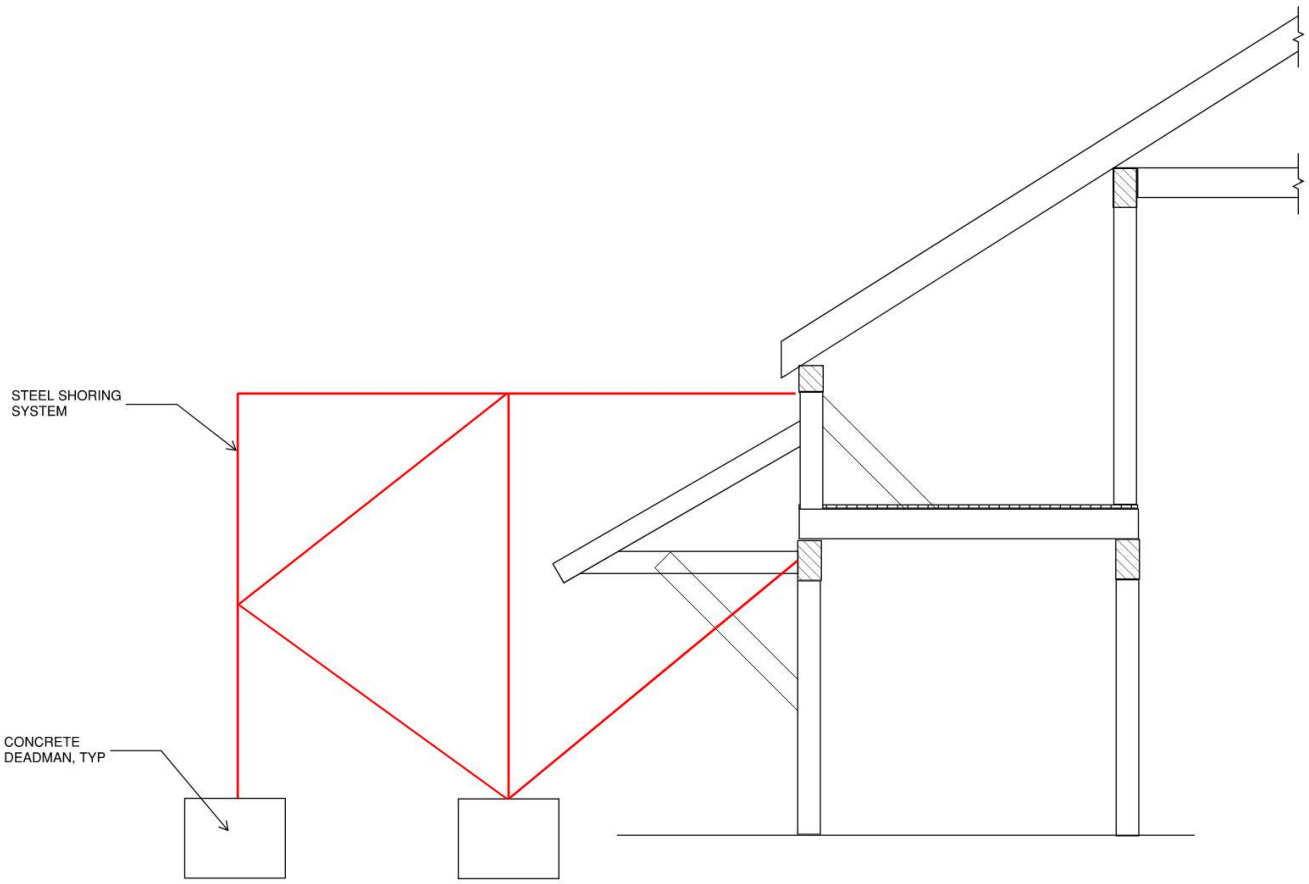
General Location	Detailed Location	Description	Brand	Amount	Photograph
Barn exterior	Approximate midpoint of north exterior wall, next to pay phone, behind bench	Mercury thermometer (rusty metal, approximately 3 ft x 8 inches)	Unknown	1 thermometer	Appendix B5, Photo E-19
Barn exterior	Concrete area south of barn's southeast corner, under farm wagon	Transmission/hydraulic fluid, plastic bottles/buckets	Hy-Gard and unspecified	10 gallons total (approximated)	Appendix B5, Photo E-20
Barn exterior	South barn exterior, southwest corner of central bump-out area	Tires	Unknown	8 tires	Appendix B5, Photo E-21
Barn exterior	South exterior wall, east of central bump-out area, inside plastic bin	Electronic/computer devices	Unknown	5 devices (approximated)	Appendix B5, Photo E-22
Barn exterior	Southwest building exterior, corner beneath overhang	Antifreeze, 1-gallon plastic bottles	Prime	3 bottles, 3 gallons total (approximated)	Appendix B5, Photo E-23
Barn interior	Barn interior, aisle leading to mobile home parking area	Aerosol wasp/yellowjacket killer spray foam, cans	Enforcer	2 cans	Appendix B5, Photo E-24
Barn interior	Barn interior, aisle leading to mobile home parking area	Aerosol wasp/yellowjacket killer spray, cans	Spectracide	1 can	Appendix B5, Photo E-24
Barn interior	Interior barn stall, along southwest building wall	Insect repellant, aerosol cans	Off	2 cans	Appendix B5, Photo E-25
Barn interior	Interior room located at the approximate midpoint of the north building wall, directly inside from payphone and bench.	Flourescent light bulbs/tubes	Unknown	2 bulbs/tubes	Appendix B5, Photo E-13
Covered storage area connecting barn to the garage/outbuilding	Adjacent to southwest end of covered storage area	Silicone coating/paint, 5-gallon bucket	Unknown	1 bucket, 5 gallons total (approximated)	Appendix B5, Photo E-26
Covered storage area connecting barn to the garage/outbuilding	Southeast end of covered storage area	Propane gas cylinder/tank, 46 in x 13 in (appears to be a 100-pound tank)	Unknown	1 gas cylinder/tank	Appendix B5, Photo E-27
Covered storage area connecting barn to the garage/outbuilding	Southwest portion of covered storage area	Tires	Unknown	12 tires	Appendix B5, Photo E-28
Covered storage area connecting barn to the garage/outbuilding	Southwest portion of covered storage area	Transmission/hydraulic fluid, plastic 5-gallon buckets	Hy-Gard	4 buckets, 20 gallons total (approximated)	Appendix B5, Photo E-17
Covered storage area connecting barn to the garage/outbuilding	Southwest portion of covered storage area	Transmission oil, 2.5-gallon and 5-gallon buckets	Miscellaneous	4 buckets, 17.5 gallons total (approximated)	Appendix B5, Photo E-17
Covered storage area connecting barn to the garage/outbuilding	Southwest portion of covered storage area	Muti-purpose grease, tube	Plews	1 tube	Appendix B5, Photo E-17

Appendix D2-6
Hazardous and/or Regulated Materials Inventory
Equestrian Barn at Avenel
Condition Assessment

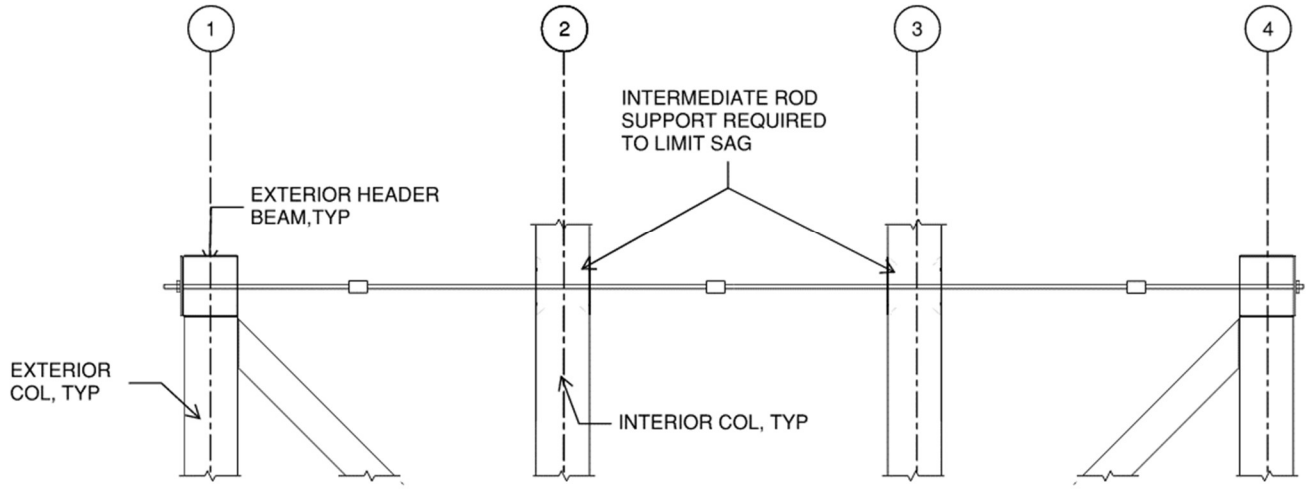
General Location	Detailed Location	Description	Brand	Amount	Photograph
Garage/outbuilding	Adjacent to northeast corner of garage.	Tires	Unknown	4 tires	Appendix B5, Photo E-29
Garage/outbuilding	Adjacent to northeast corner of garage.	Heaters and air conditioners	Unknown	5 units	Appendix B5, Photo E-29
Garage/outbuilding	Garage interior.	Transmission/hydraulic fluid, plastic 5-gallon buckets	Hy-Gard	7 buckets, 35 gallons total (approximated)	Appendix B5, Photo E-30, 31, 32
Garage/outbuilding	Garage interior.	Gear oil, 2.5-gallon bottles	Gearlube	3 bottles, 7.5 gallons total (approximated)	Appendix B5, Photo E-31, 32
Garage/outbuilding	Garage interior.	Paint, 5-gallon bucket	Benjamin Moore	1 bucket, 5 gallons total (approximated)	Appendix B5, Photo E-33
Garage/outbuilding	Garage interior.	Flourescent light bulbs/tubes	Unknown	4 bulbs/tubes	Appendix B5, Photo E-14
Garage/outbuilding	Garage interior.	Oil (appears to be used engine oil), present in a plastic jug, in an open bucket, and in a 2 ft x 2 ft x 4 ft steel tank	Unknown	50 gallons total (approximated)	Appendix B5, Photo E-34
Garage/outbuilding	Garage interior.	Engine oil, unused, 5-gallon buckets	Plus-50 II	2 buckets, 10 gallons total (approximated)	Appendix B5, Photo E-31
Garage/outbuilding	Garage interior.	Unlabeled oil, unused, 5-gallon buckets	Unknown	1 bucket, 5 gallons total (approximated)	Appendix B5, Photo E-31
Garage/outbuilding	Garage interior.	Windshield washer fluid, blue, 1-gallon plastic bottles	Camco	2 bottles, 1.5 gallons total (approximated)	Appendix B5, Photo E-30
Garage/outbuilding	Garage interior.	Gasoline, in red plastic gas cans (2.5-gallon and 5-gallon capacity containers)	Unknown	2 gas cans, 7.5 gallons total (approximated)	Appendix B5, Photo E-31
Garage/outbuilding	West exterior wall of garage/outbuilding located south of barn. Garage exterior.	Fuel tank, above-ground, 44 in x 61 in (appears to be a 275-gallon tank), fuel type not specified, no fuel level gauge present	Unknown	No fuel level gauge present on tank, 275 gallons (approximated)	Appendix B5, Photo E-35

APPENDIX E

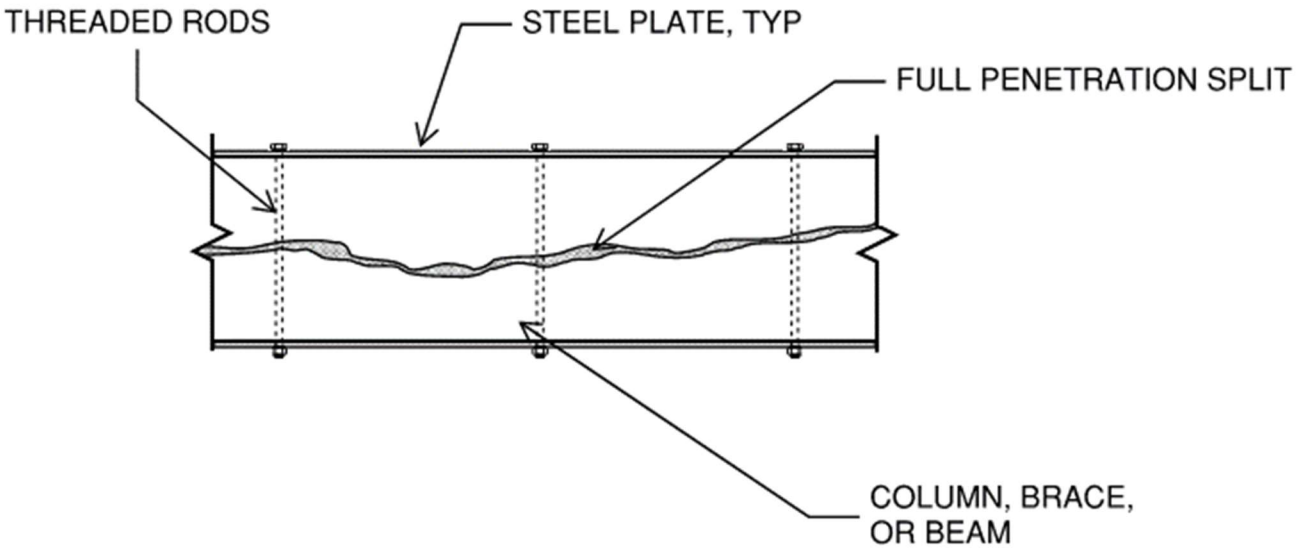
Conceptual Repair Details



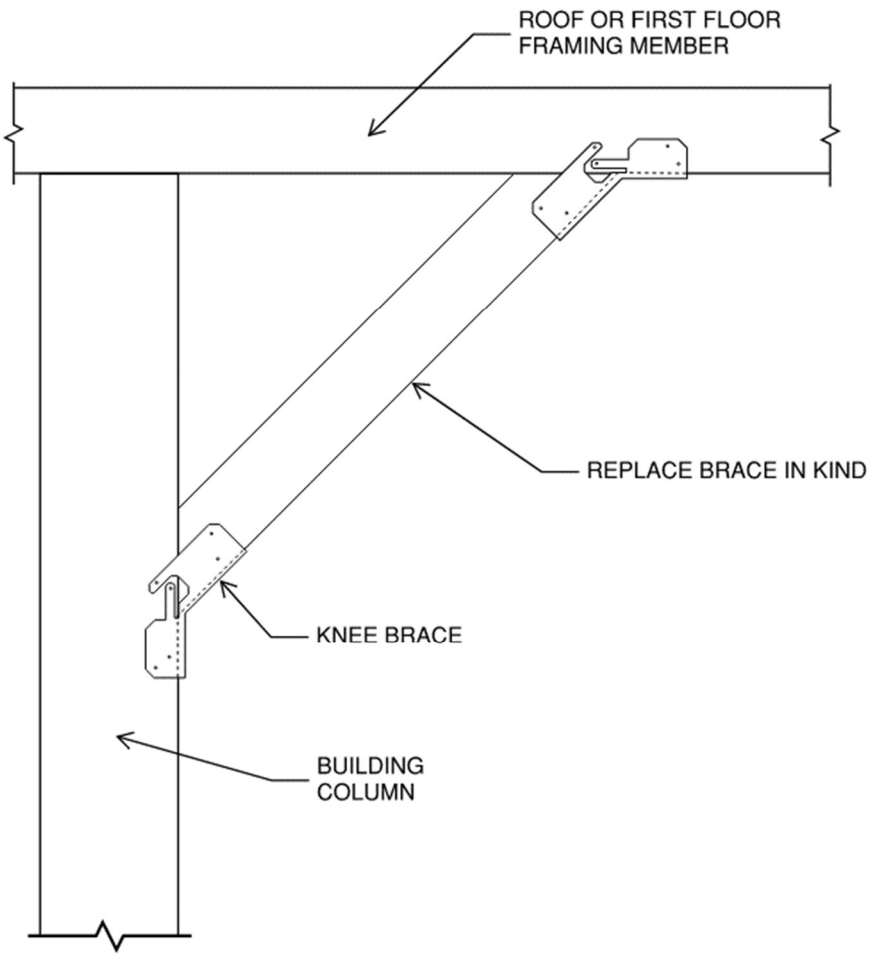
Detail-1: Building Shoring/Bracing



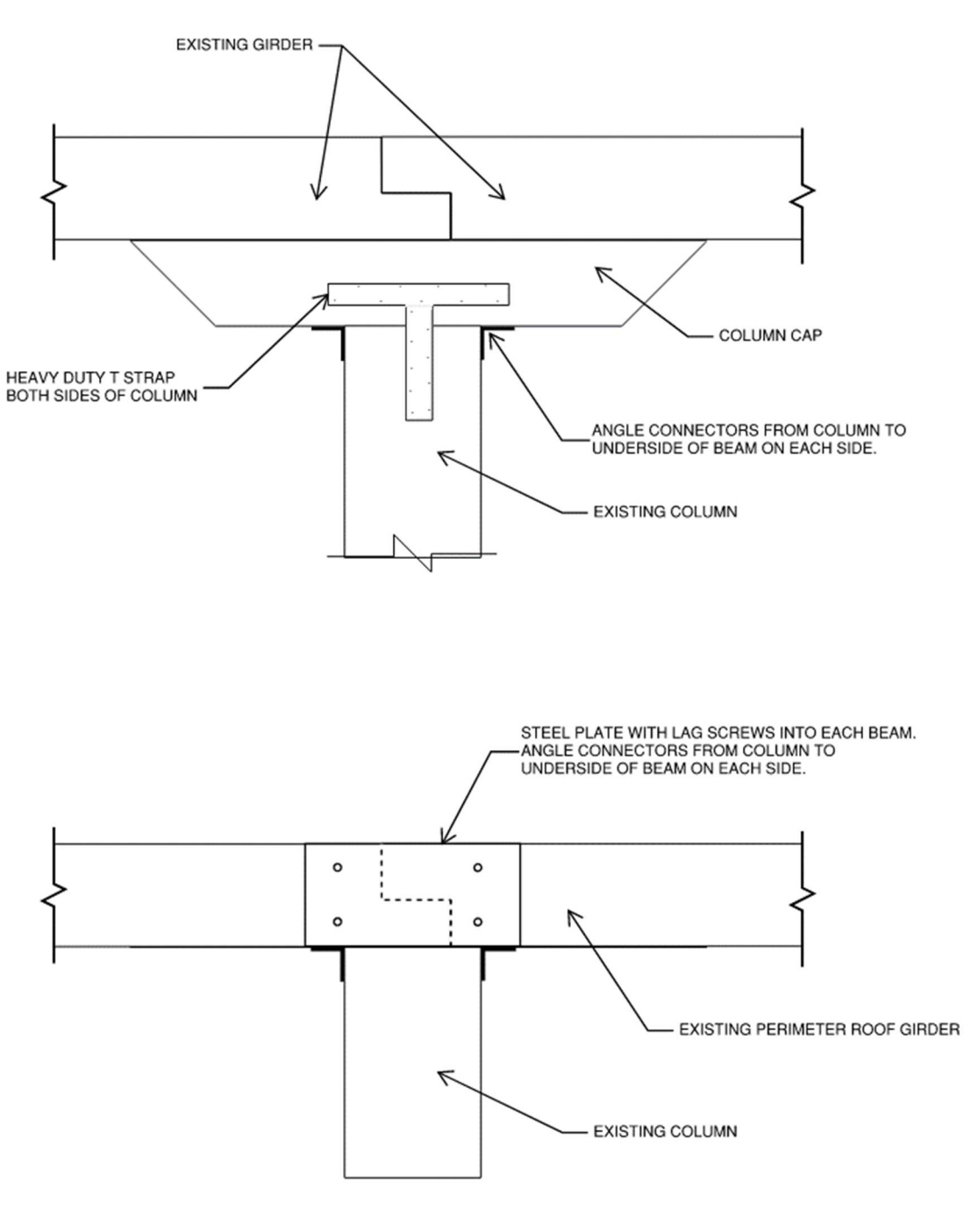
Detail-2: Roof/Hayloft Tension Ties



Detail-3: Split Members



Detail-4: Knee Brace stabilization



Detail-5: Column Cap

APPENDIX F

Glossary of Engineering Terminology

ABBREVIATIONS

- AACE – Association for the Advancement of Cost Engineering.
- ACM – Asbestos Containing Materials
- BGS – Below Ground Surface
- BIM – Building Information Modelling
- CMU – Concrete Masonry Unit
- LiDAR – Light Detection and Ranging
- GF – Gannett Fleming, Inc.
- GPS – Global Positioning System
- NEC – National Electrical Code
- PCB – Polychlorinated Biphenyl
- TP – Test Pit
- USCS – Unified Soil Classification System
- WSSC – Washington Suburban Sanitary Commission

DEFINITIONS

- Bridging – Small wood members attached to the top and bottom of the wood beams to prevent twist during loading.
- Checks – A separation in wood fibers along the grain of the wood, minor wood split occurring lengthwise along the grain of timber (minor compared to split)
- Columns – Timber structural member at the intersection of two Gridlines.
- Diagonal Braces – Same as Lateral Braces.
- Gravity loading – Structural load from the existing building materials and weight of snow or other environmental factors that exert structural load in the vertical direction.
- Gridline – Column lines that are in a grid pattern to assist the inspector, and reader to understand geographical location in the building.
- Lateral Braces – Structural supports within the building structure to resist lateral loading.
- Lateral Loading – Structural loads from environmental effects such as wind pressures and suction exerted on the building and possible seismic forces. Lateral load exert forces in the horizontal direction.
- Mortise - A hole or recess cut into a part which is to receive a corresponding projection (a tenon) on another part as to joint or lock the parts together.
- Sill Plate – A wood framing component located below the wood framing and the foundation.
- Split - A separation of wood fibers through a wood member.
- Stringers – Wood elements spanning between beams or girders. Usually fairly closely spaced.
- Structural Load Path – The route through the structure by which the weight of a structure and live loads are transmitted from their point of application to the foundation and to the ground.
- Tenon – A projecting piece of wood made to insertion into a mortice in another piece.
- Wind Girts – Horizontal timber beams used to transfer lateral load (wind) from the façade to the columns.

APPENDIX G

WSSC Provided Documents

RATHGEBER/GOSS ASSOCIATES
Consulting Structural Engineers

12 October 2022

Christine Benjamin
WSSC Water
14501 Sweitzer Lane
Laurel, MD 20707

RE: Equestrian Center at Avenel - Barn Assessment
10010 Oaklyn Drive
Potomac, MD 20854

Dear Tina,

Rathgeber/Goss Associates has performed a limited structural review of the existing building at the address noted above on 28 September 2022. Our review was limited to visual observations of the structure that was readily accessible. We did not perform any demolition or any type of materials testing. Please note that there are no warranties, expressed or implied, included with this report.

GENERAL DESCRIPTION

The existing horse barn located at the address noted above is a gable style, post and beam, braced frame, wood barn with vertical wood siding and a concrete floor. There is a large, two story, shed dormer extension near the middle of the barn on the south face leading to several outbuildings. Some of the wood posts bear below the slab and others bear on concrete pedestals above the slab. The barn is approximately 278' long in the east-west directly and 54' wide in the north-south direction. The original structural drawings were not available for review. The age of the barn is unknown but may have been built in the early 1900's. RGA was retained to review specific damage in the northwest corner of the barn as well as comment on the overall condition of the barn. Drawings have been provided to stabilize and repair the rotten beam and two posts at the northwest corner. What follows is a list of additional items that need to be repaired and associated priorities.

STRUCTURAL OBSERVATIONS

Repairs to be made soon:

- Locate any posts that have rotted off at the base and splice/repair the posts.
- The barn is leaning towards the south. Install exterior bracing at the column lines connected to concrete foundations to prevent further movement.
- Install any missing wind braces that have been removed in the past.
- Reinstall the two posts in the loft that were removed and supported with transfer beams. The transfer beams supporting the cut posts appear to be overstressed. The beams would not have to be removed.

Repair items of intermediate priority (next few months):

- Remove vegetation from the exterior of the barn and replace rotten/damaged siding.
- Inspect the barn for additional rotten/damaged members and repair/replace.
- Repair any roof leaks.
- Stabilize the leaning retaining wall at the west end and repair the heaved slab at the door.

Repairs to be made for long term stability and function of the barn:

- Analyze the barn for wind loads and provide additional bracing as needed.
- Repair any damaged floorboards in the loft and provide safe hatches or rails around all floor openings for safety.
- It appears that the south face of the barn on the east end originally had an overhanging roof like the current west end. The CMU block wall supporting the south wall that was infilled below this roof is damaged and has shifted out of place. Install a new foundation wall to support the exterior wall or remove the wall and reclad the original exterior wall.

CONCLUSIONS AND RECOMMENDATIONS

In our professional opinion, the barn condition is similar to what would be expected of a barn this age and is salvageable. We have provided details for repairs that must be made immediately for safety as well as a list of items that should be addressed in order to preserve the use of the barn for the future.

See the photos below for a graphic representation of our observations.

Please do not hesitate to contact us if you have questions or concerns.

Sincerely,

RATHGEBER/GOSS ASSOCIATES, P.C.

Bill Duvall, P.E.
22001.082

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 27100, EXPIRATION DATE: 1-25-2024

RATHGEBER/
GOSS
ASSOCIATES
Consulting Structural Engineers

PHOTOS

Rotten members at the north west end.

Damaged post in loft

Additional Rotten post.

Leaning to left in photo (south). Note vegetation.

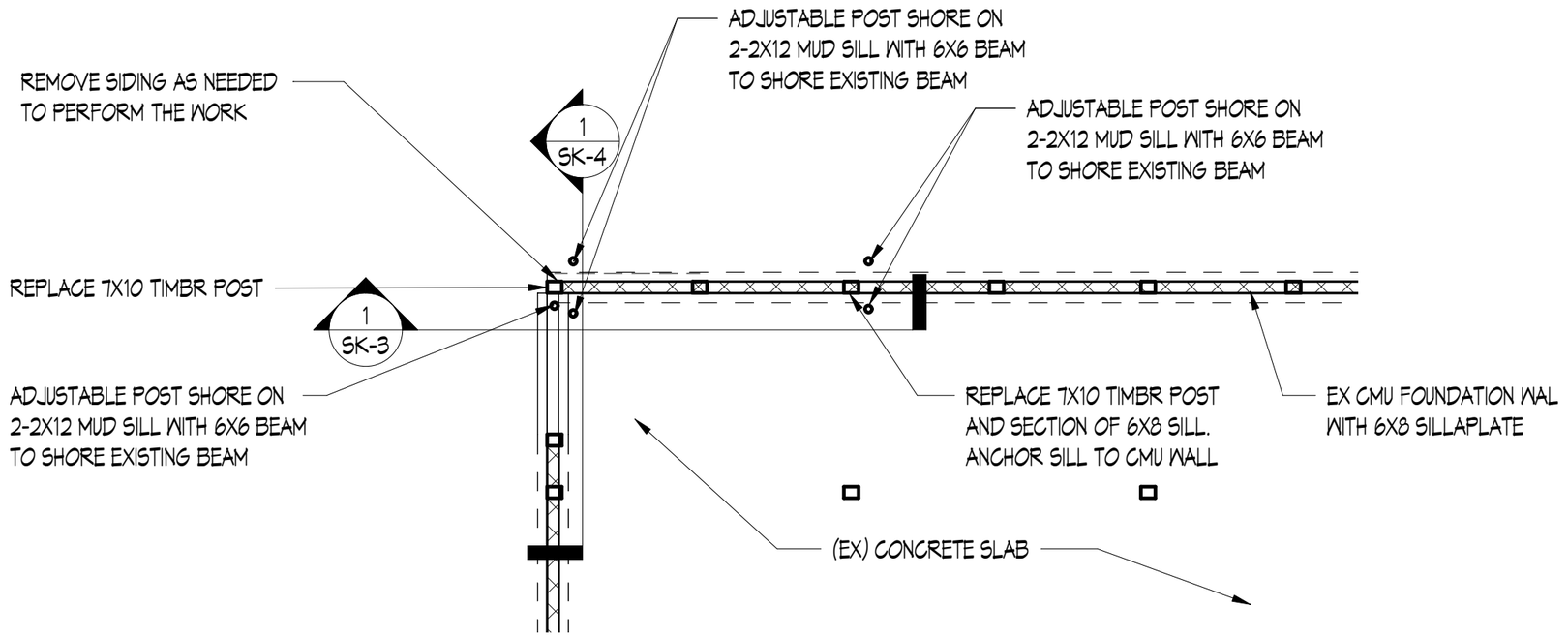
West foundation wall is a retaining wall and leaning outward.

South west foundation wall out of place.

Transferred post to be stabilized.

Note limited internal bracing.

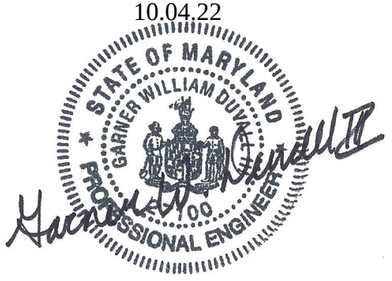
View of loft framing. Small posts on the floor indicate openings.



1 GROUND FLOOR PLAN-PARTIAL

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

10.04.22



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PROJECT EQUESTRIAN CENTER AT AVENEL SHORING

CLIENT MSSC

JOB NO. 22001.082

DWG. REF.

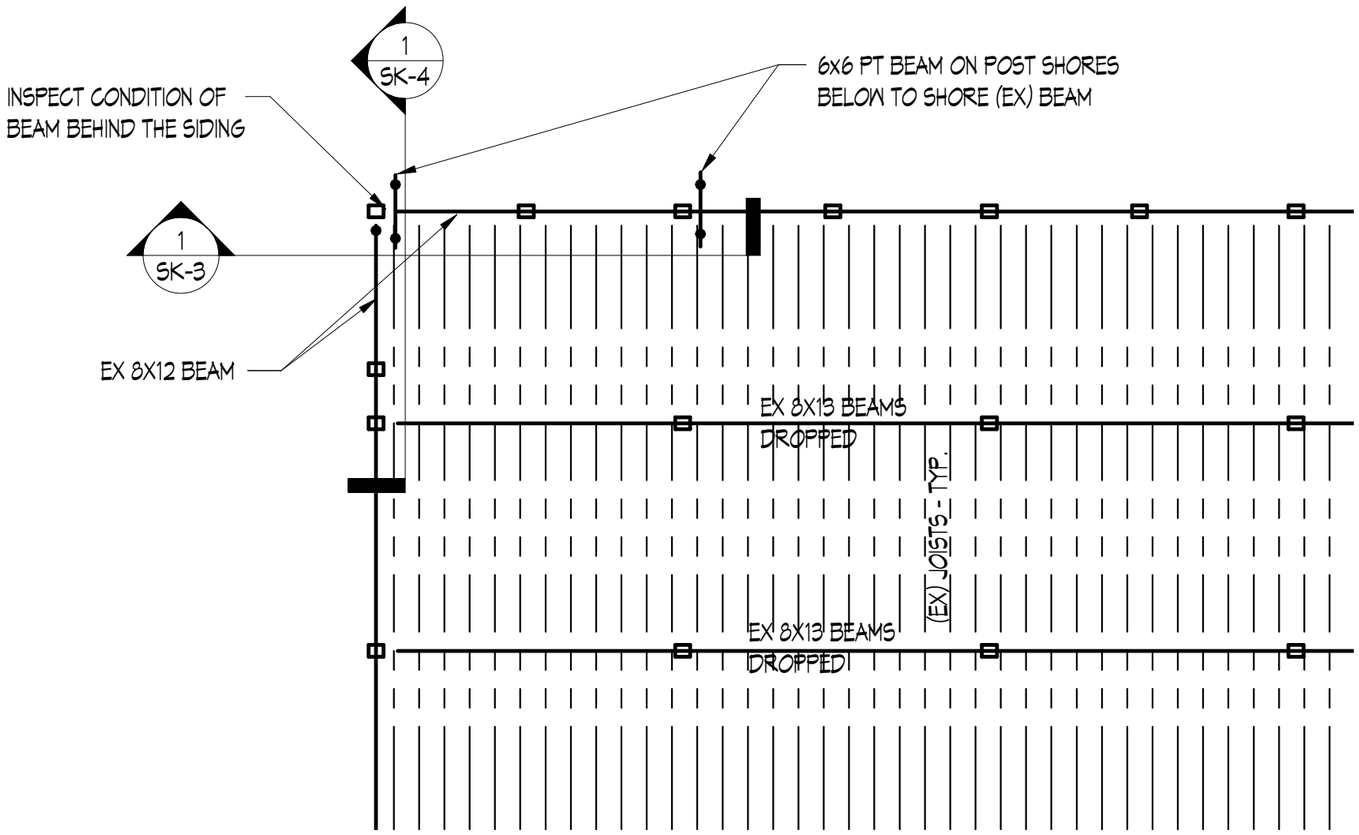
ENG. GWD

DATE 10/03/2022

REVISION

SK. NO. SK-1

RATHGEBER/ GOSS ASSOCIATES
Consulting Structural Engineers
15871 Crabbs Branch Way
Rockville, Maryland 20855



1 LOFT LEVEL FRAMING PLAN - PARTIAL

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

10.04.22

STATE OF MARYLAND
GARNER WILLIAM DUVALL II
27100
PROFESSIONAL ENGINEER

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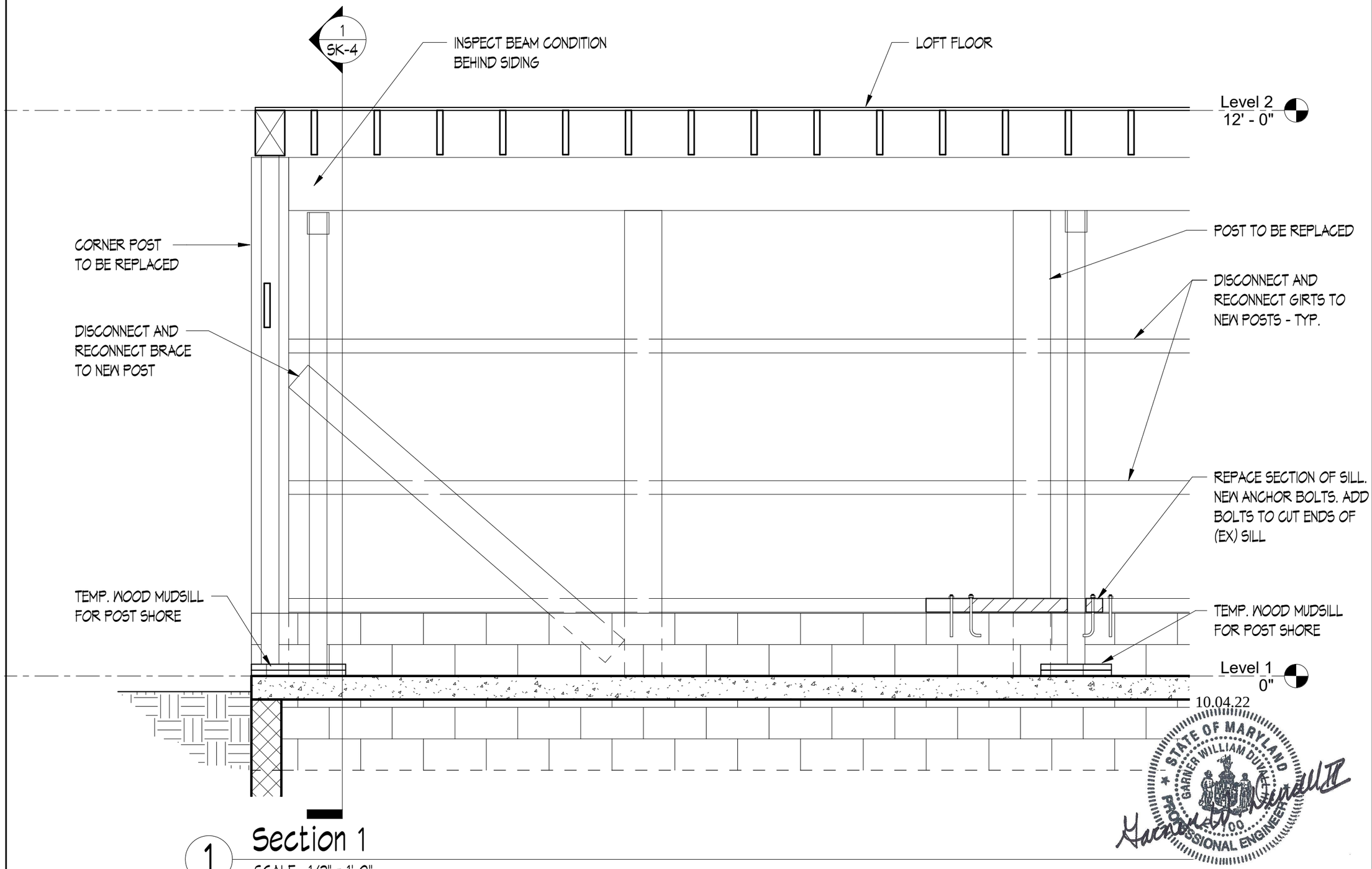
PROJECT EQUESTRIAN CENTER AT AVENEL SHORING
CLIENT MSSC
JOB NO. 22001.082
DWG. REF.

REVISION
DATE 10/03/2022
ENG. GWD
SK. NO. SK-2

RATHGEBER/
GOSS
ASSOCIATES
Consulting Structural Engineers
15871 Crabbs Branch Way
Rockville, Maryland 20855



1 Section 1

SCALE: 1/2" = 1'-0"

10.04.22

STATE OF MARYLAND
GARNER WILLIAM DUVALL III
27100
PROFESSIONAL ENGINEER

PROFESSIONAL CERTIFICATION. I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO. 27100, EXPIRATION DATE: 1-25-2024

PROJECT EQUESTRIAN CENTER AT AVENEL SHORING

CLIENT WSSC

JOB NO. 22001.082

DWG. REF.

REVISION

DATE 10/03/2022

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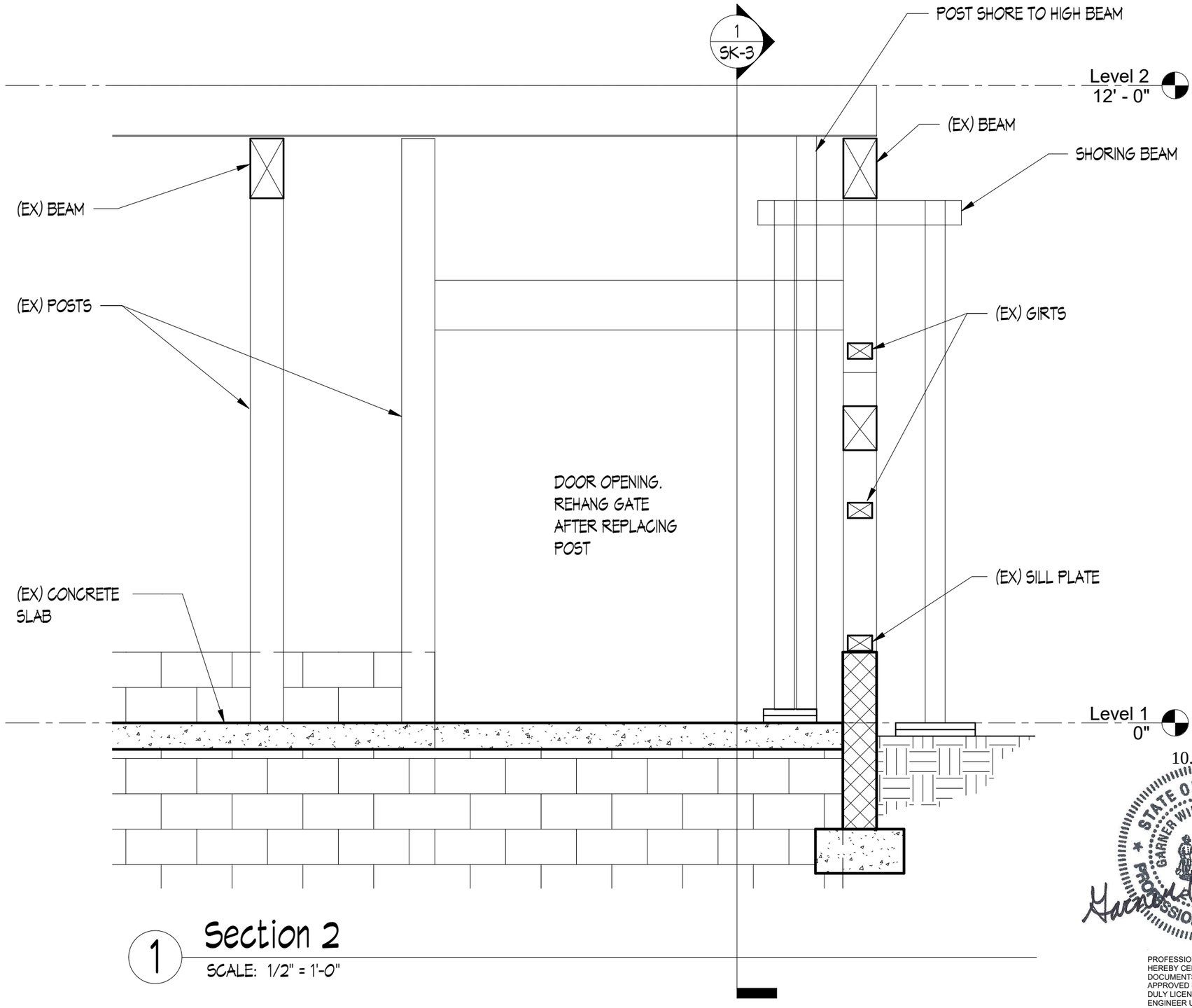
ASSOCIATES
Consulting Structural Engineers
15871 Crabbs Branch Way
Rockville, Maryland 20855



1 Section 2

SCALE: 1/2" = 1'-0"

10.04.22

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PROJECT EQUESTRIAN CENTER AT AVENEL SHORING

CLIENT WSSC

JOB NO. 22001.082

DWG. REF.

REVISION

DATE 10/03/2022

ENG. GWD

SK. NO. SK-4

RATHGEBER/ GOSS ASSOCIATES
Consulting Structural Engineers
15871 Crabbs Branch Way
Rockville, Maryland 20855


PRIVATE
KEEP
OUT

ITEMS COMPLETED

Item	Party Responsible
1. Electrical	1. Contractor
2. Roof repaired	2. Contractor
3. Traps for feeding (Hay loaf area)	3. W.S.S.C. Personnel
4. Structural beams, 8" x 8" throughout the loaf area	4. Contractor
5. Repair floor throughout the loaf area	5. Contractor
6. Riding rink - Containment boards	6. Contractor
7. Settlement control for water run-off	7. Contractor
8. Concrete work in various areas, i.e. barn and outside	8. Contractor
9. Closed in extention with rough lumber	9. W.S.S.C.
10. Tractor barn doors fabricated and installed	10. W.S.S.C.
11. General, miscellaneous closing in fabricating and installing of doors, etc.	11. W.S.S.C.
12. Pony stalls in small barn - renovated same in its entirety	12. W.S.S.C.
13. Installed fence for hot walk area	13. W.S.S.C.
14. Fabricated PVC gates (7) and installed	14. W.S.S.C.
15. Established a new fence from the barn to the Service Road	15. W.S.S.C.
16. Spread and created a parking area for horse trailers with CR6	16. W.S.S.C.
17. Installed drain line across field and roadway where public pony riding sink is to be located	17. W.S.S.C.
18. Supplied fill dirt for new public pony area and removed trees in area to be developed	18. W.S.S.C.
19. Painted all new work and the entire pony stable barn	19. W.S.S.C.

	Item	Party Responsible
20.	New hardware on existing doors.	20. W.S.S.C.
21.	Created new bi-folding type entry door to barn for safety reasons	21. W.S.S.C.
22.	Installed ten new ABC fire extinguishers	22. W.S.S.C.
23.	Placed "No Smoking" signs throughout the barn, inside and outside	23. W.S.S.C.
24.	Repaired the existing fences throughout the farm area	24. W.S.S.C.
25.	New compost area	25. W.S.S.C.
26.	"BIG, BIG" ____ - Cleanup of service road area with the Developer and the Kemper people	26. W.S.S.C. and Contractor
27.	Site work for new home for ED and public toilets	27. Contractor
28.	All planning work for installation of water and sewer mains	28. W.S.S.C.
29.	Put up "STOP" sign at entrance to road leading to the barn	29. W.S.S.C.


GANNETT
FLEMING