

HICKORY HILL ENGINEERING REPORT

December 19, 2018



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HICKORY HILL

ENGINEERING REPORT

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Hickory Hill Residence

Structural Analysis Report

THRASHER
ARCHITECTURE

600 White Oaks Blvd.
Bridgeport, WV 26330
304-624-4108 Fax 304-624-7831

Project Location: Hardy County, WV
Owner: Donna Alexander

Date: 12/19//2018

PRESENT: Lee Gustafson – The Thrasher Group

The purpose of this report is to provide an Engineering Analysis for the historic Hickory Hill Residence, located in Hardy County, West Virginia, near Moorefield and Petersburg. The report is to include a description and condition assessment of the North Wall in particular, plus a description and condition assessment of the interior of the building including all architectural features and elements, and graphic recordation with photographs and drawings of at least the first and second floor of the north east rooms.

The history of Hickory Hill has been well documented since its construction by Solomon Cunningham and Catherine Seymour in 1809. The background information referenced in this report was primarily taken from narratives and publications issued by the Owner, Donna Alexander, and found in various area news releases. Reports indicate a possible makeover in 1839, when Jane Cunningham married Felix B. Welton. After the death of Catherine in 1872, major upgrades were made including an electric generator, a Kitchen Addition, and indoor plumbing, and the home passed on to the Welton family in 1873. Stabilization cables were installed from front to back in the second floor structure of the two wings following an earthquake in that area of Virginia in the late 1800s. Other improvements including changes in heating and electrical systems continued through the 1900s, and the house and farm stayed in the family until what family remained in 2001 moved to Moorefield. The house was unoccupied for 14 years until it was purchased by Donna Alexander, daughter of Jack and Frances Welton, from Cousins Judith and Patricia Welton. The house is currently undergoing restoration with plans to allow all to enjoy the History of Hickory Hill. Hickory Hill was registered on the National Register of Historic Places in 1985.

As listed in the Historic Properties Inventory Form on file with the West Virginia Department of Culture and History, the Hickory Hill House is currently described as a five bay, four bedroom, historic home occupying a portion of the original farm. The 209 year old Federal Style brick and wood frame structure remains in very good condition, but maintenance is a constant requirement to prevent deterioration from exposure to weather and limited occupancy.

The brick walls are laid in Flemish Bond with narrow mortar joints. The stone foundation and compacted dirt basement floors appear to be solid. There is a potential for moisture problems, but the house may still be benefiting from a concealed under floor drainage system installed in the past. The metal roofing is old, but appears to be doing an adequate job of keeping rain and snow out.

Following a site visit and evaluation of the house, this report addresses the structural conditions of all of the exterior

brick walls. In particular, the report is to focus on the North Wall, which appears to be the Left End Wall when looking at the angled layout on satellite maps, and could also be the Rear Wall. This report will refer to the layout based on the Front Wall which faces the highway for the remainder of this report, and for the Photo Documentation pages. Although the Scope of Work focuses on the North Wall, there are significant cracks that have developed in the Right End wall areas between the Dining room and Kitchen, and in the front corner area of the Left End Wall.

Typical causes for cracks in masonry construction are settlement and thermal expansion and contraction resulting from moisture in the structural system. Earthquake damage is possible, but seems unlikely based on rare occurrences in the geological history for this location. In this case, it is also likely that 11 years of being unoccupied has accelerated the growth of, or possibly caused some of the cracking. Regardless of the cause, it is critical to the continued longevity of this structure to maintain the building envelope. Exterior mortar joints should be raked and repointed in all open joint areas using a mortar type and joint striking tool that will match the original. Any repointing work should be in compliance with the U.S. Department of Interior, National Park Service, Technical Preservation Services Standards, based on Preservation Brief #2 – “Repointing Mortar Joints in Historic Masonry Buildings”, for brick restoration. Due to the time of construction, the mortar is likely to be a lime putty and sand mixture, but testing should be done to confirm this prior to repointing. The new mortar used must have a greater vapor permeability and be softer than the masonry units. The products used must allow for the brick to control moisture without sealing in problems. Total repointing of the building is recommended, but for minimum requirements, refer to attached photos for the primary areas of concern.

END OF LEFT WING:

On the Front Left (SW) Corner of the Left Wing, there are cracks below the front and rear First Floor windows for Room 105 (see attached floor plans and Photo Pg.1) that have been roughly patched and are likely related to the rotted wood window sills allowing moisture penetration into the brick below the sill. There is also a peculiar separation of the built in cabinetry (also referred to as the Press), from the plaster on the rear wall. The separation tapers from narrow at the floor to approximately 1” wide at the top of the wall. This would typically indicate an outward tilting of the end wall, however there is no corresponding cracking in the exterior brick, and no interior crack showing behind the plaster, or in the same location on the second floor wall above. There is also some separation of the cabinet cornice trim at the ceiling level, so there may have been some movement in the cabinetry over the years. The floor structure under the cabinets may have settled slightly from age allowing the separation, but there was no access to the crawl space below to allow inspection of the first floor framing. The suggested repair is to patch in the gap with matching plaster. Plaster repairs should be made in compliance with the Department of Interiors Preservation Brief #21 – “Repairing Historic Flat Plaster”.

LEFT END OF RAISED MAIN BUILDING:

The vertical cracking in Room 204 in the Front Left End Wall of the Main Building is only evident on the interior of the Second Floor. It does not appear to be a through crack to the exterior. It seems unlikely, but it could have some connection to the joint deterioration below the lower gutter where the Main Building steps down to the Left Wing. The left end wall of the main portion of the house is approximately 12 feet from the cable ties which run from front to back. These ties probably helped prevent the crack from migrating to the lower floor. Repointing of the brick and possibly adding a vapor permeable water repellent (not waterproof) coating would help prevent further cracking from moisture infiltration and freeze-thaw stresses.

RIGHT END OF RAISED MAIN BUILDING:

Cracking in the upper right front corner of the Main Building where it steps down to the Right Wing is likely to be related to water damage to joints caused by gutter and flashing leaks or overflows. Previous joint repairs also extended down to just below the gutter for the step down wing. The unique brick cornice joints were also repaired and appear to be structurally sound and stable. There is no crack showing on the interior in Room 202, but there could be possible cracking concealed behind the built in cabinetry on the end wall. These issues do not appear to be connected to the cable tie that runs from front to rear through the second floor framing of both wings. Repointing is

recommended for long term stabilization and aesthetic improvement.

END OF RIGHT WING:

Cracking in the front right corner of the Right Wing and above and below windows of Rooms 101 and 201 has been repointed and appears to be stable. The joints from roof to ground show a slight horizontal movement in the front, and the end pointing was likely to be incidental cracking. Minor settlement in the end wall may be the cause, however corresponding cracking above and below the windows on the rear elevation are probably related to whatever movement has occurred in this portion of the building. Other possible explanations might be related to the reported earthquake in the late 1800s, or even from the added construction stress of the wood frame Kitchen addition. There are no through cracks showing on either floor, but there are cracks above the front window and the attic stair door that indicate some movement over the years. There is a peculiar separation between the right end wall built in cabinets and the plaster on both floors, with a gap in the plaster that tapers from nothing at the first floor to about 1 ½" at the ceiling, and continues on the second floor in a similar manor. This is also very similar to Room 205 at the opposite end of the house. The cornice molding at the first floor ceiling has not separated, but the cornice molding at the ceiling on the second floor cabinet has moved the same amount as the wall gap.

INTERIORS:

Any exterior cracks which have telegraphed to the interior should also be repointed, which will require removal of damaged plaster and plaster repair to match the original. The Department of Interior Preservation Brief #21 – Repairing Historic Flat Plaster Walls and Ceilings is an excellent guide for historic plaster repairs. It is recommended that the plaster repairs be held off until exterior repointing is complete, and moisture readings in the brick walls indicate that new plaster will properly cure and bond. Hairline cracks can be repaired with joint tape and plaster skim coating.

As the restoration efforts continue with scraping of old wall paper, moisture damaged plaster may be uncovered which should be removed to brick and re-plastered to match once the brick is tested for proper moisture content. The majority of the plaster work appeared to be very well preserved considering its age.

Existing wood floor construction appears to be structurally sound and in very good condition. Some of the floor refinishing is reported to be difficult due to tar remains from some previously installed linoleum products, but the basic wood can be maintained for the character of the original building.

Wood wainscot paneling, baseboard trim, cabinetry (the Press cabinets), fire place mantels, wood doors and framing, and similar woodwork are also in excellent condition for their age, and should remain in place.

The **Back Porch** was replaced at some time in history, and appears to be in good condition requiring only routine maintenance. Both **Front Porch Roofs** for the Wing entrances are in good condition, and should require only routine maintenance.

The **Roof** is very weathered, but doesn't appear to have any current leaking issues. If there are problems, they will very likely show up in the flashings with the winter ice and snow. As time and budget, plans should be made for overall annual inspections, maintenance and repair if possible to avoid or prolong replacement.

The **Kitchen Addition** was not in the Scope of Work, but the wood frame structure on an exposed wood foundation should be included in maintenance and repair planning to prevent accelerated deterioration from exposure. Both the original construction and the sagging structure are likely sources of stress on the original right end brick wall which shows some movement and crack repair issues in similar locations on the front and rear walls. The triangular crack in the original brick wall above the door between the Kitchen and Dining Rooms is the result of an inadequate lintel support when the door was created for access to the Kitchen. It is not related to the other wall movements, and it is not an urgent structural issue, but the fallen brick will need to be removed and reinstalled over a steel plate lintel

when the repair is made.

SUMMARY:

The integrity of the Building Envelope is critical to the longevity of the structure and finish work. Cracks in the brick and open mortar joints allow moisture penetration that migrates through the masonry and adversely affects all connected construction such as plaster, woodwork, floor structures, doors and windows.

EXTERIOR WALL MAINTENANCE AND REPAIR:

At a minimum, all open or damaged mortar joints should be raked and repointed in compliance with the U.S. Department of Interior, National Park Service, Technical Preservation Services Standards, based on Preservation Brief #2 – “Repointing Mortar Joints in Historic Masonry Buildings”, for brick restoration. With careful planning, the original mortar and tooling method can be very closely matched so the repair work is not distractingly visible. The previous repointing work should also be repointed with the same materials and methods. Technical testing should also be conducted for the brick to determine moisture content, and to assist in the decision of whether or not to apply some type of water repellent coating.

Ideally, the entire building should be repointed, including chimneys. This is an expensive process, but it insures full coverage protection and provides a uniform appearance that cannot be achieved with isolated repair work.

Continued roof and flashing maintenance is also required to keep moisture from entering the wall construction. This would include caulking around doors and windows, and replacement of any window sills that might allow water to enter behind the face of the brick.

INTERIOR CONDITIONS:

The floors, walls, ceilings, doors, windows and woodwork are in remarkably good condition considering their age of 209 years. Mrs. Alexander has documented as much of the finish history as possible, including painting methods and details, floor coverings, wood types, fireplace maintenance, and the modernization construction that has occurred over the years. Her experience and hard work can continue in her restoration efforts, and she can find excellent help by referencing the U.S. Department of Interiors, National Park Service, Technical Preservation Services, Preservation Briefs, that are available online or can be purchased in hard copies.

Any repairs done to the interior wall plaster on the exterior walls, should be delayed until exterior masonry repairs are complete. Moisture in the brick must be allowed to dissipate to acceptable levels, or it will continue to damage both new and existing plaster work.

The Scope of Work for this Hickory Hill Engineering Report was to provide the following:

1. A Description and condition assessment of the north wall, including all architectural features and elements, drawings and recommendations for the future rehabilitation of the wall, and an analysis of moisture impact at this end of the structure.
2. A description and condition assessment of the interior of the building, including all architectural features and elements.
3. A graphic recordation of the building using photographs and drawings of at least the first and second floor of the north east rooms.
4. A minimum of three copies of the report to be provided to the Moorefield Historic Landmark Commission.

Items 1 & 2 are addressed in the report above, and Item 3 is addressed in the attached Drawings and Photo Pages.

Any question regarding the information presented in this report should be addressed to Lee Gustafson, Architect, or if he is not available, contact Craig Baker, Architectural Division Manager, The Thrasher Group.

THE THRASHER GROUP, INC.

A handwritten signature in blue ink, appearing to read 'L. Gustafson', with a long horizontal flourish extending to the right.

Lee O. Gustafson
Architect

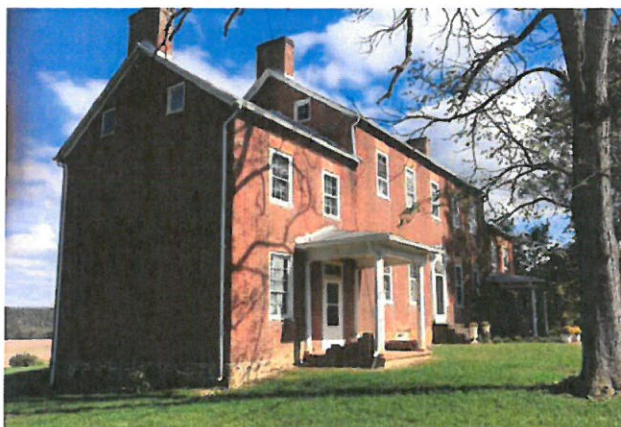
HICKORY HILL PHOTO DOCUMENTATION



Left Front – Crack Below Rotted Window Sill



Right Front Upper Level – Previous Repointing Work



Front View with Left End



Right Front Kitchen End – Previous Repointing From Foundation to Roof



Close up of Previous Repointing

HICKORY HILL PHOTO DOCUMENTATION



Right Rear – Cracking at Cornice and Between Windows



Right Rear Showing Back Porch



Rear Elevation



Left Rear – Cracking Below Window and Foundation Repointing



Left Rear Showing End Wall

HICKORY HILL PHOTO DOCUMENTATION



Kitchen – End Wall



Kitchen – Inside Wall



Kitchen – Front Wall



Interior Wall – Showing Cracking in Door Lintel



Kitchen – Right Front's End



Kitchen – Right Rear

HICKORY HILL PHOTO DOCUMENTATION



Dining (Original Men's Wing)



Dining – Stair to Bedroom 201



Dining 101 – Enlarged Cabinetry
Separation from Plaster



Dining 101 – Crack in Brick Lintel



Dining 101 - Front Wall Separation
Between Plaster and Cabinet

HICKORY HILL PHOTO DOCUMENTATION



Dining Room 102 – Ornate Fireplace and Glass Front Cabinetry “Press”



Dining 102 – Rear Wall



Dining 102 - Fireplace



Dining 102 – Front Wall

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Central Stair 103



Powder Room Under Stair



Entry Hallway 103



Ornate Carved Wood Doorway to Dining

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Parlor 104 – Hand Carved Wood Fireplace Mantle



Parlor 104 – Front Wall and Stair to 105



Parlor 104 – Looking at Door to Stairway 103



Parlor 104 – Rear Wall

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Female Wing Room 105 – Rear Wall



Room 105 – Fireplace "Press" Cabinet



Room 105 – Separation of Press Cabinet and Plaster



Room 105 – Rear Corner with Cabinet and Plaster Gap

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Room 105 – Stair to 205



Room 105 – Front Wall and Steps up to Room 104



Room 105 – Front Wall



Room 105 – Rear Entrance and Under Stair Closet

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Stairway to Room 201



Room 201 – Female Wing Fireplace and Cabinetry Press



Room 201 – Separation Between Cabinet and Plaster at Front Wall and Ceiling Gap



Room 201 – Separation Between Cabinetry and Ceiling

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Bedroom 201 – Hairline Cracking in Plaster



Bedroom 201 – Structural Crack above Front Window



Bedroom 201 – Front Wall and Steps up to Room 202



Bedroom 201 – Steps up to Room 202, Down to Room 101, and Attic Stair Door

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Anteroom 202 – Connector to Nursery and Stairway 203



Anteroom 202 – Front Wall



Anteroom 202 – Cabinetry and Passage Down to Room 201



Anteroom 202 – Doorways to Stair and Room 204

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Nursery Room 202 – Rear Wall



Nursery 202 – Press Cabinetry and Fireplace



Nursery 202 – Interior Partition with Door to Anteroom

HICKORY HILL PHOTO DOCUMENTATION



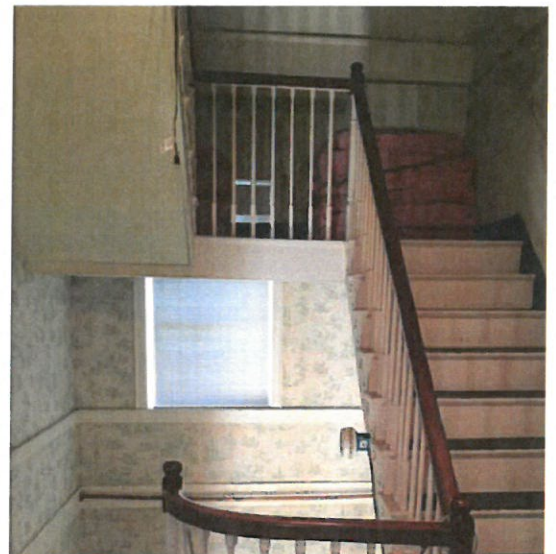
Stair 203 – Looking into Bedroom 204



Stair 203 – Looking into Bathroom



Stair 203 – Looking into Bathroom

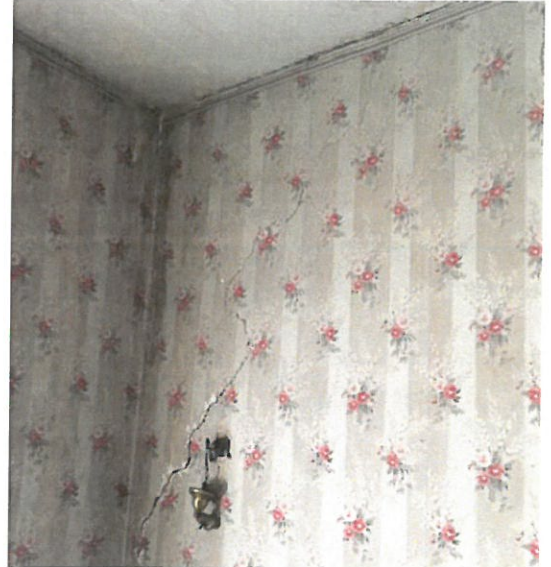


Stair 203 – Showing Stair to Main Attic Area

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Bedroom 204 Mail Wing – Showing Structural Crack in End Wall



Bedroom 204 – Showing Full Front of End Wall Crack



Bedroom 204 – Showing Crack Beside Cabinetry Tie Turnbuckle



Bedroom 204 – Floor Access to Cable

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Bedroom 205 Male Wing – Showing Stair Down To Bedroom 105 and Attic Stair at Rear Wall



Bedroom 205 – Rear Wall



Bedroom 205 – End Wall Fireplace and Cabinetry Press



Bedroom 205 – Rear Wall and Stair Down to Room 105

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Attic Above Room 205 – Stair



Attic Above Room 205 – End Wall/Chimney

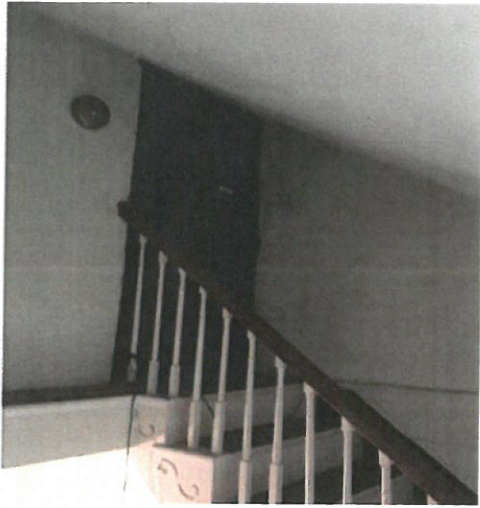


Attic Above Room 205 – Front Wall Eave
Room Framing

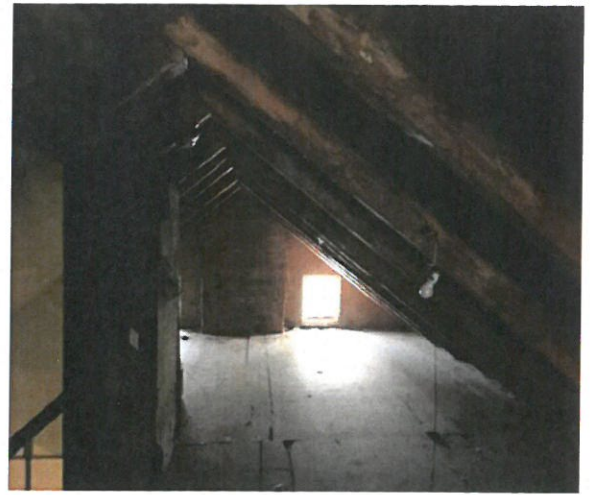


Attic Above Room 205 – End Wall

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Main Attic – Central Stairway



Main Attic – Looking at Left End Gable



Main Attic – Left End and Room Framing



Main Attic – Right End and Roof Framing



Main Attic – Looking Through to Left End

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Basement Room 1 – Front Wall



Basement Room 1 – Looking Down
Rear Passage to Room 2



Basement Room 1 – Supplementary Timber Support Columns

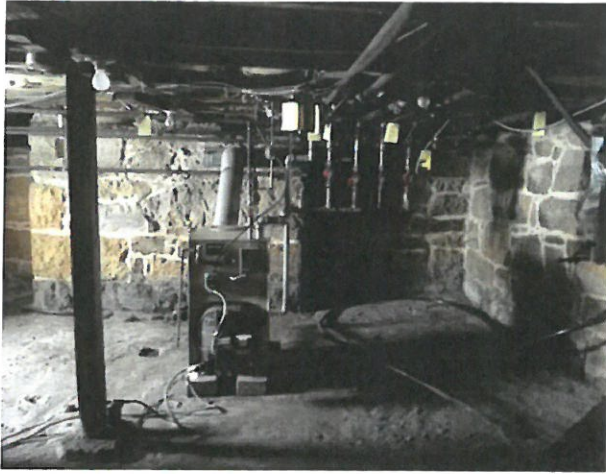


Basement Room 1 – Right End Foundation Wall



Basement Room 1 – Right Front Corner
with Minor Cracking

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Basement Room 2 – Looking at Boiler



Basement Room 2 – Looking at Fuel Tanks



Basement Room 2 – Looking at Passage to Room 1



Basement Room 2 – Grated Window Under Rear Porch

