Historic Structure Report for Appomattox Plantation Outbuildings

Pecan Avenue, Hopewell, VA

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Approved by:

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Date

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C: Management Summary

1. Administrative Data

a. Project Identification

"Historic Structure Report Appomattox Plantation Outbuildings"

Location Data: Petersburg National Battlefield
County: Prince George
State: Virginia

b. Project Statement and Purpose

The purpose of this project is to produce a Historic Structure Report (HSR) for the outbuildings. The report includes a Management Summary; Part 1: Developmental History, as well as measured drawings and photographic documentation drawings of the buildings. Part 2: Treatment and Use. The goal of the project is to identify and document the original appearance, integrity, and historic evolution of the buildings; identify their 1864-1865 appearance; and recommend treatment strategies that best preserve the extant 1865 and pre-1865 architectural materials and character defining features. This document is needed to guide future management of the Appomattox Manor's Four Outbuildings. This HSR will serve to guide treatment selection and work recommendations for the purpose of interpreting the property. Presently, the National Park Service preserves and interprets the Appomattox Manor's four outbuildings.

c. Names, Numbers, and Locational Data

The Appomattox Manor is located within the Petersburg National Battlefield, City Point Unit, Hopewell, Virginia.

This Historic Structures Report involves four outbuildings: the Kitchen-Laundry, the Dairy, the New Smokehouse, and the Old Smokehouse. The four structures and their numbers on the List of Classified Structures (LCS) are:

Structure Name	Building No./LCS #
Kitchen-Laundry	Building No. 56/80039
Dairy	Building No. 57/80044
New Smokehouse	Building No. 58/80041
Old Smokehouse	Building No. 59/80040

d. Related Studies

1. "Appomattox Manor-City Point A History," by Dr. Harry Butowsky, 1978.
2. "Cultural Landscape Report for Appomattox Manor and Grounds," (95% Draft) by Nancy J. Brown, H. Eliot Foulds, and Erika Riddington, January 2006.
3. "Cultural Landscapes Inventory, Grant's Headquarters at City Point, Petersburg National Battlefield," 2009.
4. "Historical Base Maps, Appomattox Manor-City Point," by G. Frank Williss, January 1982.
5. "Historic Structure Report Appomattox Manor," by Richard G. Turk and G. Frank Williss, October 1982.
6. The National Park Service created/approved a landscape plan for the period of significance. "Civil War City Point: 1864-1865 Period of Significance Landscape Documentation," 2009. www.nps.gov/parkhistory/online_books/pete/city_point_landscape.pdf

e. Inspection Team:

Primary Authors

John D. Feinberg, Architectural Conservator, the Collaborative Inc.
Dean Brookie, Historic Architect, the Collaborative Inc.
Dave Woodham, Structural Engineer, Atkinson-Noland & Associates

Individuals and Their Roles by Company

For the Collaborative Inc.

- John Feinberg, Architectural Conservator: Overall Project Management, Historic Research, Field Work, Digital Photography, Research, Condition Assessment, Synergism Oversight, Treatments Development, Paint Analysis
- Dean Brookie, Historic Architect: Field Work, Digital Photography, Code Considerations in Adaptive Re-Use, Treatments Development
- Tita Young: Historic Research, Data Compilation, Report Production, Graphics, Professional Document Editing

For Atkinson-Noland & Associates

- Dave Woodham, Principal Engineer: Condition Assessment, Structural Evaluation, Treatments Development, Coordination and Evaluation of Mortar Analysis

Executive Summary

This Historic Structures report was produced for the Petersburg National Battlefield, City Point Unit, Appomattox Plantation located in Hopewell, Virginia in support of the on-going stewardship of the Plantation and the subject four outbuildings: the Kitchen-Laundry, the Dairy, the New Smokehouse, and the Old Smokehouse together with the site of the four structures. It is rare to have a property owned by one family from the 1630s onward to the 1960s and, not only did the Eppes family own the property, Dr. Richard Eppes left a series of diaries providing valuable information about the plantation and its operation.

However, the Eppes family did not continuously occupy the premises as during the majority of years of the Civil War conflict, the family members were not in residence. The site of the Manor House on a promontory jutting out into the James River and bounded by the Appomattox River was a strategic location: the subject of Union shelling early in the war, and the comprehensive occupation of the site as the Union Army headquarters at the end of the war. The deep water port associated with the City Point river frontage was built up to be the most significant supply point of the entire war. These locational attributes were certainly critical in the Eppes family decisions as to settlement location, property development, and daily life. The four structures were integral to the Eppes family lifestyle, from daily use of the Dairy and Kitchen-Laundry to seasonal use of the smokehouses for initial smoking and continuing long-term seasoning of hams.

As the Eppes family land holdings progressed in development and uses, structures increased in number and specialization. An early Manor was replaced by the core portion of the existing Manor, followed by a series of improvements and expansions. The Old Smokehouse use then functionally expanded by the addition of a New Smokehouse, and a Dairy served its specific functions in a stand-alone building. The Civil War brought a substantial change in plantation operations. With the transition from enslaved people to hired employees came a reduction in the volume of functions, such as the number of hams produced; however, the operational functions of the buildings were largely the same. Essentially, once constructed the buildings largely remained unchanged throughout the plantation era.

The preparation of this report was completed in compliance with NPS policies and guidelines. The suggested format for an Historic Structures Report per NPS-28 was followed with added emphasis in several areas as agreed, namely providing information on maintenance needs and practices and employing Non-Destructive Testing and Evaluation (NDE) to assist in provision of input to the detailed condition assessment.

The Historic Structures Report has been completed by a team consisting of John Feinberg, Architectural Conservator/Architectural Historian, Dean Brookie, Historical Architect, and Suzanne Young, Chief Editor, all of the Collaborative inc. and Dave Woodham, Structural Engineer of Atkinson-Noland & Associates. Material analyses were performed at the laboratory of Atkinson-Noland & Associates, and Paint Analysis at the laboratory of the Collaborative inc. The overall project direction for the National Park Service (COTR) was provided by Wm. Eric Breitkreutz, Chief, Historic Structure Research & Documentation Historic Architecture, Conservation & Engineering Center, National Park Service, Northeast Region. The park contacts are Julia Steele, Cultural Resource Manager at Petersburg National Battlefield and Emmanuel Dabney, Curator, Petersburg National Battlefield.

The developmental history was informed by research in the Park archives, at the Technical Information Center of the Denver Service Center and research at multiple other sources, such as the National Archives Matthew Brady Photographic Collection, Records on previous repairs, NPS staff, HPTC, and contractors, Colonial Williamsburg Foundation Library (publications and

personal communication), Library of Virginia, Shirley Plantation regarding historic brick, and outbuildings, Virginia Historical Society, Eppes family foundation meeting minutes and communications, Eppes family interviews represented in oral histories, Eppes Family genealogical studies, Internet search of various topics (Eppes family, brick production, timber framing, white wash, hardware, and other materials). The NDE was able to describe the typologies of walls, floors, and ceilings thereby cataloguing differences in construction for association with the evolution of the buildings.

Summary of Conditions Assessments and Key Treatments

1. Site: Minor site grading at Kitchen-Laundry
2. Roofing: Comprehensive replacement of existing wood roof shingles with new Atlantic white cedar shingles configured to match the historic for three buildings and repairs to the shingles on the Kitchen-Laundry.
3. Flashing: repairs and replacement of the flashing between the Kitchen-Laundry gable ends and the adjacent chimneys.
4. Weatherboards: Replacement of deteriorated weatherboards and associated deteriorated moldings with materials to match the originals (further species evaluation testing required); all buildings.
5. Roof structure/sheathing: perform repairs and strengthening on two roofs as described.
6. Windows/Doors and Associated Hardware: minor repairs recommended to most, extensive repairs to the second story northeast window frame of the Kitchen-Laundry.
7. Chimney Repairs of Kitchen-Laundry: extensive condition issues require removal and replacement of inappropriate mortar, replacement of scaled/eroded bricks, installation of flashing, and restoration of lime wash finish.
8. Interior finishes: At the Kitchen-Laundry, floor finish restoration, wall and ceiling lime wash finish restoration.
9. Exterior Finishes: Comprehensive painting required.

Treatment Recommendations
The GMP has directed the continuing use of the four outbuildings to continue to interpret the history of Appomattox Manor. The period of significance for the City Point Unit is 1864-1865. The selection of two years from the long history of the site prioritizes the period of occupation by the Union Army in the battle of Petersburg, which resulted in the nominal end of the Civil War. However, the site has been occupied during certain periods for approximately 8,000 years. In historic times, the Eppes Family has owned and/or occupied the site since the 1630s and the four outbuildings represent functions in support of both the Manor and the Plantation. The two sub-themes of the Appomattox Manor's interpretation relate to the relationship of the enslaved persons to the building's functions and the Eppes family, and the food ways of both.

Research Conducted to Produce the HSR
Both Julia Steele and Emmanuel Dabney provided vital background information on the buildings, previous repair campaigns, and excerpts from Richard Eppes diary relating to the buildings and their use. In addition, they directed our attention to resources they believed would provide key information including all of the studies of the site, including the archeological investigations. We have accessed the studies and documents found in the Technical Information Center. Several specific areas for dating of materials and building structural systems were researched: brick production in Colonial Virginia, the design nuances of timber framing in the Virginia Colony, and the history of saw mills in the area from the 1600s onward. Understanding the functions of the building types required research into smokehouses and the practice of smoking, the dairy function and its requirements, and cooking practices and food of the Colonial period onward. Sources were either directly accessed or the materials were previously accessed by the park representatives from the following sources.

1. National Archives Matthew Brady photographic Collection,
2. NPS, Denver Service Center, Technical Information Center,
3. Records on previous repairs, NPS staff, HPTC, and contractors,
4. Colonial Williamsburg Foundation: Publications and personal communication,
5. Library of Virginia,
6. Shirley Plantation regarding historic brick, and outbuildings,
7. Virginia Historical Society,
8. Eppes family foundation meeting minutes and communications,
9. Eppes family interviews represented in oral histories,
10. Eppes Family genealogical studies, and
11. Internet search of various topics: Eppes family, brick production, timber framing, white wash, hardware, and other materials.

The historic photographs of the outbuildings numbered two and one other had a portion of the Kitchen-Laundry building in the background.

The field research has included:

1. Historic Paint Analysis of a selection of building fabric on the exterior and the interior, 40 samples in total, all matched to the Munsell System of Color notation. Performed by the Historic Materials Laboratory of the Collaborative inc.
2. Mortar Analysis of the mortar systems believed to be associated with various phases of construction on the buildings. This analysis was performed by Atkinson-Noland & Associate's historic materials laboratory.
3. Non-Destructive Testing and Evaluation of the exterior masonry with multiple techniques, as performed by Dave Woodham of Atkinson-Noland & Associates.

4. Photographic documentation of the exterior surfaces and interior spaces and details using 24.3-megapixel equipment by John Feinberg, with supplementary photos by Dave Woodham and Dean Brookie.
5. Wood species identification for weatherboard samples.
6. Measured Drawings of the building, created from field dimensions by Dean Brookie, drawings prepared in Auto Cad files and Revit Model.
7. Detailed Condition Assessments by John Feinberg, Dean Brookie, and Dave Woodham.

Part 1—Developmental History

Part 1—Developmental History

General Historical Background, Context, and Site Chronology

A comparison of the colonization of the continental United States by England and Spain reveals a distinct difference in approach. Spanish colonization was predicated on the Catholic Church being able to convert the native population as the basis of the colony. A military presence was intended to assist in the "conversion"; however, the soldiers were not the core of the colony, the native people were the colonists. In many places the native peoples were enslaved to form the colony and pursue Spain's quest for new world riches, particularly precious metals. The English model of colonization was seemingly less intentional, the focus was not on gold and silver and the colonists were not church or government employees. The English colonists were expected to live in the New World and often were composed of family groups, facilitating settlement of English Colonies by English descendants.

The motivation for leaving one's homeland and striking out for the New World had individual nuances for each person; yet overall, it was fueled by a desire to leave circumstances found to be unfavorable to go to a land of hoped-for favorability. The Spanish Conquistadors are believed to have been largely poor nobles from the impoverished west and south of Spain. The settlers of Plymouth Plantation (1620) were escaping religious persecution while the initial 104 English men and boys of the Virginia Company who settled at Jamestown (1607) were seeking profit for their sponsoring company. Both colonies suffered from similar problems: a lack of necessary skills, unwillingness to work at the levels required for survival, lack of food, widespread disease, starvation, internal dissension, and external conflict with native tribes. The early years of both colonies were marked by a focus on immediate survival, not on profit. Jamestown eventually became profitable, growing tobacco from seed brought by John Rolfe in 1612. In the same decade, more women were brought to the settlement expanding the number of family units. In 1619, the first documented Africans were brought to Virginia, a critical resource in the raising and harvesting of tobacco.

The location of Jamestown was considered desirable, as it was both accessible to the sea by the deepwater James River and far enough inland to provide some protection from the Spanish. The deepwater accessibility of land along the James River has been a critical ongoing factor in the shipping and development of agricultural products. The large number of plantations along the James River are evidence the importance of accessibility, most of the plantations were established during the Colonial Period; for example, the Shirley Plantation in 1613, Sherwood Forest (first known as Smith's Hundred) established by land grant in 1616, the Berkeley Plantation circa 1620, and Westover in 1637. The river terraces were considered fertile soil for crop production, and proved to be so. The Eppes family was certainly aware of these factors in its decision to settle on the James River in this early period, patenting the land in 1635.

The Eppes Family

Captain Frances Eppes moved to the New World and patented 1,700 acres in Virginia in 1635. Over the following 12 generations of the Eppes family, that property was divided among his offspring. A notable exception is when Mary Eppes Custis died in childbirth, passing the City Point property to her nearest blood relative, her Uncle Richard (grandson of Capt. Francis). This Richard Eppes was known to be of Shirley Hundred Island and City Point. It was his son, also named Richard, who "… tore down the original family home [which is likely to have been built by Capt. Francis Eppes] at City Point and built the present Eppes family home, Appomattox Manor…."[1] There is evidence supporting the concept that Richard did replace the former family

[1]Butowski, 1978, p. 18.

house: "…the age and structure of the out-kitchen appears to pre-date the construction of the house. The kitchen was mostly likely built to serve the pre-existing structure."[2]

Richard, a gentleman farmer, and his wife Christian Robertson Eppes, lived in the Manor from when they married in 1770. They had eight children, but there is no indication that the Manor was enlarged by them, probably because of concerns about the future and life at City Point following the American Revolutionary War. In 1781, The British sailed up the James River on the way to Richmond, Virginia. Colonists attacked the ships; consequently, the Eppes home was damaged in said attack.[3]

The property passed first to Richard's first son (also named Richard) and then to the second son Archibald and, upon his death, to Richard's daughter Mary, who married Benjamin Cocke. While he was an important business personality in City Point, his mismanagement of the Eppes farm left Mary Eppes Cocke in debt upon his death. After he died, Mary was able to rebuild the property's agricultural assets by selling slaves, among other strategies. It was due to Mary that her son Richard changed his name in 1840 from Richard Eppes Cocke to Richard Eppes, thus continuing the Eppes name in ownership. Dr. Richard Eppes took full control of his estate following his mother's death in 1844. By 1860, Dr. Eppes owned 2,367 acres of land in Charles City, Chesterfield, and Prince George Counties.

During the years between when Dr. Eppes first got married and the outbreak of the American Civil War, his focus was on tending family estates and overseeing the family farm operation. Dr. Eppes kept a detailed journal of daily events and farming operations at Appomattox Plantation. This journal is a wonderful source of Eppes family history from 1851 to 1896.

At the beginning of the Civil War, Dr. Eppes enlisted as a private in the Confederate cavalry. He also provided equipment to 16 men, who were members of his unit, his relatives, and his friends. While he was on active duty, he did not add entries to his journal nor, it appears, did he write letters home. In 1862, the Civil War disrupted City Point by the occasional shelling of it and Appomattox Manor by a flotilla of Union ironclads. Mrs. Eppes and the children went to Petersburg for safety, but ended up going to Philadelphia as the situation worsened. General Grant and the Union army encamped on Dr. Eppes's property in 1864. At the end of the war in May of 1865, Dr. Richard Eppes was discharged from the cavalry. He worked as a civilian physician for the Confederates during the siege of Petersburg. When he assessed the damage to his property, he found ruined fields, lost livestock, and none of the slaves he had owned. "A scene of perfect desolation; barns, stables, hay houses, dwellings and fences had, with scarcely an exception, disappeared."[4] It took quite some time, money (borrowed from his in-laws), and hard work to reclaim his property from the Federal government so he could return to "the life of a wealthy Virginia landowner."[5] It was not just the Federal government he needed to vacate his land, it was also temporary tenants, such as the "active company of mixed colored and white harlots doing business just a few feet from Appomattox Manor."[6]

[2]Butowski, 1978, p. 19.
[3]National Park Service Cultural Landscapes Inventory: Grant's Headquarters at City Point, 2009, p. 31.
[4]Butowski, 1978, p. 57.
[5]Butowski, 1978, p. 14.
[6]Butowski, 1978, p. 61.

Below is the chain of title, according to the publication entitled *Cultural Landscape Report for Appomattox Manor and Grounds*, 2005, Figure 2.6, p. 8.

Capt. Francis Eppes	d. 1668
John Eppes	b. 1626
John Eppes	b. 1643
William Eppes	d. 1737
Francis Eppes	b. ?
Mary Eppes Custis	d. ?
Richard Eppes	b. 1763
Richard Eppes	b. 1736
Richard Eppes	
Archibald Eppes	
Mary Eppes Cocke	b. 1783
Richard Eppes Cocke (Richard Eppes in 1840)	b. 1824
Richard Eppes	b. 1864
Richard Eppes	b. 1905
Richard Eppes	b. 1936

The four outbuildings are referred to in the draft Cultural Landscape Report as "dependencies" and as "outbuildings" in this report. They are the Kitchen-Laundry, the Dairy, the New Smokehouse, and the Old Smokehouse. Only the Old Smokehouse has undergone substantial changes to the point where its signature function as a smokehouse is no longer visibly apparent. By contrast, the New Smokehouse has the characteristic pyramidal roof structure of heavy hewn timbers with wood smoke stained surfaces. The Old Smokehouse has a gable roof with a replacement structure of dimension lumber unstained by smoke. The New Smokehouse side wall structures are of exposed post and beam construction, also darkly smoke stained. The post and beam wall structure of the Old Smokehouse is obscured at the interior by later-applied boards. The floor of the New Smokehouse is exposed earth where the smoking fire was built while the Old Smokehouse has a wood floor. In sum, all but the Old Smokehouse could be used today for the functions for which they were created.

For some length of time in each of the four buildings' history, the building served a function integral to the operation of the Appomattox Manor. The buildings each possess specific characteristics connected to their use, relationships to external resources, and a specific site design based on historic precedence. Each building was enlivened by the people performing the individual functions carried out within their walls, on the adjacent site, and in the larger context of the plantation and the rivers.

Site Plan as a Cultural Landscape

The layout of the four buildings in plan view is shown on the site plan with current representation of individual building locations. At certain periods buildings have been added, removed, and moved. The Developmental History contains a series of site plans indicating on maps of City Point what was recorded; small utility buildings were not always noted. Only the New Smokehouse lacks a defined foundation, a factor that would have allowed it to be moved easily. The predominant arrangement appears to be the south elevations in alignment (inexact but close), from west to east: Old Smokehouse, New Smokehouse, and Dairy. The Kitchen-Laundry building, with its north-south ridge, is perpendicular to the south elevations of the three other buildings. It overlaps the Dairy.

As might be expected, the smokehouses are located furthest from the Manor. While smoke was also generated by both the kitchen and the laundry, the fires for cooking and heating water were not intended to produce smoke; they were meant to produce heat. The smokehouse fires were not lit year-round. The hogs were slaughtered in late fall-early winter. In his journal notes for January 5, 1854, Eppes recorded "Day misty and rainy, had fires made in smokehouse today to commence smoking the meat, hickory wood used." On many of these days, Dr. Eppes noted the wind direction. The favored wind direction would be from the smokehouse away from the house, and the predominant direction noted by him was northeast. Care in siting the smokehouses would favor downwind from the main house with wind direction during the winter smoking months being the most important. With wind direction being critical to smokehouse siting relative to the Manor house, the favored wind direction would be from the east, northeast, southeast, north, and south. The least favored were winds from the west. Dr. Eppes's concern with wind direction is understandable. Evaluation of current wind direction records indicates that winds from the southwest, west, and northwest are more prevalent during the summer than the winter when they are considerably less prevalent. Journal notes from December 15, 1859, indicate this period as the time to slaughter hogs and commence salting. In Dr. Eppes's diary, hogs were brought over from his farms, as indicated in his notes for December 19, 1860.

A second factor for siting buildings is access. As two of the three Eppes farms were across the river, access to the river was important in bringing over hogs, and supplies such as sugar, molasses, and salt from stores at the other farms or from river transport (ships, barges, small craft). The wharf and steps to the north, therefore, were an important support function. Dr. Eppes also notes in his diary fish being placed in the Old Smokehouse. Whether this was in preparation for salting or for smoking is not described. Given the major runs of both American shad and Blueback herring on the river (March to early June), the logical access point from the river to the Old Smokehouse would be the same river front wharf.

Photo 1 (164056pr.jpg): Historic example of a Site Plan. This one is of Virginia Dairy and Smokehouse. General View (labeled from left to right)—Kendall Grove, Dairy, Outhouse, & Smokehouse, State Route 674, Eastville, Northampton County, VA. Source: Library of Congress, Survey HABS VA-807-B.

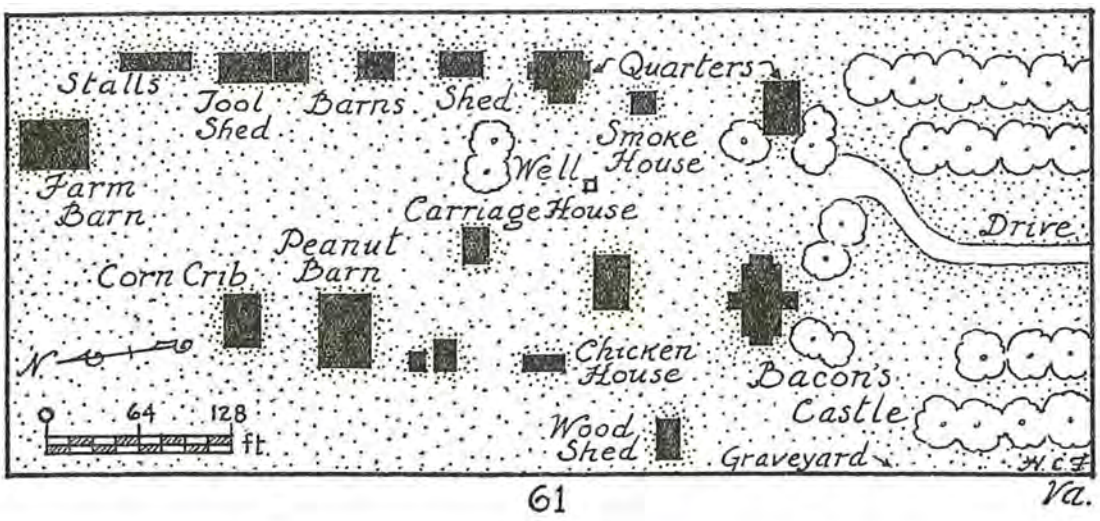

Figure 1: Bacon's Castle, Surry County, Virginia, c. 1650. Plot plan showing arrangement of dependencies. (After HABS). Source: Forman, *The Architecture of the Old South*, p. 53.

The second aspect of access was from the Manor House to the Kitchen-Laundry. The Eppes family's slaves would carry food from the kitchen to the dining area and dirty and clean laundry would travel between the laundry and the Manor House. Other supply access routes were internal to the Manor and to the remainder of the Hopewell area to the south. Take, for example, the ice house, which has an unknown date; however, we know from pre-war entries that there was an ice house. After the war, Eppes writes in May of 1868 about having Charles Brown, a bricklayer start "cleaning out & preparing ground for ice house...been occupied all day getting it ready to lay brick...." On the 8th, he continued, "hands occupied hauling brick for ice house by kitchen...." On the 14th he wrote "Charles Brown finished the top of ice vault today." The ice house is located under the current carriage house (also known as garage) and it would have been stocked with ice either by boat or by wagon. In turn the ice would have been brought to its place of use, logically the Manor House. Ice could have been sourced locally, as Eppes had an ice pond and at the time the James and Appomattox Rivers regularly had ice on them in the winters. Otherwise, ice could have been brought in by schooner from New England, a lively trade that went as far as New Orleans.

These four outbuildings forming their own little village has historic precedence: it was common practice of many of the plantations. Neatly aligned with an outdoor yard area used for supplementary activities, the buildings and their arrangement presented a cultured appearance important to plantation owners.

> *Throughout the 18th century, clusters of working outbuildings reminded visitors of nothing less than a sequestered English country village. Nor was it merely the presence of so striking and so many little outbuildings that attracted the eye. Their linear or symmetrical disposition on the ground was also part of the allure. There seemed to be a rhetoric of placement in play.*
>
> —Olmert, *Kitchens, Smokehouses, and Privies,* pp. 14 and 15.

Of course, on closer inspection, this idyllic arrangement was charged with activities, much of it rather unpleasant to observe or experience: the heat, noise, smells, smoke, and dust. Thus, the kitchen yard area was both physically separated from the Manor and sheltered from view, the two-story Kitchen-Laundry building assisting in blocking a good deal of the view of the kitchen

yard. The buildings may have been artfully arranged for visual effect, yet they were also sited to keep the distasteful aspects of common life separated from the view of the residents and guests of the Manor.

The Importance of the Kitchen-Laundry

The two primary functions carried out in the Kitchen-Laundry both required fireplaces and resulted in smoke. Access to the Manor House meant the kitchen needed to be fairly close, apparently deemed more important in the siting than the reduction in aggravation caused by the smoke. Additionally, the cooking and laundry functions needed access to well water.

The kitchen and laundry, being functionally joined in one building, was a logical use of personnel and fire. The laundry-side fire was used to heat wash water, flat irons for pressing, and making soap. The fire did not need to be used all day long for these tasks and either the fireplace or the coals from the fire could be used for cooking. The personnel who worked in the building were typically those who were housed in the second floor's two rooms. Most 18th and 19th century Virginia plantations were run by enslaved people. There certainly is no documentary evidence that the Eppeses had any paid cook or laundress until the eradication of slavery. The earliest enslaved woman identified as a cook was Hannah Slaughter.[7] By the 1850s and through the end of the war, Susan Slaughter (Hannah's daughter-in-law) became the cook as Hannah was not actively cooking due to her age. Susan was assisted by her niece Ursula Slaughter.[8] In 1824, Mary Randolph's cookbook, *The Virginia Housewife or, Methodical Cook*, was first published.

Figure 2: Washington's Kitchen, Mount Vernon, Painting by Eastman Johnson, 1864. Note the typical above-fireplace shelf from which tools were hung. Courtesy of the Mount Vernon Ladies' Association.

The recipes cover what one might expect for the time and place and then the unexpected such as

[7]Source: Benjamin Cocke, Account book, 1826-1834. Mss 1 Ep734 d 129, Virginia Historical Society.
[8]Richard Eppes, Diary, December 27, 1857, Mss1Ep734d292 and Richard Eppes, Diary, January 1, 1858, Mss1Ep734d293, Virginia Historical Society.

gaspacho (sp), curries, and recipes from both the East and West Indies. While not all households served up such diverse fare, the plantation owners along the James River were keen to set a fine table with interesting foods. Their kitchens and staffing were developed to support these objectives.

Olmert, refers to the production of the fine meal as the "food miracle."

> *In the end, the detached kitchen of the Tidewater was a departure from architectural custom. It had little to do with the threat of fire, and everything to do with slavery. Kitchens were essential to the food miracle. That is, the grinding work of preparing food was suppressed, while the meals themselves were seen to be regally, even magically, set before the nonchalant family and its self-regarding guests. Like manna from heaven, food just appeared, like grace itself, justifying the family's status and privilege.*
>
> —Olmert, *Kitchens, Smokehouses, and Privies,* p. 47.

Other than the main houses of the plantations, the kitchen buildings tended to be the next in size and scale. At almost two stories with its pair of chimneys, the building stands second only to the Manor. Eppes records in his diary the use of the kitchen for several special events: December 31, 1856, "A marriage & marriage party between two of the Bermuda negroes John Bird and Patience Anderson…the party came off the following night in the kitchen…," and on December 28, 1858, "George our dining room servant was married tonight to a girl belonging to Mrs. Wood by name of Anna. Mrs. Eppes gave them an entertainment in our kitchen."

The age of the Kitchen-Laundry building may predate that of the Manor as the Manor was in turn a replacement of an earlier main house. Dendrochronology will assist in determining if the Kitchen-Laundry is the oldest current building on the Appomattox Plantation. While there exists speculation by some chroniclers of the history of the plantation that the building may have been built in two phases, there is little evidence other than that the two chimneys are of different styles, and slightly different sized brick. There are several features of this building type beyond the fireplaces and chimneys. The east elevation has separate entrances for each half and the kitchen half has a second door to the west, accessing the work yard. Both halves have double hung windows in alignment with the front edge of their respective hearths to provide cross ventilation of what could be a very hot room, particularly in the heat of the summer.

This two-phase hypothesis was based on the different size bricks of the two chimneys and the overall chimney configurations, the north chimney's uppermost section being laid up right alongside the north elevation and its southern counterpart set out from the south elevation at its uppermost portion (so called "free standing"). The challenge was to see what aspects of the two halves of the building might otherwise differ and whether the brick size and chimney configuration were conclusive.

1. The brick sizes are slightly different, but sizes varied over time without a specific pattern except for special bricks not present here.
2. The chimney configurations do not relate to specific time periods. The free-standing chimney might be slightly more prevalent in the 1600s and early 1700s than the flush chimney. (See the examples on the following pages.)
3. Wall thickness differs by one-half inch between the two halves.
4. Wall framing differs slightly in that the down brace of the east elevation's northeast corner intercepts the sill timber after 2.5 stud spaces and at the southeast corner it is 2 stud spaces.

5. Wall framing anomaly also includes an overly large timber seen at the middle of the east elevation, exposed during repair campaign of 1989-1990. Its size is commensurate with those of the corner posts.
6. Roof framing interruptions or differences if present were not discernible. Limited access did not allow roof sheathing boards evaluations as to whether the boards were discontinuous at a specific location, such as the midpoint. To observe this location will require sliding on one's back over boards temporarily laid over the tops of the collar ties.
7. Exterior weatherboards do not have a defined break at the midpoint, nor is there a break at the soffit.
8. Finish material differences were not noted either: flooring, wall, or ceiling plaster.
9. Fireplace openings differ in size. The south fireplace (laundry) is smaller than the north (kitchen). Functionally these size differences are to be expected. The south fireplace has a cross bar often used for hanging pots, the north does not.
10. The north half's first story windows are of overlapping sash, the south half's corresponding windows do not have this configuration. The second story windows are of the same configuration for both halves.

Insufficient numbers of paint samples were taken from the exterior to describe a notable difference between the north and south halves. Mortar analysis may provide additional definition of a difference with more samples, particularly for samples from the north half versus the south half found as part of the archeology of the crawl space depth increase by excavation in 1989-1990. However, the most conclusive results will be derived from dendrochronology.

On this and the following pages are examples of residential structures from the area from different time periods, exploring the hypothesis that separated versus attached chimney structures were time period related. The examples presented do not show any clear relationship to time periods for attached versus separated chimneys.

Figure 3: Adam, Thoroughgood House, Princess Anne County, Virginia, c. 1640. South and east elevations. An example of hall-and-parlor dwelling. (After HABS, and Waterman and Barrows, 1932). Source: Forman, *The Architecture of the Old South*, p. 49.

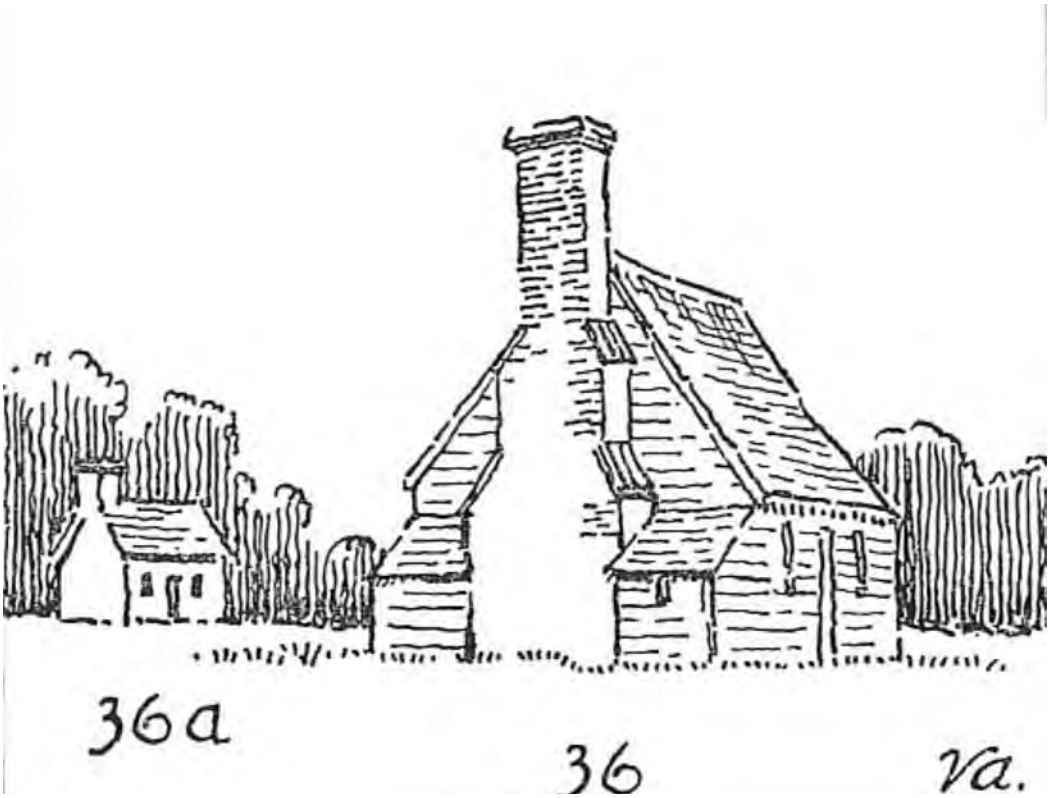

Figure 4: One bay "House on Isaac Watson's Land," Jamestown, Virginia, C. 1644 (?), showing ingle recesses. Reconstruction. (After Forman, 1938). Source: Forman, *The Architecture of the Old South*, p. 39.

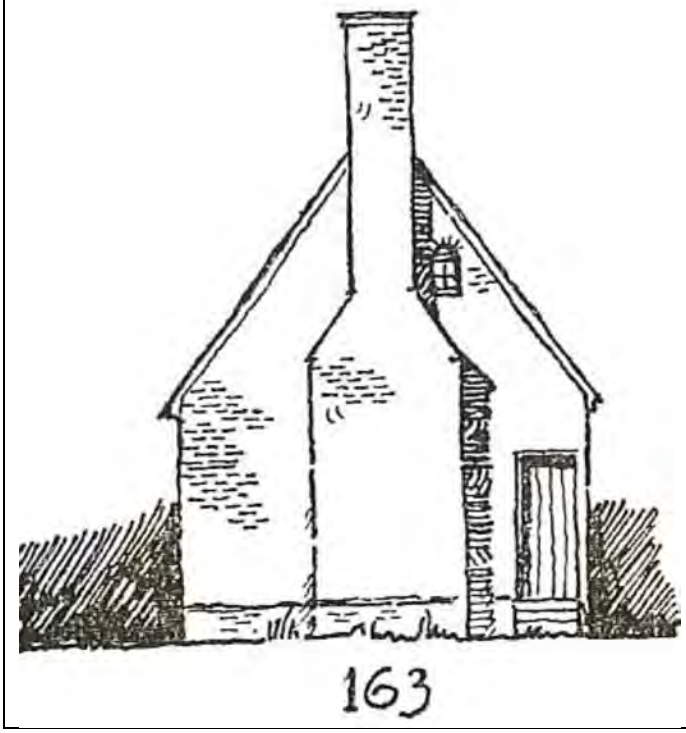

Figure 5: Clocker's Fancy, St Mary's City, Maryland, c. 1658. Source: Forman, *The Architecture of the Old South*, p. 122.

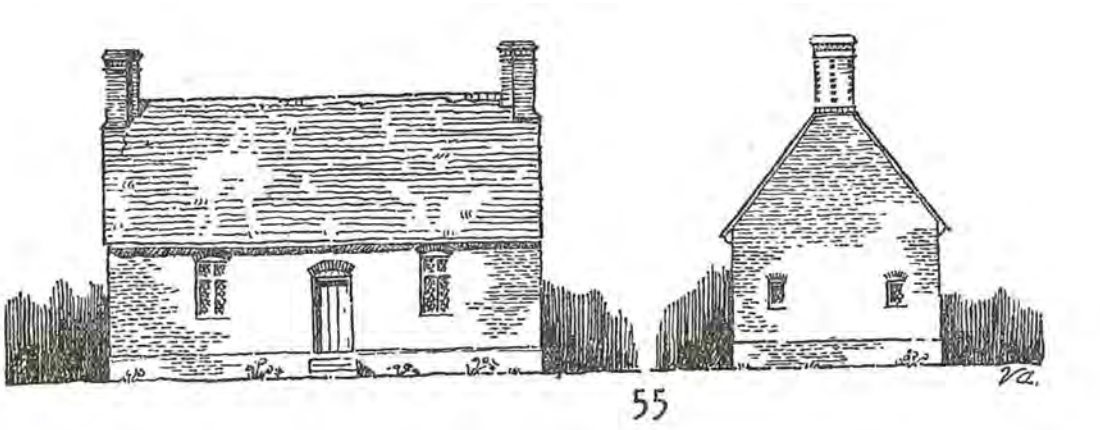

Figure 6: Pinewoods, or Warburton House, James County, Virginia, c. 1680. South and west sides. Example of central-passage type. (After Kimball, 1935, and author's notes) Source: Forman, *The Architecture of the Old South*, p. 49.

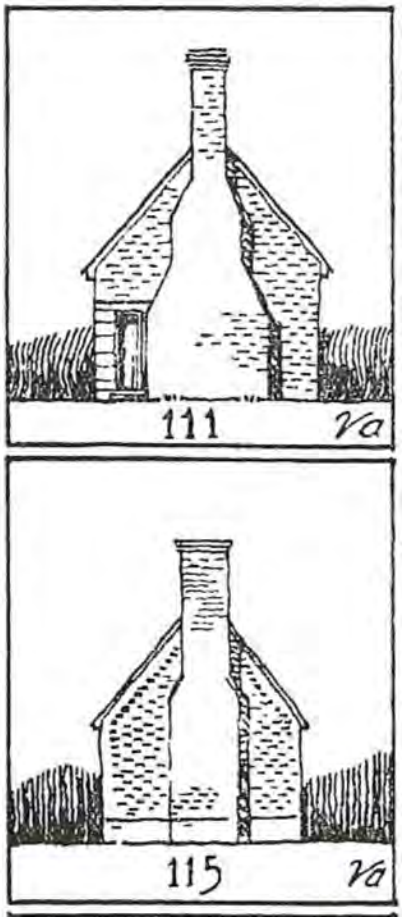

Figure 7 (111): Huggins House, Princess Anne County, Virginia, early eighteenth century. Source: Forman, *The Architecture of the Old South*, p. 89. (115): Skiff's Creek House, James City County, early eighteenth century. Source: Forman, *The Architecture of the Old South*, p. 89.

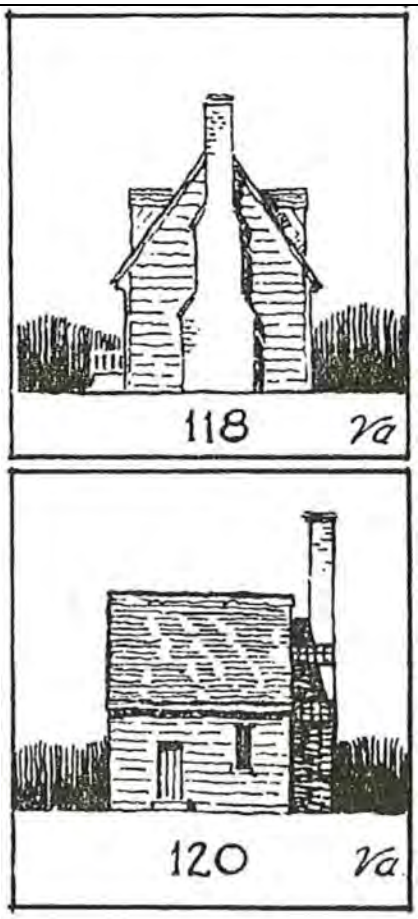

Figure 8 (118): Montague House, or Bracken House Williamsburg, Virginia, eighteenth century. (After Kimball, 1935) Source: Forman, *The Architecture of the Old South*, p. 89. (120): Greenway Slave Kitchen, Charles City County, Virginia, eighteenth century. Note freestanding chimney. Source: Forman, *The Architecture of the Old South*, p. 89.

146. GUNN'S RUN, CHARLES CITY COUNTY, VIRGINIA

An eighteenth-century cottage, showing persistence of medieval style. The left-hand wing w probably built first.

Figure 9 (146) Gunn's Run, Charles City County, Virginia. An eighteenth-century cottage, showing persistence of medieval style. The left-hand wing was probably built first. Source: Forman, *The Architecture of the Old South*, p. 106.

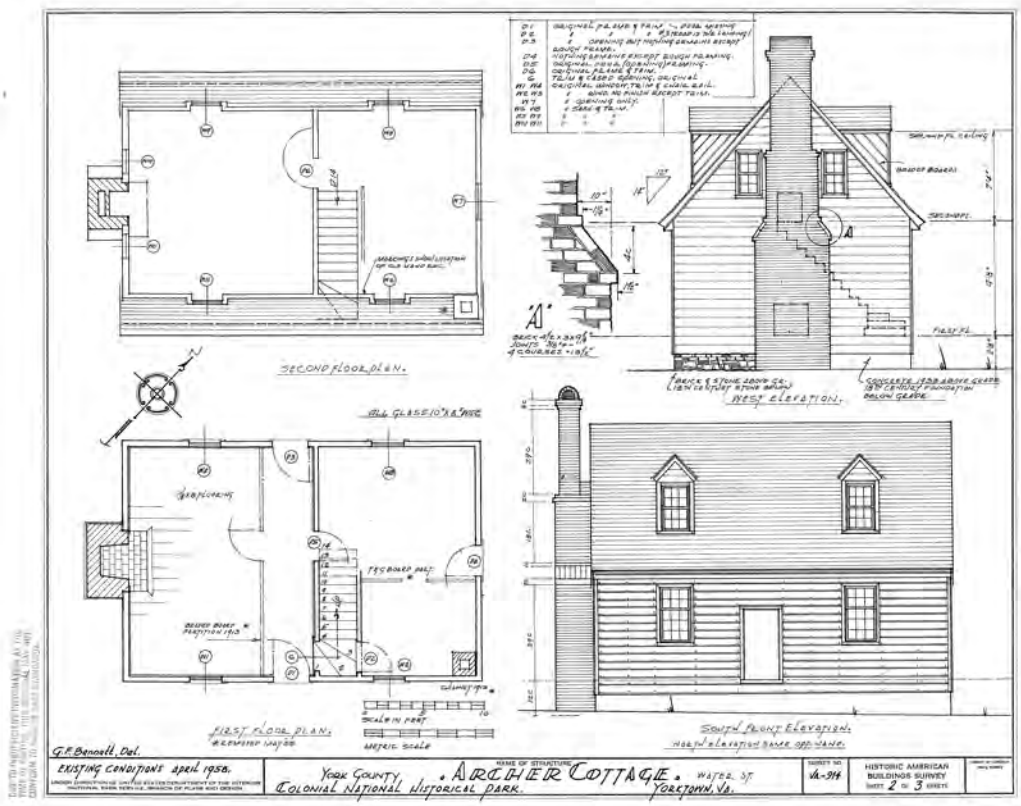

Figure 10 (00002a.tif): An example of a separated chimney in the Archer House, Lot No. 123, Water Street, Yorktown, York County, VA. Source: Library of Congress— HABS VA,100-YORK,17- (sheet 2 of 3), 1958.

> *In 1993, a number of test units were excavated underneath the floor of the detached kitchen to the west of the manor house. A brick fireplace base was found as was a subfloor pit. Many animal bones were preserved. Artifacts included an array of late eighteenth century to modern artifacts.*
>
> —Steele, "Appomattox Manor Repair and Rehabilitation Project and DOE," p. 50.

Some kitchens of the period did have other built-in features such as warming ovens, and built in, attached, or free standing cooking aids such as cranes, trammels, grates, and spits. Large wood mantles were convenient locations for hanging kitchen tools such as lid lifters, and small shovels to move hot coals from the firebox to the Dutch ovens. The Appomattox Manor does not have any of these features.

The Importance of Dairies

Dairies are first seen as separate buildings in the last half of the seventeenth century.[9] "Altogether the dairy boomlet lasted a little more than a century, from the middle of the eighteenth century to the Civil War."[10] The proximity of the Dairy at Appomattox Manor to both the smokehouse and the Kitchen-Laundry is a bit unusual as "milk, cream and cheese readily absorb the smoke and unsavory smells associated with farming and household work."[11]

In addition to the siting of the building, there are two critical aspects of the building design: cleanliness and coolness. To achieve cleanliness, the floors were characteristically constructed of brick, such as at Appomattox Manor. The walls and ceiling were covered by lath and plaster with a whitewash finish, not present at the Dairy, only present for the Kitchen-Laundry at this time. The ventilation was provided by slatted openings that were covered on the interior by cheesecloth to keep the bugs out. The wall plates needed to be tight to the foundation to keep out bugs and rodents. The coolness of the interior was achieved to as great an extent as possible by features of the building design. The floor was sunk into the earth, with 21 inches seen for other dairies. Ventilation was provided at the tops of the walls by slatted openings, protected by wide eaves. The airflow from the slatted openings was enhanced by moldings at the connection of soffit to wall, the intention to reduce turbulence. The containers for the milk needed to be kept cool and in many dairies, this was accomplished by placing them in a trough that could be supplied with cool well water. The trough could be a shallow metal pan or constructed as an integral part of the floor of mortared brick or stone. The dairy needed to be close to the well for the water to be supplied to the pan/trough and for keeping everything clean: surfaces, utensils, containers, and people. The Kitchen-Laundry at Appomattox Manor is adjacent to the well. The desire for this adjacency was likely a major factor in its location.

On December 15, 1859, Eppes noted that for the freshly slaughtered and salted hogs "owing to the rain last night kept the hogs in smoke house & kitchen & dairy…." As dairies were used year-round, one would suppose that Dr. Eppes would not have ordered the hog quarters to be stored in Dairy with its ultra-cleanliness requirements unless it was no longer being used as a dairy either

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[9]Michael Olmert, *Kitchens, Smokehouses, and Privies: Outbuildings and the Architecture of Daily Life in the Eighteenth-Century Mid-Atlantic* (Ithaca, New York: Cornell University Press, 2009), 99.
[10]Ibid., 113.
[11]Ibid., 103-104.

permanently or temporarily. “Dairies passed out of architectural fashion because dairying—unlike smoking meat, for example—did not actually require a separate building. It could just as well be done in a shaded, well ventilated room in a house or in a basement as at Shirley.”[12] Cream, butter, milk, and cheese did not care where it was processed except that it be clean and cool.

Dr. Eppes wrote extensively in his diary about his dairy operation. He continued a fairly robust dairying operation into 1860 and thus would need a place to store the excess butter that he was selling. And while the post-war diaries have not been exhaustively searched at the time of writing this report, it is known that he was selling excess milk as early as April 1866 from cattle at his Bermuda Hundred farm.[13]

His January 30, 1869, inventory at Bermuda Hundred shows he had ten milking cows, four milk pans, three churns, and one milk tin. On February 20, 1869, he mentioned that he received butter from Bermuda Hundred. On Thursday August 12, 1869, he wrote he paid $15.00 to Bettee Spenser, the “milkwoman.” In another inventory, Eppes wrote about his dairying items at the Eppes Island farm in 1883. Likely the change of this building from a dairy to a storage place occurred in the early 1900s, once Richard and Elizabeth Eppes were deceased.

While the Dairy at Appomattox Manor lacks the characteristic features of being buried 21 inches below grade—it is 3.5 brick courses in depth—and while it does not have lath and plaster wall coverings or ceilings, it does have whitewash on the wall structural members and the roof structural members. It was noted in the October 18, 1851, entry in Eppes diary, “Madison cleaned out and whitewashed the Dairy....” In the search for evidence of these surfaces previously having lath and plaster, the focus was on the presence of spaced holes left by lath fasteners. If plastered, the lath nail holes should have been evident on those surfaces from which the whitewash had currently incomplete coverage. While various nail holes were evident, the pattern was not consistent with a lath and plaster installation. It is possible that the nail holes found were part of an interior surface of wood boards, with each board of varying width as the pattern is, in itself, variable. It is also noteworthy that the roof structure is similar in all respects to the New Smokehouse. Perhaps the Eppes family was not sure if they wanted a dairy but they could always convert the new building to a smokehouse if the dairy did not work out provided the roof structure was stout enough to support hanging hams. The roof of the Eppes’s Dairy is similar to a host of other original dairy buildings in Virginia. The hope was to draw up the hot air into the top so the product would not become warm. Other original dairies in Virginia with similar roofs are Sherwood Forest (http://www.loc.gov/pictures/item/va1262.photos.160386p/); Poplar Forest (http://www.loc.gov/pictures/collection/hh/item/va1458.photos.159832p/); Toddsbury (http://www.loc.gov/pictures/collection/hh/item/va0053.photos.161939p/); and Kendall Grove (http://www.loc.gov/pictures/item/va1209.photos.164056p/), among others. The economy of the plantation was likely more invested in hogs than dairy cows.

Olmert expresses a sense that the dairies were not integral to the operation of the plantation’s economy. Rather, the Dairy epitomized an agrarian society as a kind of fashion statement. While that is true for other folks, Eppes used his dairying operations pretty heavily. In the 1850s he routinely had slaves, particularly Madison Ruffin, selling his extra butter. Eppes took his dairying seriously, as evidence by him routinely measuring the amount of butter being produced. He also whipped his dining room servant, George Bolling in April 1852 for failing to bring milk with Eppes’s coffee.

[12]Ibid., 113.
[13]Eppes, Diary, August 14, 1866, Mss1Ep734d297, Virginia Historical Society.

When dairies were at their peak, they appealed to an agrarian and plantation mind-set that liked to dramatize and compartmentalize every aspect of life and work, as if the yard were a vast stage set. It was a matter of control. The landowners were the directors; their slaves, servants, and even families were mere actors. The elite liked to visualize themselves in charge.

More important, they wanted their charges to feel they were acting out a drama that was as sacred and cyclical and unimpeachable as the ecclesiastical year. "This is what we do," they were saying, "and this is where we have always done it." Dairies were just one of the many stages where the different acts of this life were performed. And when the play closed, the sets began to wither away.

—Olmert, *Kitchens, Smokehouses, and Privies,* p. 113

The Importance of Smokehouses

Until the advent of electrical power for refrigeration, the preservation of food relied on an array of methods: root cellars to extend the shelf life of late harvest fruit and root vegetables, pickling, salting, sugar curing, and smoking. In an interview with Mary Anderson in *When I was A Slave*, edited by Norman Yetman, she recalled that the ice house on the North Carolina plantation of her birth was used to store pickles, preserves, cider, and brandy. Typically, the ice house was not used to keep perishable food cold. Ice provided a status symbol for keeping drinks cold and making ice dependent specialty foods such as frozen fruit creams, and ice cream. Ice cream was made with ice from the ice house and was stored there for a short time between its creation and its serving.[14] Preserves were also put up using simple sugar syrup in crocks covered with cloth, often with a bit of brandy.[15]

Appomattox Manor had an ice house located under the present garage; it is possible that over the years there had been others to serve the Manor House. Archaeological work revealed a root cellar under the kitchen floor, but it is not intact today. In the following historic Civil War-era photograph, there is a medium height mound at the back left that is likely to have been either a root cellar or an ice house.

[14]Mary Randolph, *The Virginia Housewife or, Methodical Cook: A Facsimile of an Authentic Early American Cookbook* (New York: Dover Publications, Inc., 1993), 142.
[15]Ibid., 154-161.

Photo 2: The earth mound at photo left may cover either a root cellar or ice "house," according to the historic narrative of the Eppes family. The roofing of the kitchen is not easily distinguishable although the Manor clearly has round butt shingles. The texture does appear to indicate wood shingles. Source: Chicago Historical Society.

Smoking was the primary method by which meat was preserved. While the primary meat preserved in the smokehouse was pork, reference is seen in Dr. Eppes's diary of fish. Accounts of the recollections of the practices of other plantation smokehouses reference also smoking beef and game.

The diary of Dr. Richard Eppes has several entries regarding the hog production on the plantation: quantities, quality, and losses due to hog cholera. In addition to the date, he noted wind direction and temperature. The importance of wind direction was in avoiding having a great deal of smoke travel downwind from the smokehouse toward the Manor, and the temperature concern related to meat spoilage. After the hogs were slaughtered, Eppes salted the meat with salt he bought from Petersburg commission merchants and a merchant operating out of City Point.[16] On many plantations saltpeter was used in addition to just straight salt. The salting process was intended to reduce the moisture in the meat thereby inhibiting microbial growth and was accomplished by either brining or dry rub. The Anglo-Saxon process, sometimes referred to as corning, used coarse pellets of salt ("National Center for Home Curing, Curing and Smoking Meats for Home Preservation"). The use of saltpeter as an additive commenced as a practice in the early 1800s, and its effectiveness in retarding spoilage led to its increased use. Eppes's diary noted his use of "saltpetere" in his entry for December 15, 1859. "Used salpetere on the shoulders & a little on the hams which are all sugar and molasses cured. Lost no meat last year, the pepper black rubbed on the hams prevented the fly & worms."[17]

Three years of hog production were compared in Eppes diary: 1857, 8,332 pounds; 1858, 9,634.75 pounds; and 1859, 11,942.5 pounds.

[16]Emmanuel Dabney, email of December 26, 2016, to John Feinberg, TCI.
[17]Richard Eppes, Diary, December 15, 1859, Mss1Ep734d296.

Photo 3 (Hogs_1999_160_260_266dpi.jpg): In this 1890s photo, Dr. Richard Eppes's son, Richard, received assistance from two employees as they prepare to place recently slaughtered hogs into the smokehouse.

The entry for April 26, 1858, would seem to indicate that fish were to be smoked in the Old Smokehouse: "Madison overhauled and removed meat from the old to the New Smokehouse preparatory to putting in fish." The entry for April 27, 1858: "Had fish brought up from fish house & put in Old Smokehouse this morning" indicates there was a separate fish house and by 1858 there were two smokehouses.[18] This entry puts forward the question of whether the fish were to be salted, smoked, or both and if smoked was this to be done in both the old and New Smokehouses or just the old. After the Civil War, Eppes wrote that he had a spring opened next to a "sycamore tree just above where the old fish house used to stand" saying that "it is less than 100 yards of the kitchen."[19]

Eppes noted that it took nine people most of the day on the 15th of December in 1859 to salt the meat of 80 hogs. The recommended salt mix of today (Virginia Cooperative Extension) may be similar to what was used at Appomattox Manor for its hams: 8 pounds salt, 2 pounds sugar, 2 ounces saltpeter. Black pepper and molasses as additions to the curing process mix were Virginia additions, one primarily for repelling bugs and one for taste. The amount of time for the salt cure to remove the desired amount of moisture would vary with meat thickness, humidity, and local practice. The hams were hung from the smokehouse roof structure and smoking with a hickory

[18]Richard Eppes, Diary, April 27, 1858, Mss1 Ep734d294, Virginia Historical Society.
[19]Richard Eppes, Diary, March 25, 1866, Mss1E734d297, Virginia Historical Society.

wood low temperature fire would fill the smokehouse with the desired smoke. The pyramidal shape of the roof structure was purposeful: it both concentrated the smoke and allowed the hams to be moved from the lower levels to be stored in the higher levels. In some practices the oldest hams were hung from the highest perch for as long as two years.

The roof structures of smokehouses were, of necessity, constructed of heavy timbers to handle the weight of the meat they supported. To facilitate the handling of the hams, each had a hook from which it hung, and this facilitated its initial hanging and movement to the upper levels for longer storage. Smokehouses thus served the dual function of a place for smoking the meat and for storing the smoked meat.

Determination of the Buildings' Age

The age of a building can be estimated by a number of research avenues and materials testing. In the case of the four outbuildings at Appomattox Manor, there have been several primary studies providing overview of the buildings and site with the emphasis of each described in its title. These are:

1. "Appomattox Manor-City Point A History," by Dr. Harry Butowsky, 1978.
2. "Historical Base Maps, Appomattox Manor-City Point," by G. Frank Williss, January 1982.
3. "Historic Structure Report Appomattox Manor," by Richard G. Turk and G. Frank Williss, October 1982.
4. "Cultural Landscape Report for Appomattox Manor and Grounds," (95% Draft) by Nancy J. Brown, H. Eliot Foulds, and Erika Riddington, January 2006.

These four studies are apparently based on exhaustive reviews of the available database, as evidenced in the large number of archives and databases used for sourcing material. The three sources of greatest interest and reliability presented in these studies are historic photographs, historic maps, and contemporary written documents.

Two archaeological studies are of importance, in particular relative to the artifacts recovered. These are:

1. "Appomattox Manor Repair and Rehabilitation Project and Determination of Eligibility" (Draft), by Julia Steele, March 2005. In addition to its own findings, this report reviewed the findings of seven previous archaeological surveys.
2. "An Archaeological Survey of Historic Occupation at City Point, Virginia," by Brooke S. Blades, July 1988.

Members of the Eppes family have developed their own history of the evolution of the site and the buildings. In part, it is based on the diary of Dr. Richard Eppes and covers a period from 1851 to 1896, with some breaks. In part, it is based on oral histories of various family members and stories passed down through the generations.

Materials testing can provide information on dates by dendrochronology of wood timbers. Dating of other materials is by reference only. In paint analysis, the paint layer closest to the substrate will be the oldest evaluated within the sample. In mortar analysis, similarities between sample results lead to the logical conclusion that the similar mortars were mixed and placed in the same general period. If one has a certain date for the construction of one building with mortar of a certain type per the analysis, a second building with similar mortar may be assumed to have been built during the same general period. Details of appearance, including color and size may indicate bricks to have been fabricated during the same general period. Bricks can be tested to determine other characteristics of strength, absorption, porosity, firing temperature, mineral content (by petrography or XRF), and thermal and hygric expansion. The most information about the

elements in the material comes from XRF analysis. Specific markers in the XRF results may allow comparison to a known date of a material.

The four outbuildings have materials that may yield date references as set out below in the order of material, testing method, anticipated result, and reliability considerations:

1. Timbers, dendrochronology, specific dates of cutting. Accurate. May have timbers re-used from another building, may have timbers cut from stockpiled trees. Cannot be applied to small dimension wood materials with limited growth rings, like a plank, unless the plank growth rings go through the heart of the tree.
2. All wood materials, species identification. Accurate. Some species appear similar.
3. Paint, color matching to the Munsell System, reference based information. Can tell basic information about the paint type, such as latex or oil, and the color. Layering may be incomplete given weathering, paint scraping in preparation for new paint, or lead paint abatement.
4. Paint, elemental analysis by XRF, accurate.
5. Brick, dimensions, of moderate assistance. During the periods of construction in question, many bricks were made locally and sizes were highly variable. Even bricks from the same form vary by firing heat exposure. Forms were not initially constructed to strict dimensional tolerances and were subject to wear due to abrasion.
6. Brick, by all of the techniques set out above, reference data. Accurate within a range. Bricks are handmade; sources vary for the material and even within a single source (top of clay bank to bottom). Drying process and firing qualities vary so variances will occur.
7. Mortar, by chemical analysis, acid digestion, and aggregate sieve analysis and color. Accurate, by range. Mortar was hand mixed and accuracy in measurements of the components in the mix was not a priority.
8. Mortar, by petrography and/or XRF. Highly accurate for the individual sample, however, the analysis results for the samples will fall within a range. The range can be as broad for these testing techniques as for the results from #7. However, there may be a marker discovered by XRF—one element with a distinctive reading—that can trace the mortar (and the same for brick) within the site's four buildings and possibly to other buildings on the site or nearby buildings. By example, the same brick or mortar used on a building of a known date ties down the other building's unknown date of construction by reference.

Summary of Paint Analysis

Table 1: Dairy

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: northwest corner column: white	1	White Wash	White Wash	—	2
Interior: northeast diagonal, north wall: white	2	White Wash	White Wash	—	2
Interior: east diagonal: red	3	5YR2.5/2	10GY3/1	10R4/10	3
Exterior: east elevation lap siding bottom edge of third from bottom: cream	4	N9.5/90.0%R	10YR9/2 putty yellow	10YR10/2 creamy white	3
Exterior: bottom of threshold of south door: cream	5	* N9.5/90.0%R white	**	N8/59.1%R 10YR10/2 creamy white	5
Exterior: north lap siding under edge, 9th up: cream	6	White	10YR9/2 Putty Yellow	10YR9/2	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown
**Spots of N8/59.1%R only

Table 2: New Smokehouse

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Southeast corner board (rotted) flat	7	N8/59.1%R gray	N9.5/90.0%R white	10YR9/2	1
Southeast corner board bead	8	N1.75/2.5%R black vestiges	White	—	2
Older looking board of lap siding, 8th from the bottom, face	9	N8/59.1%R gray	10YR9/2	N9.5/90%R white	3
Door jamb casing	10	N8/59.1%R gray (thin)	10YR9/2 Creamy Yellow	N8/59.1%R gray | 10YR9/2 Creamy Yellow	4
Underside of threshold	11	*	White	White	3
Top casing of door, architrave	12	*	White	White	3
Lower molding, south elevation	13	White | Cream | White	Putty gray | White	White | Light cream white	7
Upper molding, south elevation at underside of roof	14	White	Red	White	3
Upper molding, south elevation at underside of roof	15	White	Spots of cream	White	3
Soffit	16	White	Red (thin)	White	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

Table 3: Old Smokehouse

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: South crossbeam	17	White Wash (lots of wood fiber)			1
Interior: north crossbeam	18	Creamy white	Creamy white	—	2
Exterior: trim at top of wall	19	White	White	White	3
Exterior: soffit	20	White	Silver gray white	White	Cream	Light cream white	5
Exterior: fascia	21	7 layers of white	Red (thin)	White	9
Exterior: north elevation siding, high up at gable peak	22 White	N978.7 %R gray	Cream	Gray	3 layers of White	Red (thin)	White	9

Table 4: Kitchen-Laundry Exterior Windows

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
West: north	23	White	Gray	White	White	4*
West: south	24	10R3/1 Dark brown (very small area)	2.5Y8.5/4 creamy yellow	White	White	4
East: north	25	White	White	—	2
East: south	26	White	—	—	1
East: south window sill	27	White	White	Creamy white	3
East: south window sill	28	White	White	Very light cream white	3

Table 5: Kitchen-Laundry Exterior Siding and Molding

Wall siding in groove, east	29	White	White	Very light cream white	3
Wall siding in groove, east	30	White (extremely weathered)	White	White	3
Wall: northeast corner molding (looks like green early)	31	White (extremely weathered)	White	White	3

*Incomplete layers, may have a first coat of shellac primer; spotty

Table 6: Kitchen-Laundry Exterior Doors

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East, north door, not lead abated	32	White	White	—	2
East, north door, not lead abated	33	10R4/6 medium red brown	N5/1 9.8% R med. gray	N7/4 3.1% R gray	Creamy white / White	Creamy white	White	7

Table 7: Kitchen-Laundry Interior

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East elevation, 1st story north door: brown	34	10R4/6 medium red brown	N5/19.8%R medium gray	10R3/1 dark red brown	White	4
North room, 1st story, south wall wainscot	35	10R4/6 to black	—	—	1
Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
North room, 1st story, east wall wainscot	36	Creamy white / White	Butter-scotch white / 2.5Y8.5/4 creamy yellow	Med. Brown / Dk. Brown	6
First floor, south room, window casing, east window	37	White	White	—	2
2nd floor, south room, door, south face	38	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd floor, north room, west elevation baseboard	39	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd floor, north room, west elevation baseboard	40	10R4/6 thin	—	—	1

In general, improvements to the Manor House due to a change in financial circumstances likely coincided with improvements to the supporting function outbuildings. According to NPS research, the work of Mary (Eppes) Cocke from 1840-1842 was done in a mode of reinventing herself and her son, coinciding with her son's legal name being changed to Mary's maiden name. In addition to the house, she got new furnishings, a new silver service, new carriage, and purchased new slaves. More improvements to the Manor took place around 1850 after a visit from Philadelphia of Eppes's future in-laws who inspected the future home of their daughter. "The Philadelphia Horners lived in very comfortable circumstances and believed that some

improvements were required before their daughter could be comfortable."[20] Just as the 1763 date of the original construction of the Manor house is important, so is the beginning of these first series of improvements of 1840.

Current Estimates of Construction Dates of the Four Outbuildings

1. Kitchen-Laundry: Speculation is found in the literature about the date of original construction with two alternate periods: commensurate with the construction of the current Manor's first phase of construction in 1763, previous to this date and serving the earlier Manor house attributed to the last quarter of the 1600s. The 1993 archaeological survey dated the earliest artifacts found under the kitchen floor to the late 18th century.

   Based upon the ceramics found during archaeological excavations, Julia Steele hypothesizes a change in the pattern of broken ceramics disposal after the war with Great Britain ended in 1783 and trade resumed.

   > *"The fact we don't see a lot of pearl ware may have more to do with new trash disposal patterns. The kitchen to the west of Appomattox Manor was built sometime during this time period and servants may now have been cleaning dishes in buildings and yards to the west and disposing of broken ones over the bluff."*[21]

   The October 1982 HSR for the Manor indicates:

   > *"The existing documents do not indicate a date of construction for the outdoor kitchen. The first reference to the structure is found on an 1837 map of the area. However, it is believed that the building is at least contemporary with the manor house (1751 or 1763), and that the kitchen may have served an older structure referred to by Dr. Richard Eppes in his history of the Eppes family."*[22]

2. Dairy: The construction detailing of the Dairy and the New Smokehouse are similar with only minor differences related to their specific function. The diary of Dr. Richard Eppes refers to the Old Smokehouse in the 1850s, indicating the use of the New Smokehouse as the primary location of the smokehouse function. In the same period, he noted that they had to break in to the Dairy because the key to the lock was inadvertently taken off-premises. "Sent Madison to Petersburg to change shoes, staid all day & took keys with him, compelled to break open Dairy."[23] From the practice standpoint, dairies were popular from the mid-1700s to the Civil War period.

3. New Smokehouse: As discussed, the construction and size are quite similar to the Dairy. The construction dates of the two buildings are likely to be close to the same time.

4. Old Smokehouse: Smoking of meat was integral to the operation of the plantation. While smoking of meat is known to have occurred in chimney flues, the capacity of this method was

[20]Butowsky, page 35, based on an interview with Mrs. Elise Eppes Cutchins in 1977.
[21]Julia Steele. "Appomattox Manor Repair and Rehabilitation Project, Phase II Archeological Testing Waterfront Parking Lot, Phase III Archeological Testing, City Point Unit Archeological Determination Of Eligibility, City Point Unit, Petersburg National Battlefield, Hopewell, Virginia," p. 86.
[22]Richard G. Turk and G. Frank Williss. "Historic Structure Report Appomattox Manor," p. 81.
[23]Richard Eppes, Diary, 1852 October 1 - 1854 March 11, Mss1Ep734d291, Virginia Historical Society.

limited. Smoking of meat was a long-standing method for preservation, and was used by the ancestors of the early settlers of Jamestown in their home country of Great Britain. Williamsburg has many smokehouses, eleven of the current eight-eight original structures, most of similar design to the New Smokehouse. However, as to the form of the building and it being purpose built for smoking, "Just about any sort of vernacular structure could serve this purpose."[24] The earliest reference to a smokehouse in the written records of Virginia is in a 1716 document.[25] The Old Smokehouse is not fixed to a permanent foundation and could have been easily moved about the property. Interestingly, the brick foundation under the existing Old Smokehouse extends beyond the perimeter several feet to the north. These bricks are of unknown depth for the entire perimeter; at only the south side did an archaeological investigation indicate the depth as 2.05 feet below grade. Smoking of hams generally occurred during the first 6-12 weeks of the year, and the Old Smokehouse could have been used for other purposes during the remainder of the year. Dr. Richard Eppes diary references using the Old Smokehouse to store the fish in April. Possibly after the New Smokehouse was built, the Old Smokehouse was used for smoking fish, thus keeping the smoked hams hanging from the New Smokehouse rafters separated from the fish smoking.

In the HSR for the Appomattox Manor, the authors state: "There is no documentary reference to the date of construction. The first reference to any smokehouse is a January 16, 1825, reference in Benjamin Cocke's Account Book."[26] The authors reference an 1837 map of City Point that shows two outbuildings; the kitchen and a possible smokehouse. According to Elise Eppes Cutchin and James Van Deusan Eppes in an interview by the Appomattox Manor HSR authors in April 1981, in reference to changes to the Old Smokehouse, the building was lined and the floor installed "probably before" 1907.

Materials can aid in understanding the history of a site or building. Archaeologists are adept at tracing ceramic sherds to manufacturers and through to the dates when these manufacturers products first were regionally available. Tobacco pipes made from fired clay are key artifacts in dating layers in from which these were recovered. Stone tools are likewise identifiable as to period of use. Metal objects such as buttons, belt buckles, and clasps are traceable to the period of use. Buildings may contain materials, and structural systems associated with a specific period.

In the perfect world of archaeological investigations, each layer would be discrete with no intermixing, providing confidence in the layer's period identification by examination of the discovered artifacts within the layer. However, this is not always the case for either archaeology, or the materials investigation and dating efforts for buildings. By example, a door may have been constructed in the 1700s and be equipped with hardware—lock and hinges—from the 1840s. Likewise, extra iron nails that were hand wrought in the 1700s may have been used in the 1800s because the nails were available. Even early nails are known to be re-used; Thoreau salvaged the nails from the ashes of a burned out building to build his cabin at Walden Pond. This intermixing of periods is typical for buildings. Even wood timbers harvested considerably earlier than the expected original construction date can be found, having been re-used from an earlier structure or having been stockpiled.

The timbers in the structures of the four buildings walls, floors, and roofs can be individually differentiated by method of preparation, squaring them up: hewn, pit sawn, or sawmill sawn.

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[24]Michael Olmert. *Kitchens, Smokehouses, and Privies: Outbuildings and the Architecture of Daily Life in the Eighteenth-Century Mid-Atlantic*, p. 75.
[25]Ibid., p. 77.
[26]Richard G. Turk and G. Frank Williss. "Historic Structure Report Appomattox Manor," p. 97.

Except if the sawmill used a cutting blade that went up and down—as did the early sawmills in Virginia—then differentiating between the two sawing techniques of pit and mill would be extremely difficult if not impossible. However, there might be discernible differences in the assembly of the timbers: timber framing details, differences in mortise and tenon joint configurations, and, to a lesser degree, differences in the pegs. In these four structures, the species of wood could differentiate time period if one could link a species to its availability. Typically, local construction used local trees, and picked the best trees, biggest and straightest unless they used curved braces then the tree was selected to have the grain follow the curve. Eventually, the availability of suitable local timber producing trees becomes scarcer when demand outstrips supply. Perhaps most notably in the Colonies was the case of Essex, Massachusetts with a very large demand from shipwrights evolving from being met by local trees to the needs being met by importation of trees from Maine. Species might change along with the change in the source of supply.

In cases where a particular species was favored for its characteristics, it would be used where those characteristics were most important such as oaks for strength, and cypress and Atlantic white cedar for rot resistance. Both of the latter two species were used for wood shingles, as noted in the records of the Colonial period for Williamsburg in particular. Stylistic changes do have a broad period association, such as the adornment by a bead planed into the edges of corner boards, extended window frames, casings, and weatherboards. The earliest settlers were focused on putting a roof over their heads, rather than a bead in their weatherboards. Likewise, the use of the classical moldings seen on both the Dairy and New Smokehouse stand in contrast to the Old Smokehouse, which has no ornamental moldings and no ornamented weatherboards. As further contrast, the forms of the Old Smokehouse and the New Smokehouse differ, with the New Smokehouse's pyramidal roof offering some improvements in smoking the hams by virtue of enhanced contact time with the abundance of retained smoke.

As with timber-framed buildings, there were changes in brick structures. The brick coursing could present the plainest appearance with "running bond," or be laid in a number of other bonds with differing characteristics, such as "Flemish Bond." Attempting to differentiate periods of early brick construction by brick size was fruitless, there were no specific sizes attributed to the earlier periods. The mortar might also provide period differentiation. By example, if the lime in the mortar was created by firing oyster shells then bits of shell might be seen embedded in the mortar under the microscope. If the mortar's lime was created by firing of limestone, the bits of lime embedded in the mortar would appear different. If lime in the mortar could be tied to the period of the first lime kilns in the area, or the first shipment of lime from outside the area (cargo manifests), then connection to a period might be possible.

Styles of the manor houses of the Tidewater are a source of period connection. However, little stylistic change was seen for the functional buildings other than as described for the smokehouse. In contrast, the use of a separate building for a dairy is attributable to a period, as a "fashion statement," from the late 1700s up to the end of the Civil War. There are changes over time in kitchen design, specifically associated with the fireplace and hearth accoutrements: built in oven, cranes, and the use of a trammel on a cross bar. In addition, although not of necessity built into the fireplace, spits were used for roasting. Any of these cooking supports could occur at most any time from the 1600s on. Thus, these improvements were not regional, they were individual kitchen based in terms of when introduced and when implemented. By example a fireplace crane could be present from the 1600s on. The only exception might be the built-in warming oven as a feature of the 1600s and 1700s. Iron cookware such as the Dutch Oven largely replaced the necessity of a built-in oven in the brick work.

The detailed investigations undertaken are presented in different sections of the Historic Structure Report as highlighted sidebars. The subject matters covered are:

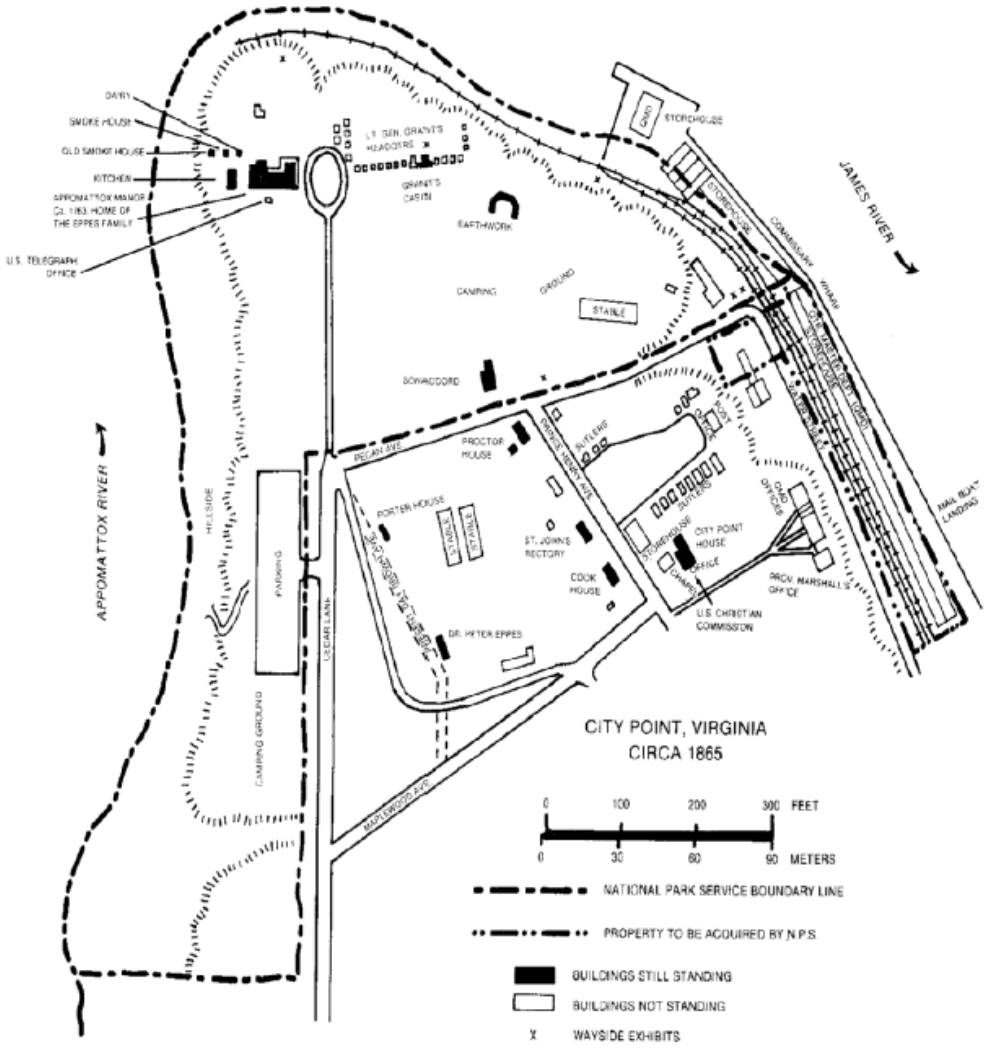
1. Brick manufacturing, beginning in Jamestown and brick sizes over time
2. Door hardware
3. Early sawmills in Virginia
4. History of Wood Shingles
5. Timber framing history

The following subject matters will be featured as sidebars in Part 2.

6. Foodways
7. Rice

Part 1—Developmental History

Physical Description—Site



Source: NPS, U.S. Department of the Interior Petersburg National Battlefield, Virginia, "Civil War City Point: 1864-1865 Period of Significance Landscape Documentation," July 2009, page 39.

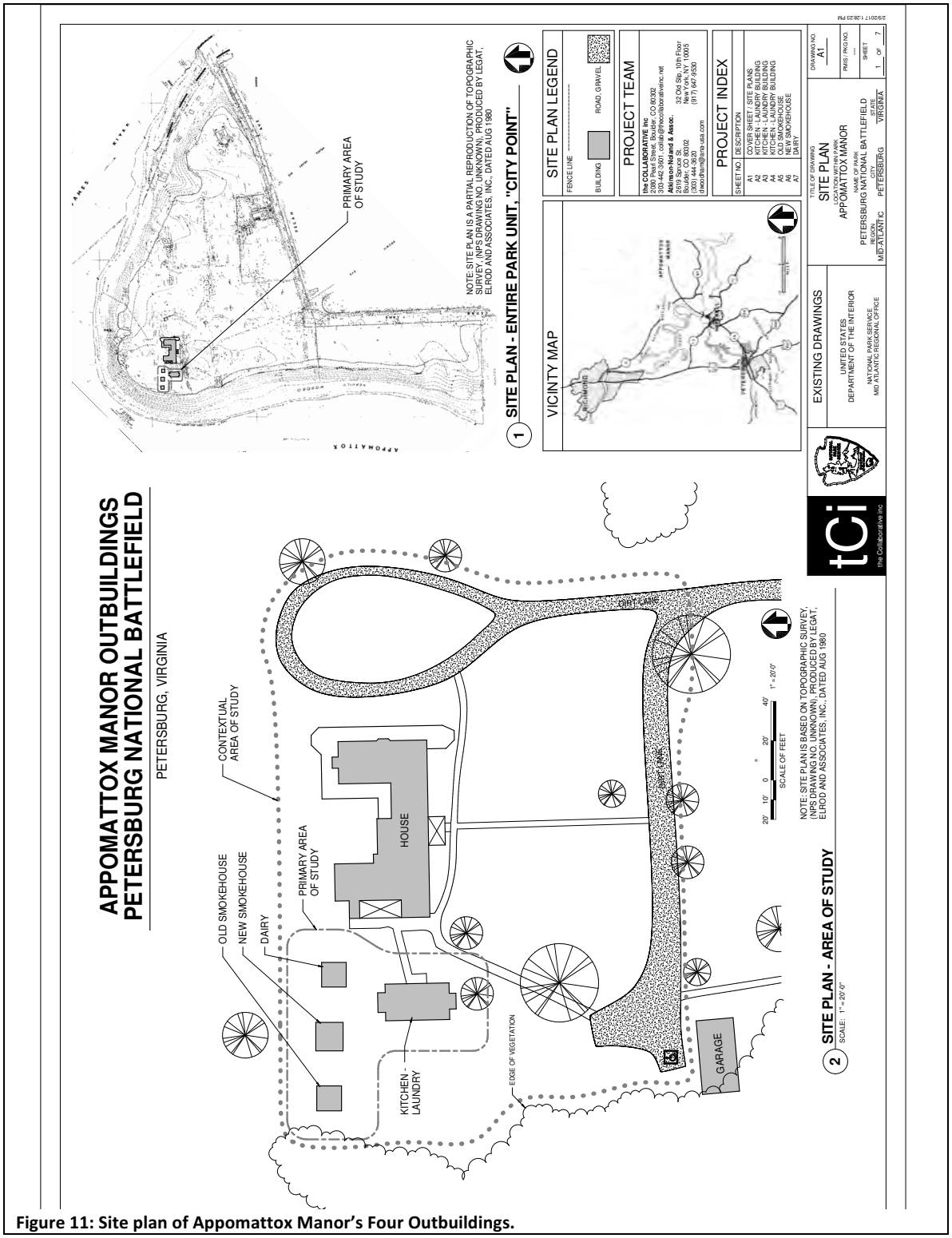


Figure 11: Site plan of Appomattox Manor's Four Outbuildings.

Description and Condition of Elements

Topography and Drainage

The topography of the City Point peninsula upon which the Appomattox Manor house and the four outbuildings are situated is characterized by a fairly flat top with steep side slopes descending to the shoreline. The area of the four outbuildings has a less than 1 foot in 100 feet drop (0.67%) from north to south, and an east-west slope of about 1% increasing to 5% near the top of the slope to the shoreline. The two buildings with a foundation of an above ground brick stem wall are the Kitchen-Laundry and the Dairy. The ground slopes adjacent to these foundation walls are of substantially more concern than for the other two buildings that are set on corner "piers" and allow surface flow to pass through. The Kitchen-Laundry ground slopes were measured with a smart level every 2 to 3 feet around the entire perimeter as there appeared to be some areas of back slope; that is, drainage toward the building instead of away. The Dairy has reasonably good ground slope away from the foundation walls at a slope range of 2% to 5%.

Seventeen individual slope measurements were taken around the Kitchen-Laundry (see figure 12). Most of the ground adjacent to the east elevation sloped toward the building at slope percentages as high as 4.4% and 6.5%. The south elevation measurements indicated the slopes as being away from the building at 1.5% and 8%. The six measurements of the west elevation ground slopes indicated fairly flat ground with four measurements indicating the ground sloping away and most measurements in the 1% to 3% range. The ground on the north elevation sloped toward the building with one measurement of 4.3% toward the join of the chimney's west elevation with the building's north elevation. This is not a good place for moisture saturation given the weight of the chimney. Settlement is an issue.

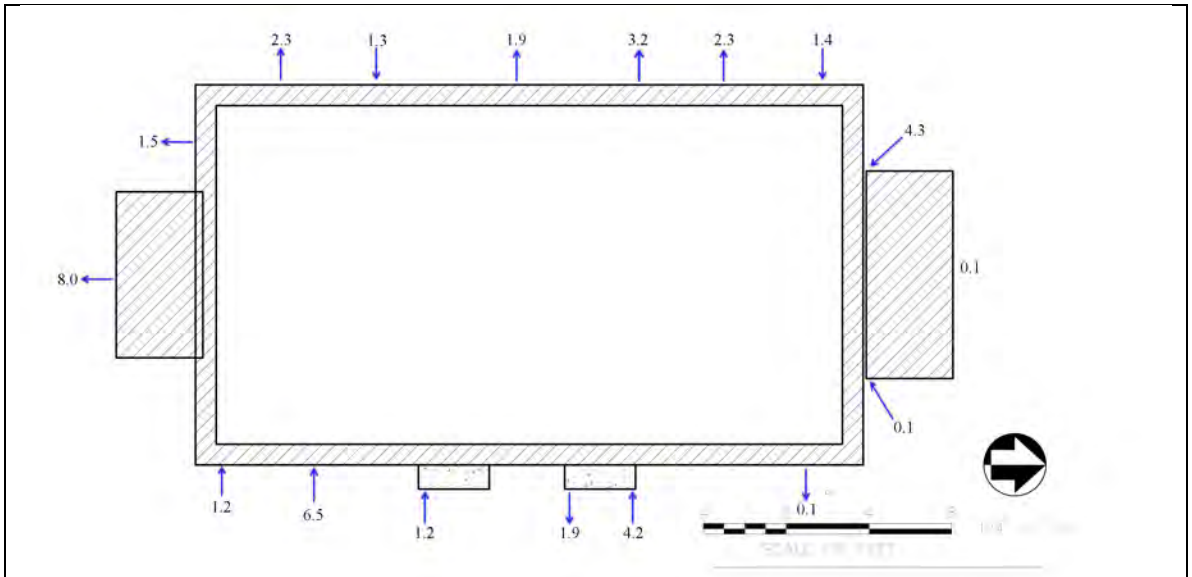


Figure 12: Kitchen-Laundry: Ground slopes adjacent to the walls (arrow indicates direction of flow, number indicates slope percent).

Vegetation

The site of the four outbuildings is covered with turf grass with a few woody shrubs. The draft Cultural Landscape Report describes the grass as "mostly Bermuda." The report did not identify nor call out as contributing the woody vegetation located as follows: south of the Kitchen-Laundry (see photo 4), southeast of the Dairy a crape myrtle (photo 5), and west of the Dairy (photo 6).

Photo 4 (2268): Two conjoined woody shrubs located south of the Kitchen-Laundry.

Photo 5 (2270): A crape myrtle located southeast of the Dairy.

Photo 6 (2263): Woody vegetation west of the Dairy.

Walkways and Steps

The pathways in and through the larger site are extensively documented in the 95% draft of the Cultural Landscape report. However, the pathways from the manor to the Kitchen-Laundry are constructed of exposed aggregate concrete and, while the material is noncontributing, the alignment is similar to that indicated in a photograph taken from the water tower (see photo 7). The alignment may be considered contributing. A similar exposed aggregate concrete pathway extends to the parking area of the garage from the house (see photos 8 and 9).

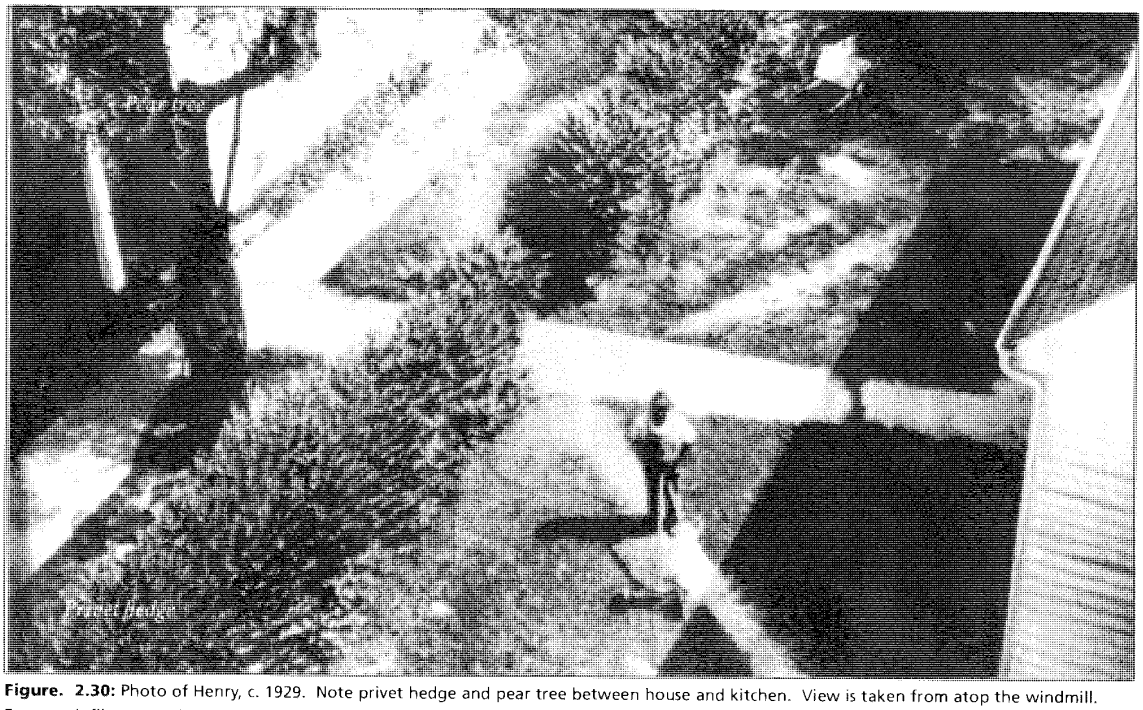


Figure. 2.30: Photo of Henry, c. 1929. Note privet hedge and pear tree between house and kitchen. View is taken from atop the windmill. From park files, Petersburg NB.

Photo 7: This photograph taken from the water tower shows the historic alignment of the pathways from the manor to the Kitchen-Laundry. Source: National Park Service Olmsted Center for Landscape Preservation, *Cultural Landscape Report for Appomattox Manor and Grounds*, p. 38.

Photo 8 (2269): Exposed aggregate concrete "accessible" pathway as seen from the Manor looking toward the garage.

Photo 9 (2270): Exposed aggregate concrete "accessible" pathway.

Steps are present at the following doorways, all appearing as a single step: both east elevation doorways of the Kitchen-Laundry, cast in place concrete; Dairy, cast concrete as a stepping stone; and for the west elevation of the Kitchen-Laundry a stepping stone of concrete similar to that of the Dairy.

Miscellaneous Features

Shallow Concrete Trough: A shallow concrete trough exists between the Dairy and the New Smokehouse at the north end of the space. It has no apparent use. It may be located over the well.[27] The well was the subject of a 2008 William and Mary school archeology field project, for which the report with location map has as yet not been completed. See photo 10. This photo also shows the three cast concrete stepping stones leading to the trough from the south.

Photo 10 (2264): Oct. 2016 view of shallow concrete trough between the Dairy and the New Smokehouse at the north end of the space.

[27] Julia Steele personal conversation, October 2016.

Photo 11 (JS0352): Photo taken in 2008 of a William and Mary field school's archeology project. The photo shows roughly where the well is; in 2008, it was thought to be a well Eppes references in his diary from the 1850s.

Photo 12 (JS0340): Close-up photo taken in 2008 of a William and Mary field school's archeology project. The photo shows roughly where the well is; in 2008, it was thought to be a well Eppes references in his diary from the 1850s.

Removed Site Features (within or near the project boundaries): Earlier photographs (for example, see photo 13, Jack Boucher's 1964 HABs #164893 photograph) show the windmill tower over or near the well, located to the northwest of the corner of the Dairy. Regarding the now-removed windmill, Mrs. Ashley P. Cutchin said that "four girders that were once part of a windmill at Appomattox Manor stand between, and slightly north of, the Dairy House and New Smokehouse. The structure was constructed in 1916, and torn down in 1969."[28] The girders are no longer in this place.

Photo 13: Jack Boucher's 1964 HABs photograph shows in the background the windmill tower near the well, located to the northwest of the corner of the Dairy.

[28] Mrs. Ashley P. Cutchin, interview on January 6, 1981.

In the following historic photograph, there is a medium height mound at the back left that is likely to have been either a root cellar or an ice house.

Photo 14: The earth mound at photo left may cover either a root cellar or ice "house," according to the historic narrative of the Eppes family. The roofing of the kitchen is not easily distinguishable although the Manor clearly has round butt shingles. The texture does appear to indicate wood shingles. Source: Chicago Historical Society.

A site plan from 1962 (figure 13) shows a building noted as "new storage shed" located south of the Old Smokehouse and west of the Kitchen-Laundry (See figure w, "Sketch Map Appomattox Manor, Hopewell, Virginia, October 15, 1962," Butowsky, National Park Service, Mid-Atlantic Region, *Appomattox Manor—City Point: A History*, 1978, page viii).

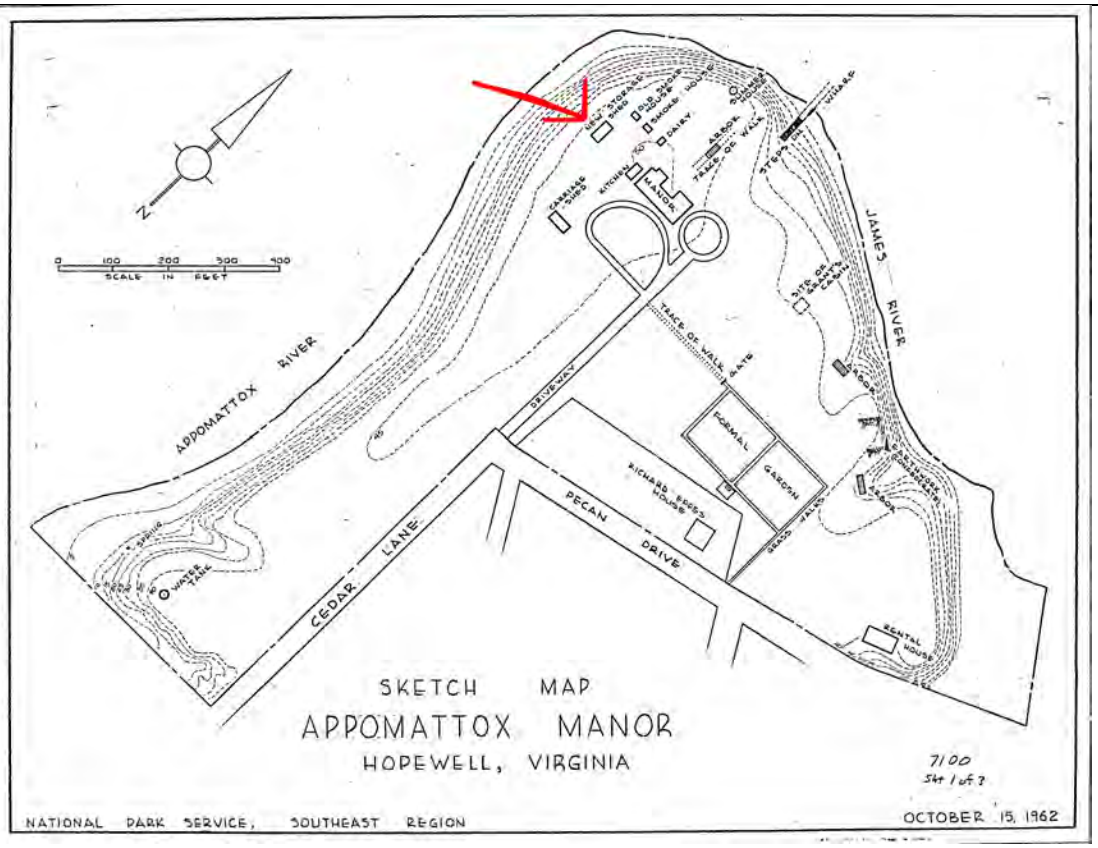


Figure 13: 1962 Sketch Map of Appomattox Manor, Hopewell, Virginia, National Park Service, Southeast Region, October 15, 1962.

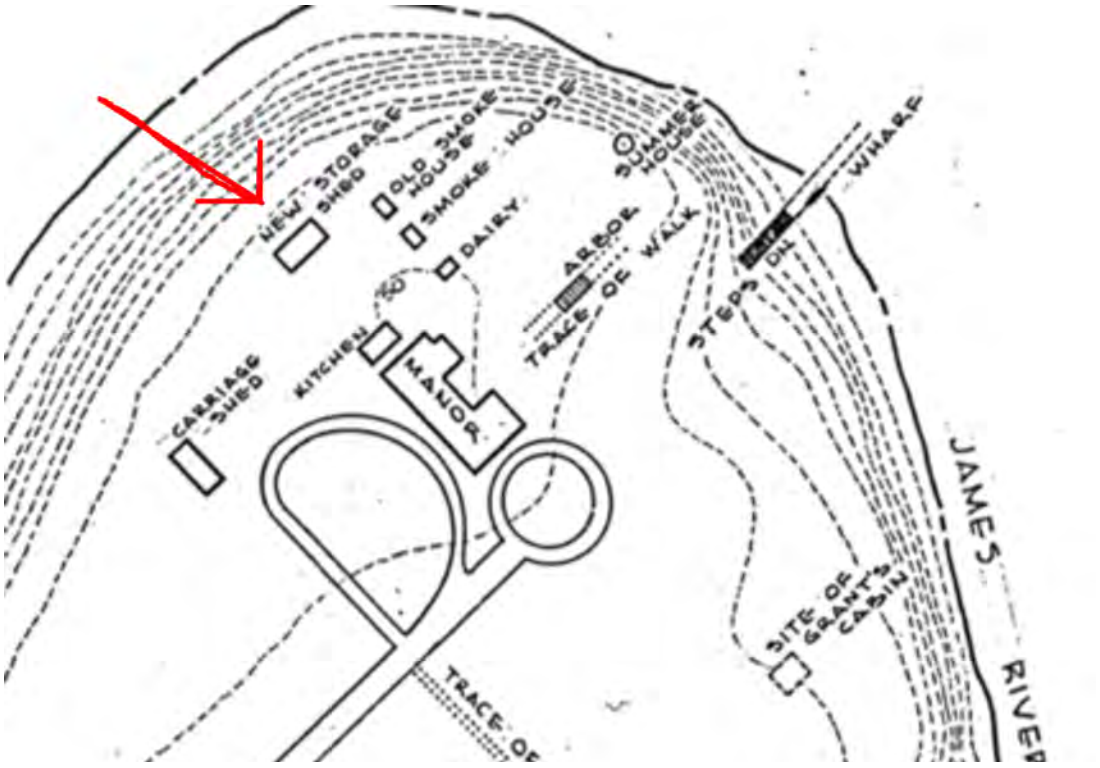


Figure 14: Part of 1962 site plan showing "new storage shed" located south of the Old Smokehouse and west of the Kitchen-Laundry.

Figure 14 is an enlargement of a portion of the above sketch map (see figure 13) that was prepared by the National Park Service in 1962. There are photographs from 1964 in which the water tower is seen, but it is not shown on this earlier 1962 plan. There are other elements that are shown in the plan which appear to be representational, such as the driveway turnaround shape of circular when it is shown as tear-dropped in other plans.

Code Considerations

In general, building codes provide allowances for historic buildings. Several codes have no applicability because there are none of the applicable systems, such as fire suppression, electrical, plumbing, and heating ventilation and air conditioning. As the building has no heating or cooling systems, there are not any requirements relative to shell energy efficiency: insulation, weatherization, or windows. Without having mechanical systems, there is nothing to address relative to minimum efficiency ratings. The most impactful code consideration is Accessibility Code: Uniform Accessibility and Standards (UFAS).

Given the limits of the study area for the Historic Structures Report., the Appomattox Manor house, restrooms, and ramp are not subject to evaluation for the report. However, the following items as listed below are subject to evaluation. Each factor is presented with an evaluation as to how the existing is configured, and what are the factor's non-compliance issues. The Treatment Section, set out in Part Two, describes the specific recommended interventions for your consideration. The four elements addressed are accessible parking, accessible route, ramps, and signage.

Parking, Accessible Walkways Route, Signage, and Ramps

Accessible Parking Description; In General

There are three opportunities for parking: on the street, in the gated parking lot, and on the site itself by the garage. Respectively, the locations move from 24-hour access for everyone, to daytime access for park visitors, to restricted pre-arranged parking next to the garage, and drop off at the loop in the gravel drive. The following description is part of the PLAN YOUR VISIT information of the Petersburg National Battlefield website. In addition, numbers to call are provided for accessibility arrangements, with one week's notice requested.

> **"General Grant's Headquarters Visitor Contact Station**: The main entrance on the west wing includes a ramp which also leads to the fully accessible restrooms. However, there is no paved trail leading to General Grant's cabin. Visitors have to travel across a flat grassy area to access the cabin."[29]

Accessible Parking Description

1. Accessible Parking Location: The main public lot has parking spaces for designated parking. The parking area has 25 regular spaces, and four designated accessible spaces of which two are van accessible, identified by pavement signage and striping.

   The access drive to the lot has a gate that is locked by park rangers at dusk or soon thereafter. There is a 380' long access path from the parking lot toward the Manor aligned in parallel with the top of the treed slope. The path begins at the northwest corner of the lot and its paved surface ends to the north at the onsite garage parking's gravel surfaced area.

2. Onsite Parking: Within the fenced area of the Appomattox Manor portion of the larger site, there is a designated accessible parking space to the north of the garage. This approximate location is where the path from the parking lot ends. Being gravel surfaced there is no definition of the space by painted lines. There is a post mounted sign. The route from the gravel surfaced parking area to the Manor is by a paved path of 82' in length leading toward the base of the ramp serving the west entrance to both the Manor's exhibits area and the restrooms.

Accessible Parking Condition

The assessment of condition is relative to compliance with the UFAS requirements.

1. Signage should designate each parking space for use only as an accessible parking spot and for a van-accessible space. The signage is not in full compliance as the requirements require a post mounted sign of specific size, color, wording, and fonts.
2. The walkway from the main parking lot is not continuous. It is interrupted by the gravel parking lot by the garage. The width of the walk is believed to measure at least 36 inches and, while the entire length of the walk was not measured to determine compliance with the 2% cross-slope maximum, it does appear to be compliant. The width of 36 inches is at the minimum per UFAS, in which case a passing spot of 5 feet by 5 feet must be provided every 200 feet for walkways of 36 inches in width. The discontinuity in the walk at the gravel parking area is not compliant.
3. The accessible parking in the gravel area must be hard surfaced ("stable, firm, and slip resistant") and conform to all of the requirements configuration, surface marking, and signage. The current space is non-compliant.
4. If access into the Kitchen-Laundry is desired, there is no current provision.

[29] https://www.nps.gov/pete/planyourvisit/accessibility.htm (22 May 2017).

Character Defining Features
The four buildings are each purpose-built to perform specific functions in support of the operation of Appomattox Manor. With the exception of the Old Smokehouse with its present interior finishes, each building is an accurate representation of its functional requirements providing an integration of building form and function. The traveler in 1850 or 1860 would recognize each building type by its exterior, immediately realizing the functions contained within. The traveler in 2017 who was familiar with the plantations of the Tidewater and beyond, would likewise recognize the function of each building by its exterior. The arrangement of the buildings on the site was common enough to have these travelers also recognize that this area was devoted to household support functions.

Functional Considerations
1. Located anywhere but upwind of the house as determined by prevailing winds,
2. Close to the house,
3. Kitchen-Laundry closest to the house,
4. Dairy to be sited in the most likely to-stay-clean location and close to the well,
5. Smokehouses to be the furthest from the house,
6. Flat ground,
7. Shrubs for drying laundry,
8. Well water availability, and
9. Accessibility to transport routes by land and by water.

Aesthetic Considerations
10. The view of the kitchen yard from the Manor is to be obscured, in this case by the two-story Kitchen-Laundry.
11. Reference is made in the general literature of drying the laundry on shrubs with a pleasant smell.
12. Alignment of the buildings in the cardinal directions, and clustered to appear as a village.

Summary of Treatments
Slope Grading and Drainage: The conservation standard is to have the ground surface adjacent to all building elevations drain away from the building with a minimum slope of 5% for a minimum of 5 feet.

Site: Parking and Site Signage, Accessible Walkway, Building Access
With the assumption that the parking space signed for people with disabilities remains in the same current location near the garage, the parking area must meet the accessibility standards as must the walkway from there to the entry to the Manor house on its west elevation.

Future Research Needs
Additional archeological work for the site is recommended for consideration.

Part 1—Developmental History

Physical Description—Kitchen-Laundry Building

Kitchen-Laundry Building

General Description

The Kitchen-Laundry building is a wood structure with a gabled roof with the axis running north-south. Both the east and west elevations are 32 feet, 3 inches in length; both the north and south elevations are 18 feet, 4 inches in length. The building is one and one half stories in height with an 11 foot, 8 inch floor-to-floor height and a partial second story; not the full width and of short height (6 feet, 6 inches maximum; 2 feet, 6 inches minimum). See the section drawing (A4) on page 43. The roof and walls are framed with both hewn and sawn timbers with mortise and tenon pegged joints. The wood framed walls are covered by painted wood lapped weatherboards with a bead planed into the lower edge. The gable ends each have a massive brick chimney that serves the four interior fireplaces, one at each end of the first story and one at each end of the second story. The roofing is painted round butt cedar shingles with a projecting comb ridge. The join of roof to sidewalls (east and west) has a plain boxed eave. The moldings are rake cover boards, fascia to roof sheathing, window casings, door casings, and corner boards. The latter three have a bead planed into the exposed edge. The foundation is brick for the exterior perimeter, chimneys, and fireplace hearths, and one concrete block pier as support for the floor structure.

There are three exterior doors and eight windows. Two of the doors are on the east elevation. The north door (door #1), which accesses the kitchen of the first story north half is constructed from two vertical planks with three exterior horizontal wood cleats. The door hardware is a rim lock and a pair of "T" hinges. The south door (door #2), which accesses the laundry of the first story south, is a six panel without edge molding of the panels. The door hardware is a rim lock and "HL" hinges mounted on the interior face. The single door of the west elevation (door #3) accesses the kitchen. It is constructed of eight random width vertical planks with battens in a "Z" configuration on the interior face. The door hardware is a rim lock and a pair of "HL" hinges mounted on the interior face. The four windows of the first story are all wood double hung configuration with nine over nine glazing configuration except for the northwest window, which is six over six. The north pair, serving the kitchen is of notable configuration in that the two sashes overlap, there is no meeting rail. The sash dividers of the northeast window are wider than the others. The second story windows are flanking each chimney of the gable ends, are of casement style opening, and are two over two glazing configuration with a simple single pair of hinges and a wooden thumb lock. All the hinges appear to be stamped metal.

The interior floors are wood planking and the floor structures are primarily historic hewn or sawn beams. The floor planks are replacements, pit sawn and smoothed by a drawknife. The interior walls and ceilings are plaster over predominantly split wood lath with some sawn wood lath. The wood interior doors of the second story (doors #5 and #6) access each of the two rooms from the center hallway at the top of the steep wood stairs of open riser design. The two doors are of six-panel design with door hardware of rim locks and "H-L" strap hinges. The south door accessing the south room is mounted upside down. Under the staircase is a closet, with an access door (door #4) of vertical plank construction.

The overall interior floor plan has two rooms with an east-west axis dividing wall that forms the north wall of the under-stair closet. The second story has two rooms accessed from a center hallway.

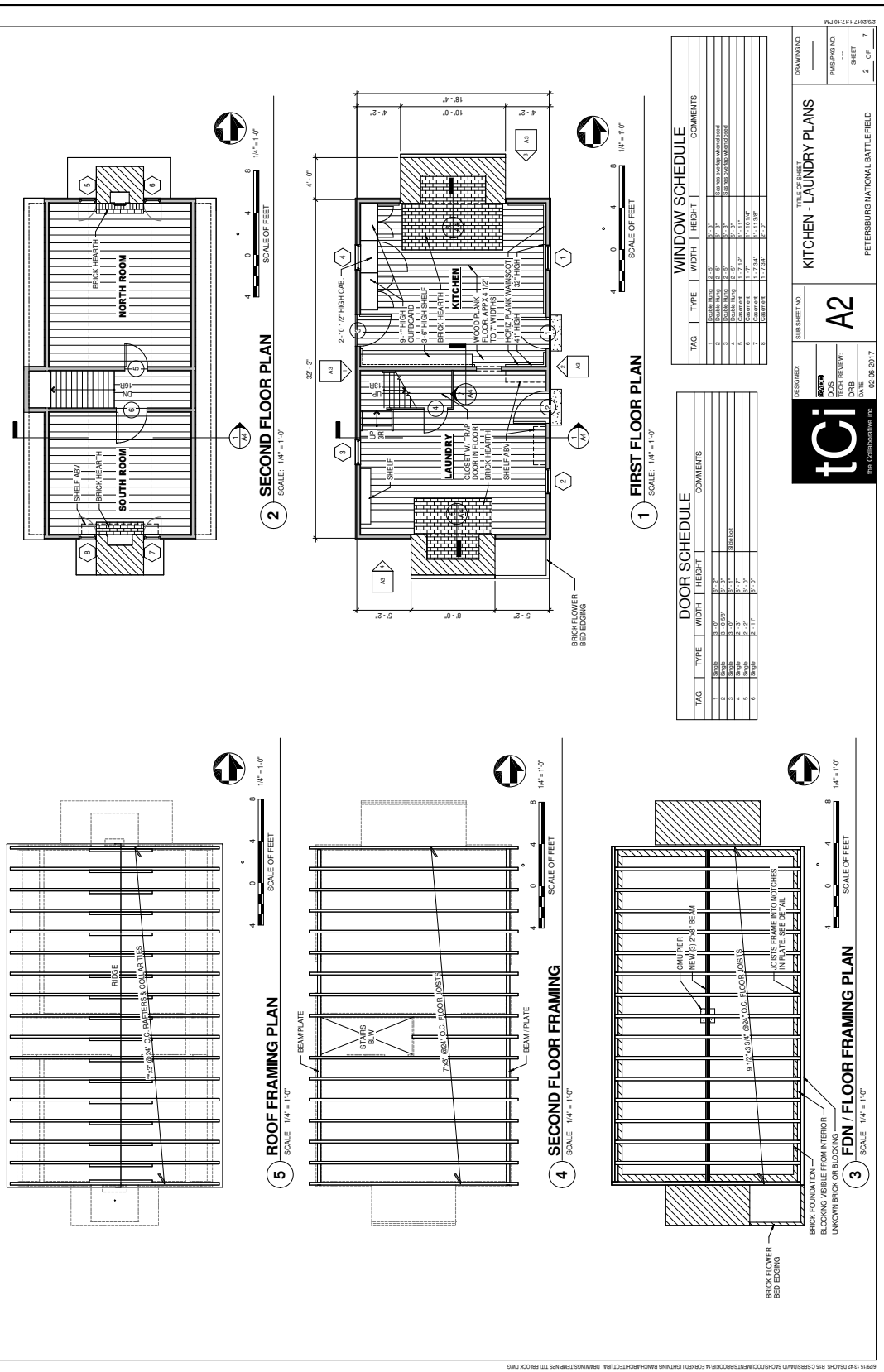


Figure 15: Sheet A2—Kitchen-Laundry Plans

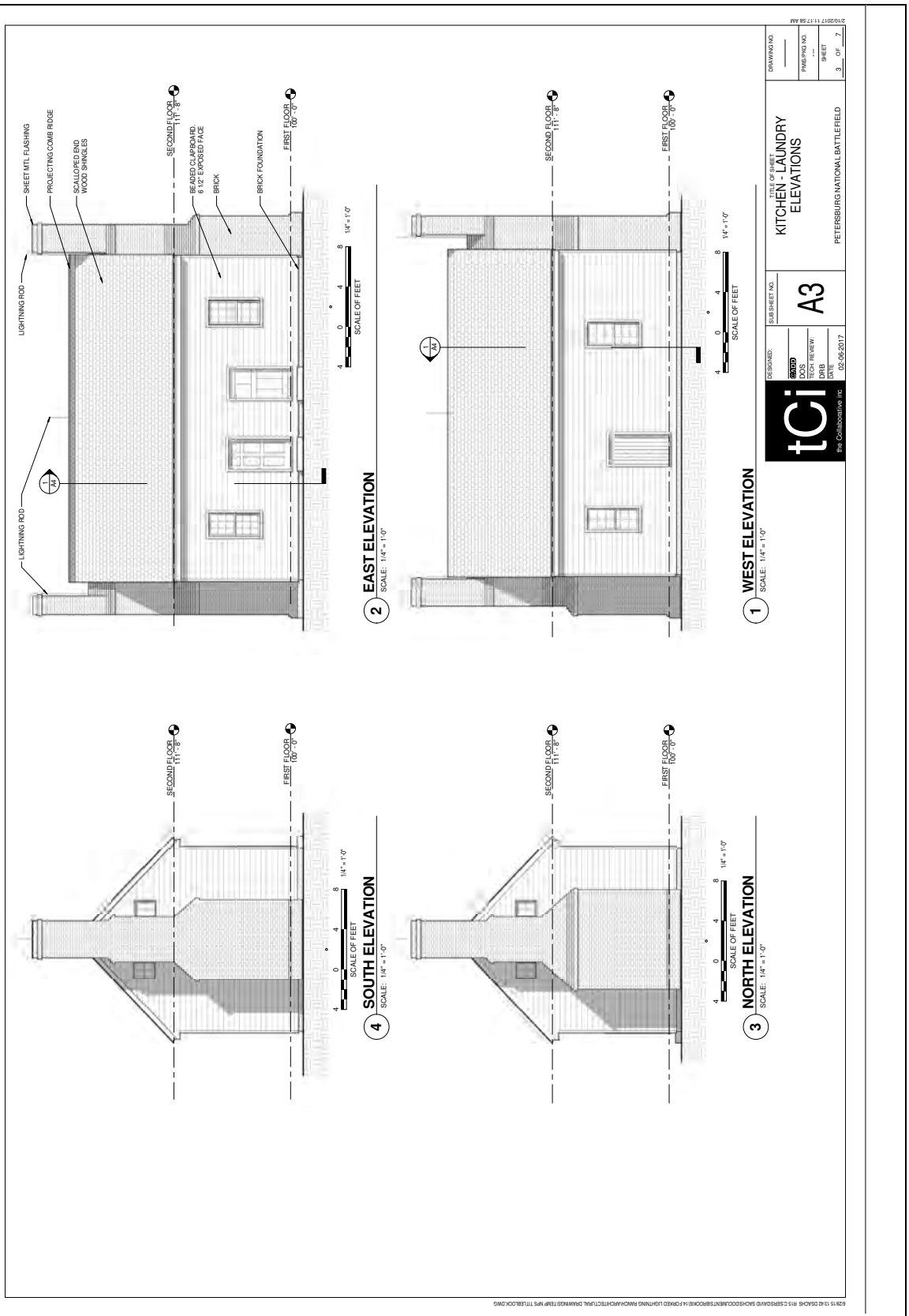


Figure 16: Sheet A3—Kitchen-Laundry Elevations

Figure 17: Sheet A4—Kitchen-Laundry Sections, Details

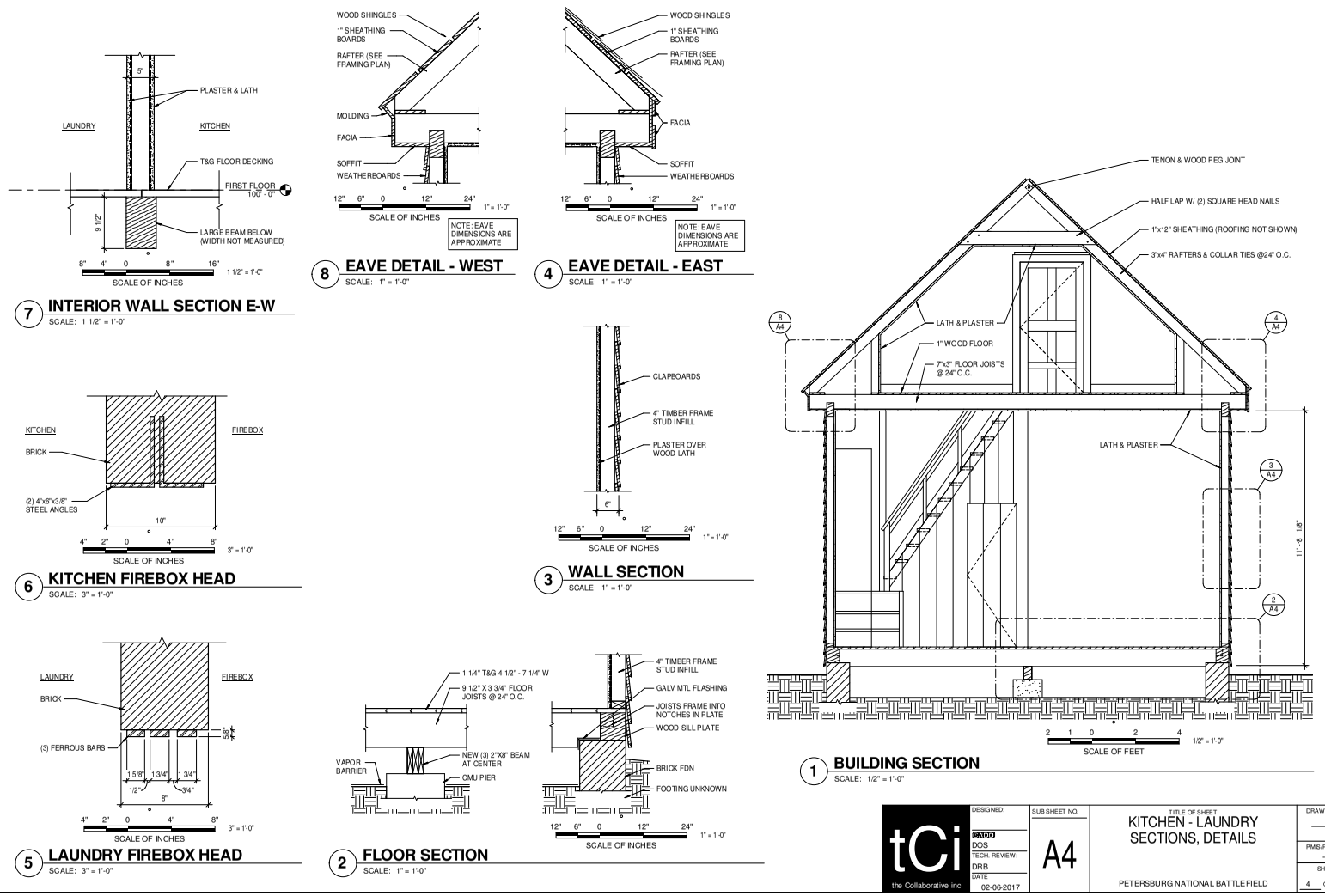


Photo 15 (JDF2089): Kitchen-Laundry: North elevation.

Photo 16 (JDF2090): Kitchen-Laundry: East elevation.

Photo 17 (JDF2091): Kitchen-Laundry: Southeast view.

Photo 18 (JDF2092): Kitchen-Laundry: Southwest view.

Photo 19 (JDF2093): Kitchen-Laundry: West elevation.

Photo 20 (JDF2140): Kitchen-Laundry: First story, south room, south elevation.

Photo 21 (JDF2141): Kitchen-Laundry: First story, south room, west elevation.

Photo 22 (JDF2142): Kitchen-Laundry: First story, south room, north elevation.

Photo 23 (JDF2143): Kitchen-Laundry: First story, south room, east elevation.

Photo 24 (JDF2144): Kitchen-Laundry: First story, south room, ceiling, east half.

Photo 25 (JDF2145): Kitchen-Laundry: First story, south room, ceiling, west half.

Photo 26 (JDF2146): Kitchen-Laundry: First story, south room, east half of floor.

Photo 27 (JDF2147): Kitchen-Laundry: First story, south room, west half of floor.

Photo 28 (JDF2148): Kitchen-Laundry: First story, Stairs up to second floor.

Photo 29 (JDF2149): Kitchen-Laundry: Stairs in progression.

Photo 30 (JDF2150): Kitchen-Laundry: Stairs in progression.

Photo 31 (JDF2151): Kitchen-Laundry: First floor, north room, looking at south elevation.

Photo 32 (JDF2152): Kitchen-Laundry: First story, north room, west elevation.

Photo 33 (JDF2153): Kitchen-Laundry: First story, north room, north elevation.

Photo 34 (JDF2154): Kitchen-Laundry: First story, north room, east elevation.

Photo 35 (JDF2155): Kitchen-Laundry: First story, north room, north half of ceiling.

Photo 36 (JDF2156): Kitchen-Laundry: First story, north room, south half of ceiling.

Photo 37 (JDF2157): Kitchen-Laundry: Second story, center section, east.

Photo 38 (JDF2158): Kitchen-Laundry: Second story, center section, east wall to ceiling.

Photo 39 (JDF2159): Kitchen-Laundry: Second story, ceiling over stairs.

Photo 40 (JDF2160): Kitchen-Laundry: Second story, continued view of ceiling over stairs.

Photo 41 (JDF2161): Kitchen-Laundry: Second story, center section, north wall, west.

Photo 42 (JDF2162): Kitchen-Laundry: Second story, center section, north wall, east.

Photo 43 (JDF2163): Kitchen-Laundry: Second story, center section, north wall, at stairs.

Photo 44 (JDF2164): Kitchen-Laundry: Second story, center section, south wall, west.

Photo 45 (JDF2165): Kitchen-Laundry: Second story, south room, south elevation.

Photo 46 (JDF2166): Kitchen-Laundry: Second story, south room, west elevation.

Photo 47 (JDF2167): Kitchen-Laundry: Second story, south room, north elevation.

Photo 48 (JDF2168): Kitchen-Laundry: Second story, south room, east elevation.

Photo 49 (JDF2171): Kitchen-Laundry: Second story, north room looking south at south elevation.

Photo 50 (JDF2172): Kitchen-Laundry: Second story, north room looking south at west elevation.

Photo 51 (JDF2173): Kitchen-Laundry: Second story, north room looking south at north elevation.

Photo 52 (JDF2174): Kitchen-Laundry: Second story, north room looking south at east elevation.

Photo 53 (JDF2175): Kitchen-Laundry: Second story, north room looking south at east elevation.

Photo 54 (JDF2176): Kitchen-Laundry: Second story, north room looking at north half of ceiling.

Photo 55 (JDF2177): Kitchen-Laundry: Second story, north room looking at south half of ceiling.

Photo 56 (JDF2178): Kitchen-Laundry: Second story, north room looking at south half of floor.

Photo 57 (JDF2179): Kitchen-Laundry: Second story, north room looking at north half of floor.

Record of Repairs and Alterations

The Kitchen-Laundry was the subject of two projects. The 1980 renovations, for which one key drawing and some specifications exist, were completed by a private contractor—The Arthur Painting Company—between June and October 1980. On June 5, 1980, Lucia C. Camper, Administrative Technician for the NPS had written the following comment on the Individual Building Data sheet for the Kitchen: "…the plaster in these high-ceilinged first floor rooms is ruined."

1980 Project

Work Summary Summer Kitchen—1980

1. *Rebuild each chimney from the roof up, cap with flagstone set into lime mortar bed.*
2. *Replace broken, spalled, or otherwise defective bricks with new bricks matching the original in size and color.*
3. *Following the removal of defective face brick, grout interior voids with lime mortar to provide a solid back-up for new brick.*
4. *Repoint all chimney brickwork with lime mortar. Match existing joint color, texture & thickness.*
5. *Carefully remove plant growth from brick chimneys.*
6. *Replace existing lintels with two "L" shaped steel angles and rebuild deflected brickwork immediately above. Remove pipe col's.*
7. *Repoint surrounding masonry at north and south fireplace openings on first and attic floors only as necessary.*
8. *Remove remaining traces of white wash using a soft fiber brush.*
9. *Repair existing door sill. Replace existing material only as necessary.*
10. *Patch and repair gable porch hood [west elevation, now removed] and supporting struts. Replace unsound wood timbers. Install metal flashing.*
11. *n/a [instruction for summer house, now removed]*
12. *n/a [instruction for summer house, now removed]*
13. *n/a [instruction for summer house, now removed]*
14. *Remove existing wood shingles, repairing and/or replacing defective shingle lath, sheathing and roof framing as necessary.*
15. *Provide and install cedar shingles which match existing shingle dimensions, shape and weather exposure.*
16. *As shingles are laid, shingle in asbestos felt strips between each course.*
17. *n/a [instruction for summer house, now removed]*
18. *Patch existing comb ridge detail.*
19. *Match existing hip joint detail.*
20. *Remove wood strips, repair window frame as necessary.*
21. *Remove composition board, repair existing frame and sash.*
22. *Reusing existing hardware, rehang door to make operable.*
23. *Patch and repair existing door.*

The 1989-1990 renovations were completed by the Williamsport Preservation Training Center (WPTC) Day Labor Crew for which there are some limited documents such as a Project History completed by Craig S. Struble, Exhibits Specialist, Project Leader, WPTC, April 1990. Several photographs were found and are provided after the work description for the 1990 project. The project history described the work completed, materials used, and processes followed.

1989-1990 Project

The shoring system used by WPTC to support the load bearing walls utilized needle beam system which pinched the studs and penetrated through the walls at the baseboards. This approach was used to minimize destruction of the plaster walls and eliminate holes from mechanical fasteners in the wall studs. It was hoped that some of the deflection in the middle of the east and west walls could be raised by jacking with this system. This was rejected when attempts to lift the wall began to jeopardize the integrity of the plaster on the interior.

The construction sequence involved shoring the building one side at time to support the walls and removing three courses of brick from the foundation walls below. The resulting space allowed for the removal and reinstallation of the new sills. This provided for alignment/engagement of the stud tenons to the sill mortises. About 90% of the former foundation brick was used to rebuild the foundation walls up to the sill bottoms.

The problem of procuring oak and yellow pine timbers sized to fit differing dimensions was overcome by sawing all of the timbers on site with WPTC's portable saw mill. Advance procurement for the timbers was completed by the park and arrived a month after the start of the project. All of the original floor joists, which were pit sawn on two sides and hewed on two sides were replaced with the exception of three. An average dimension was selected for the height and width of the six oak sills to overcome the problem of fitting machine cut timber in a space formerly occupied by timbers of uneven dimensions. The height of the original sills varied as much as 1½" across the length.

For this reason, the final course of brick relayed midspan on the East and West elevations are half of their original thickness due to the deflection in the framing above.

A brick root cellar was discovered by the park during the demolition of the contemporary flooring in the south room prior to WPTC's involvement. Initially, a trap door was to be installed in the flooring for interpretive purposes. This was not completed so that planning considerations regarding lighting, hatch opening location and coordination of exhibit design features could be finalized. In anticipation, the floor joists spanning the root cellar where hand sawn with a pit saw at Colonial Williamsburg to replicate the sawed surfaces of the original joists.

Establishing adequate ventilation and access to the crawl space was another concern. This was accomplished by reducing the dirt floor level and installing four vents in the North and South elevation foundation walls. The resulting 18" space beneath the floor joists increased air flow and provided clearance for termite inspection purposes. WPTC was commended by the Regional Archeologist for its efforts in recovering artifacts during the removal of dirt and sensitivity toward protecting important archeological features.

Work Summary Summer Kitchen—1989-1990

1. *Replaced oak sills around perimeter of building and replaced mortice and tenon joinery from existing sills.*
2. *Replaced 11 of the 16 floor joists with replacement in kind yellow pine lumber.*
3. *Installed lead coated copper (termite shields) at all wood to masonry surfaces: sill plates, rafter hearth intersections and root cellar.*
4. *Removed and relayed the top three courses of the brick foundation wall on all elevations.*

5. *Excavated dirt from the interior of the building to create a crawl space and installed a 6 mil. vapor retarder.*
6. *Installed four crawl space vents on the north and south elevations.*
7. *Fabricated and installed a CCA pressure treated laminated beam at mid span for supplemental floor joist support. (beams run north to south)*
8. *Fabricated and installed yellow pine flooring in first floor North and South rooms. Top surfaces were hand planed and two coats of tung oil applied as a finish.*
9. *Incorporated a trap door into south room closet flooring for access to crawl space area.*
10. *Replaced door sills and added thresholds to the three entrance doors. Fabricated sealed flashing pan out of lead coated copper to protect oak sill plates.*
11. *Rebuilt both brick hearths and foundations in the North and South rooms to match existing second floor hearths.*
12. *Completed selected repairs to the vertical timber stud bottoms at the Northeast door, West door, and both East elevation corner studs.*

- Foundation: The 1980 work did not call for any work to be done on the foundation. It did call for masonry work on the exterior chimneys so masons who would have been on site might have been issued a change order (none found as yet) for pointing. The later floor structure replacement of 1989-1990 interacted with the foundations—perimeter and chimney—to a minor extent and the project noted the installation of supplemental pier supports. On February 5, 1990, additional structural repairs were authorized: "1) Vertical timber frame repairs [location not noted]…3) structural masonry support for the center partition wall.4) rebuilding the hearth foundation boxes." The limits of project were described as follows:

Limits of Project

1. Buildings: Repairs to forst (sic) floor area of historical structure including brick foundation, crawl area, perimeter sill joists, flooring and fireplace hearths. Lower exterior siding and door sills were also affected Approximately 575 square feet floor area.

The 1989-1990 work was quite extensive in that the work raised the entire building, removed the brick foundation (three courses), and at the later portion of the construction—after the sill beam and floor structure construction was complete—relaid the brick foundation and installed a lead coated copper termite shield prior to lowering the building. Ninety percent of the bricks were determined capable of being relaid, per the project report. The report did not indicate any testing of brick and results thereof so it is likely the re-use decision was made in the field without the benefit of test data. Additional work related to the foundations and completed as part of this project included: *6. Installed four crawl space vents on the north and south elevations* and *11: Rebuilt both brick hearths and foundations in the North and South rooms to match existing second story hearths.*

- Wall structure: Given the replacement of wall weatherboards on the exterior in select locations where rot was visible, the wall structure would have been exposed in part (see photos on the following pages). Inspection might have indicated work to be done but no documents have been found as yet indicating wall structure repairs. The 1990 project stated repair work being completed on "vertical timber frame." The vertical members were repaired as follows: *12: Completed selected repairs to the vertical timber stud bottoms at the Northeast door, West door, and both East elevation corner studs*, and the oak sill was replaced, *1: Replaced oak sills around perimeter of building and replaced mortice and tenon joinery from existing sills.*

Photo 58: Kitchen-Laundry 1990 Work Documentation 1. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 59: Kitchen-Laundry 1990 Work Documentation 2. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 60: Kitchen-Laundry 1990 Work Documentation 3. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 61: Kitchen-Laundry 1990 Work Documentation 4. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 62: Kitchen-Laundry 1990 Work Documentation 5. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 63: Kitchen-Laundry 1990 Work Documentation 6. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 64: Kitchen-Laundry 1990 Work Documentation 7. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

Photo 65: Kitchen-Laundry 1990 Work Documentation 8. Source: Petersburg National Battlefield Resource Management Records, Series 7, Subseries B: Photographic Records, PETE 20003, Box 36 of 38.

- Wall weatherboards: The exterior siding of lapped weatherboards were not specifically called out in 1980 for replacement. However two references are present as tasks #20 and #21 of the 1980 work summary, which logically would require some weatherboard replacement. Task #20 —*Remove wood strips and repair window frame as necessary*—is tied to the south elevation southeast second story window. Task #21—*Remove composition board, repair existing frame and sash*—is tied to the north elevation northeast second story window. The references to wood strips and to composition board is confusing, however any repair of deteriorated window frames would likely include repair of the adjacent weatherboards. The 1990 work describes "lower exterior siding" as being "affected." Scope (how many and where) was not defined. The work-in-progress photographs do show the areas of removed weatherboards, east elevation.

- Moldings: There was no work called out in the 1980 scope for moldings although work was called out for work on the now removed projecting hood over the west elevation door. When the hood was removed is not as yet known.

- Doors: The 1980 project called out work for both doors of the east elevation: the southeast door's threshold (sill) was to be repaired, and the northeast door was to be rehung to make operable and patch and repair (not specified as to what type of repairs). The1990 work included sill joists replacement and this work also included removal and replacement of the door thresholds: *10: Replaced door sills and added thresholds to the three entrance doors. Fabricated sealed flashing pan out of lead coated copper to protect oak sill plates.*

- Windows: Only the frames of the two upper windows and sash of the northeast window was specified for repairs in 1980. The specific repairs were not described.

- Roof structure: none

- Roofing: Task notes #14-16, and #18 of the 1980 project indicate total replacement of the wood shingle roofing with cedar shingles to match. The descriptions include repair to existing "shingle lath."

- Chimneys: The work on the two exterior chimneys is covered in the 1980 notes #1-5 and note #8. Called for are removal of all plant growth, rebuilding both chimneys from the roof up, topping with flagstone, removal of the whitewash of the surface, replacement of damaged brick, and pointing "all chimney brickwork with lime mortar." This job was not completed correctly with lime mortar, the presently visible Portland cement mortar was installed and was the subject of NPS complaint. As seen in the mortar analysis and Schmidt Type PM pendulum hammer based evaluation, numerous locations exhibit the inappropriate pointing mix. The 1990 scope does not specifically call for work on the exterior chimneys, however it does state the lead coated copper was installed between the rafters and the hearths (#3. *Installed lead coated copper (termite shields) at all wood to masonry surfaces: sill plates, rafter hearth intersections and root cellar*). Currently, there is copper flashing between the chimneys and the wood for the entire height of the joint, more than seemingly was specified.

Kitchen-Laundry Interior:

- "Fireplace/chimney fronts: In 1980, a new lintel was installed in the kitchen fireplace, composed of a back to back pair of angle irons per the specifications. Reconstruction of the

area above the lintel was also requested. Pointing with lime mortar of both fireplace fronts was set out."

- "Walls: No work was described for the walls in the 1980 project. The 1990 work was *12: Completed selected repairs to the vertical timber stud bottoms at the Northeast door, West door, and both East elevation corner studs."*

- "Floors: No work was described for the floors in the 1980 project. The 1990 work completed extensive work on both the flooring and the floor structure: #2: *Replaced 11 of the 16 floor joists with replacement in kind yellow pine lumber*; #7: *Fabricated and installed a CCA pressure treated laminated beam at mid span for supplemental floor joist support [beams run north to south]*; #8: *Fabricated and installed yellow pine flooring in first story North and South rooms. Top surfaces were hand planed and two coats of tung oil applied as a finish;* and #9: *Incorporated a trap door into south room closet flooring for access to crawl space area.*"

- Ceiling: No work was described for the ceilings in the 1980 project.

- Doors: No work was described for the interior doors in the 1980 nor the 1990 project.

- "Systems: There are no building systems present other than motion detectors inoperable and smoke alarms (untested) and the time period for their installation is not currently known. A small amount of electrical wiring was installed in the crawl space in the 1989-1990 work. It is inoperable; not connected.

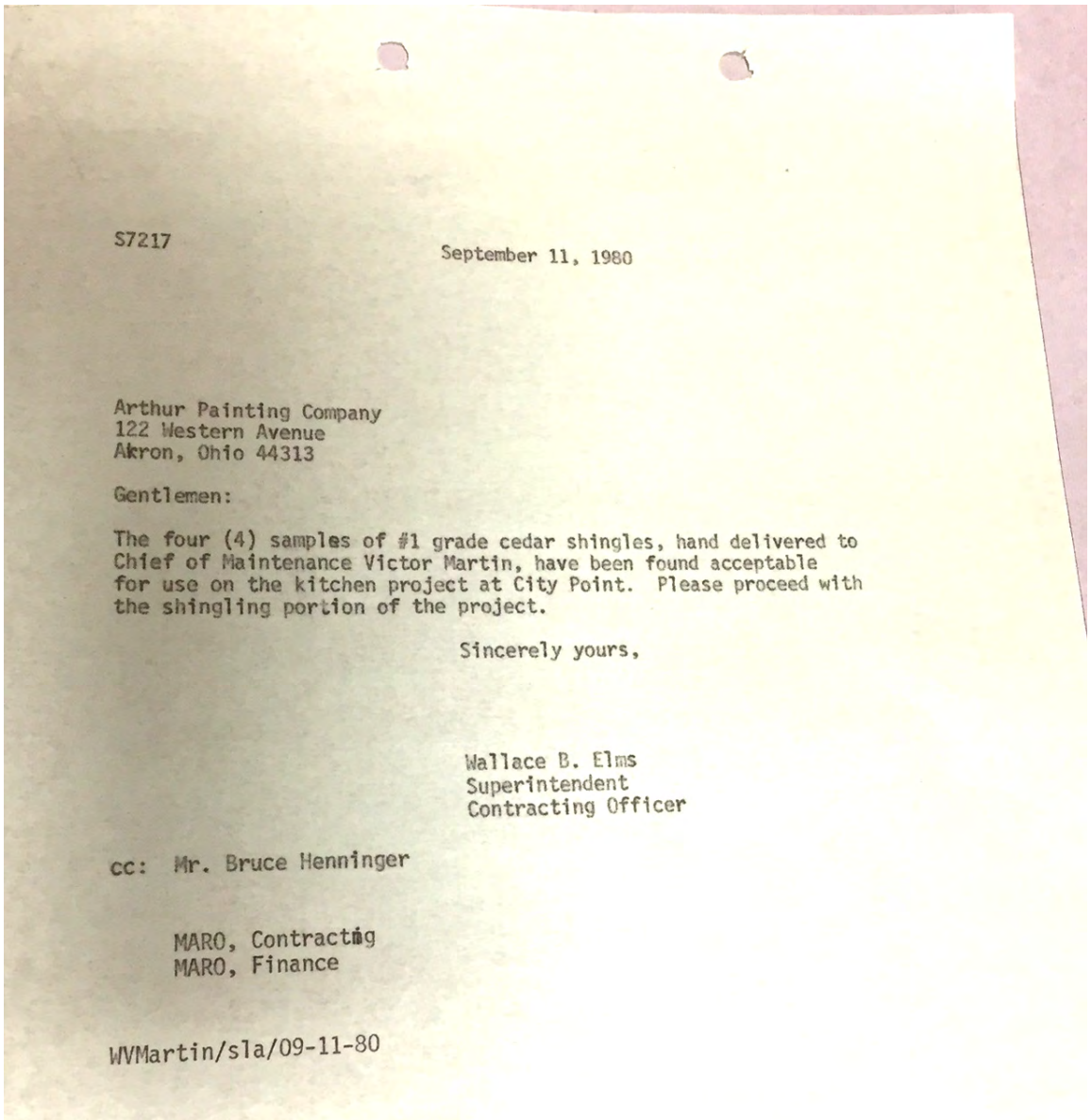
  Lightning protection installed per 5/22/1980 bid request and specifications. There is both physical evidence and written documentation that the building had electricity and lighting. In the second story south room, there is a short section of exposed knob and tube wiring and one porcelain ceiling socket. In an expense report prepared by Elise Eppes Cutchin for the Board of the Appomattox Manor Foundation for the period May 1, 1964-May 1, 1965, an expense is noted: "Improvement (Lights in Dairy and Smokehouse) $90.00". There is no evidence of wiring in the other buildings, and none of the three has electrical service. It is supposed that electrical wiring existed for these buildings and was removed. As public access is not allowed for the second story of the Kitchen-Laundry building, this may provide a rationale for the removal of wiring from the first story, the Dairy, and the smokehouse (new as old was probably used for storage) to provide a more authentic period sense of place for visitors. The removal of electrical supply, panels, wiring, and lighting was completed by the National Park Service in the 2010 work."

Description and Condition of Elements
The materials of the Kitchen-Laundry are wood shingles, wood roof sheathing, wood rafters, wood weatherboards as siding, wood timbers as wall construction, wood fascia/soffit, wood moldings, wood entry doors, wood windows, wood plank floor, wood floor structure, wood lath interior ceilings and wall finishes, plaster over lath, metal door and window hardware, metal lintels at fireplaces, cast metal (iron) fireplace insert, brick hearths/fireplaces/chimneys, brick foundation, and concrete piers. The exterior is coated with paint and the interior has lime-based whitewash.

Roofing
Description: The Kitchen-Laundry has a gabled roof form with the ridge running north south. It has a projected comb ridge with the shingles extending up and over the ridge line from the west

slope. There are eaves on the east and west elevations and none on the north and south. The wood shingles have a semi-scalloped lower edge, also referred to as a "round butt." The shingle thickness generally appears to match that of the New Smokehouse and the Old Smokehouse. There are 30 rows of 101 shingles each for a total of 3,030 shingles per slope. Each shingle has a 6-inch exposure, a 5-inch width (another 1/8 inch including the gap), and an 18-inch length. The exposure to overall length relationship results in a triple layer roof.

In 1980, the form 10-768 noted "Roof: Gabled covered with wood shingles." Accompanying the form are photographs that appear to show the roof with wood shingles. The drawing called for replacement of the existing wood shingles with new wood cedar shingles, in-kind: shape, size, and exposure. Further communication indicated the shingles to be installed were #1 grade cedar (see figures 18 and 19).



S7217

September 11, 1980

Arthur Painting Company
122 Western Avenue
Akron, Ohio 44313

Gentlemen:

The four (4) samples of #1 grade cedar shingles, hand delivered to Chief of Maintenance Victor Martin, have been found acceptable for use on the kitchen project at City Point. Please proceed with the shingling portion of the project.

Sincerely yours,

Wallace B. Elms
Superintendent
Contracting Officer

cc: Mr. Bruce Henninger

MARO, Contracting
MARO, Finance

WVMartin/sla/09-11-80

Figure 18: Source: Petersburg National Battlefield Resource Management Records, Park Central Files: Supplies, Procurement and Property, PETE Catalog Number 20003, Box 10, Folder 2.

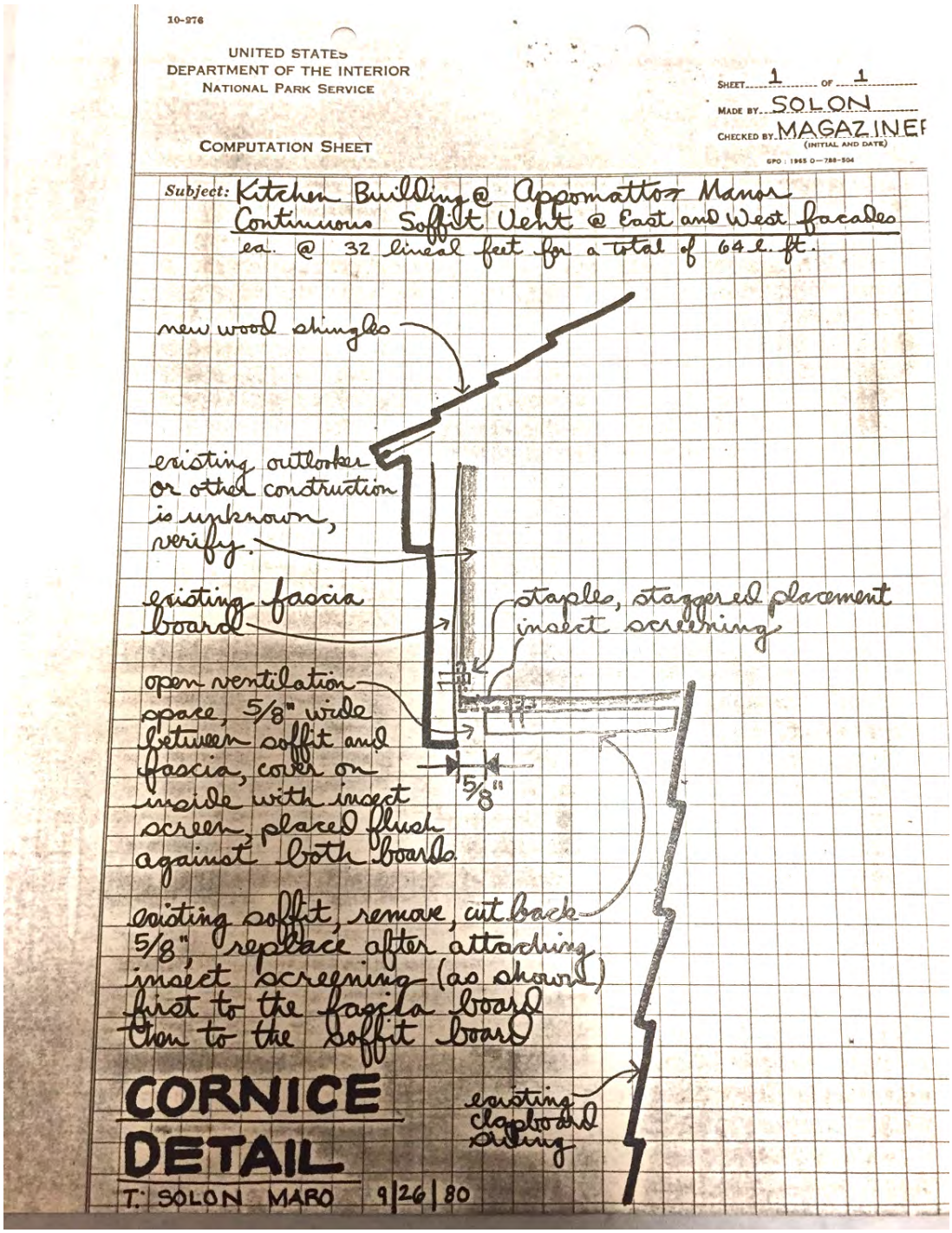


Figure 19: Source: Petersburg National Battlefield Resource Management Records, Park Central Files: Supplies, Procurement and Property, PETE Catalog Number 20003, Box 10, Folder 2. Proposed "cornice" modification is not verified as having been implanted.

Condition: The overall condition of the shingles is good. There are five shingles missing from the east slope and only one from the west slope at the projected comb ridge. Paint loss in excess of 25% of exposed surface is present for 3.5% of the east slope shingles and less than 1% of the west slope shingles. Cupping, splits, and edge loss condition were not observed for either slope.

However, observed were individual shingles exhibiting a lifted condition, by example, 30 on the west slope. The cause was not determined.

Given the favorable condition of this roof relative to the others, the question arises as to whether all roofs were completed at the same time, to the same specifications, by the same tradespersons, and/or whether this roof has been subject to a higher degree of maintenance than the other three. Typical maintenance procedures would be: refastening loose shingles, painting, and replacing missing or damaged shingles.

Roof Structure
Description: Rafters, at approximately 24 inches on center, are attached to a raising (false) plate attached to the floor joists that overhang the top plate. The floor joists are believed to be through-lapped with the top wall plate and extend approximately 9 inches beyond the plate to form the overhangs on the east and west elevations. The 3 x 4 inch rafters meet at the ridge with a mortise and tenon joint that is pinned with a wooden peg. The connection between rafters and the raising plate is unknown. A 3 x 4 inch collar tie is half-lapped into the rafters approximately 6½ ft. above the floor surface and secured with two square-headed nails (where observed). Roof sheathing is 1 x 12 inch planks with ¼-inch to 1-inch gaps between members. The small ceiling, raked rafters and knee walls are finished on the interior with wood lath and plaster.

Photo 66 (DW0739): Wall and roof structure—hewn timbers and sawn timbers with mortise and tenon joints with wood peg fasteners.

Saw marks on the sides of some of the roofing members could have been the result of being produced by either a pit sawn method or a sawmill using a blade with up and down motion, rather than a circular saw blade. The history of early sawmills in Virginia is presented in the Sidebar/Sawmills on pages 245 to 250.

Condition:
The roof framing was visible through a damaged area of the ceiling in the southern room of the half story. The roof framing (where viewable) is in good condition. Similarly, the roof sheathing is in good condition with some staining indicating previous moisture intrusion. This staining is typically near the ridge.

Roof Appurtenances
Brick Chimneys Description: The two fired-clay masonry chimneys, on the north and south elevations, are constructed with different details, indicating they may not have been built at the same time or perhaps built by different masons. Bricks on the south chimney are typically 8⅜ to 8¾ inches in length, 2⅛ to 2¼ inches high, and 4⅛ to 4¼ inches wide. Typical dimensions for the brick on the north chimney are slightly different at 8¾ - 8⅞ x 2 - 2⅛ x 4 - 4¼ inch (l x h x w). Lintels on the south fireplace opening consist of three ferrous bars approximately 1¾ inches wide by ⅝ inch deep that span the nearly 60-inch wide opening. The original lintel for the north fireplace has been replaced with two back-to-back 4 x 6 x ⅜ inch steel angles oriented with the longer legs vertical.

Photo 67 (DW0598): Lintel for south fireplace is three ⅝" x 1 ¾" ferrous bars supporting the masonry across a span of 59 ½". The lintel has deflected ½" at mid-span.

Brick Chimneys Condition: There are three major causes of brick loss: thermal expansion and contraction cycles, freeze-thaw cycles, and salts formation appearing as efflorescence at the surface and indicating sub-florescence below the surface. The overly hard mortar, in conjunction with soft brick tends to break down the brick from the applied pressure of thermal cycles. The

preference is for a mortar with enough softness to accommodate the small increments of size change due to heat and cold. Water can enter the masonry's brick and mortar and, if trapped, it will freeze. When it freezes, water expands in size, thereby causing damage to brick and mortar. Soft mortars, typically lime based, allow for evaporation and release of water. Hard mortars, which typically are Portland cement based, do not release the water as effectively and trap water. Efflorescence indicates the presence of salts, appearing on the surface of the masonry as light colored crystals. The crystals form at moisture percentages of between 3 and roughly 8. Higher than 8% keeps the salts in solution. The crystallization of salts within the masonry is the expansive force that can destroy the bricks and mortar. This below surface salts crystallization is called sub-florescence or cryptoflorescence.

The effect of these forces on the brick is determined in part by the quality of the brick. Low-fired bricks often have incomplete vitrification of the clays, resulting in a weak matrix and greater porosity. The lower firing temperatures also result in the brick's face being harder than the body of the brick as it was exposed to higher temperatures for a longer time. When the three forces described above work individually, or in concert, the brick face can become separated from the body and be lost.

The causes of these forces can be mitigated by keeping water from concentrating in the masonry, and in using mortar with ultra-low salt content and an appropriate softness. Keeping surface water away from the brick masonry reduces capillary action of the lower bricks in absorbing salt from the ground. Ground water is more difficult to redirect. Unfortunately, the number of bricks with face losses is typically lower than the number where the face is loose. During brick masonry repairs it is important to test for face attachment by tapping with a small hammer to listen for a thump rather than the ring of a cohesive brick. As a rule, there are always many more bricks with partially detached faces than there are with fully detached faces.

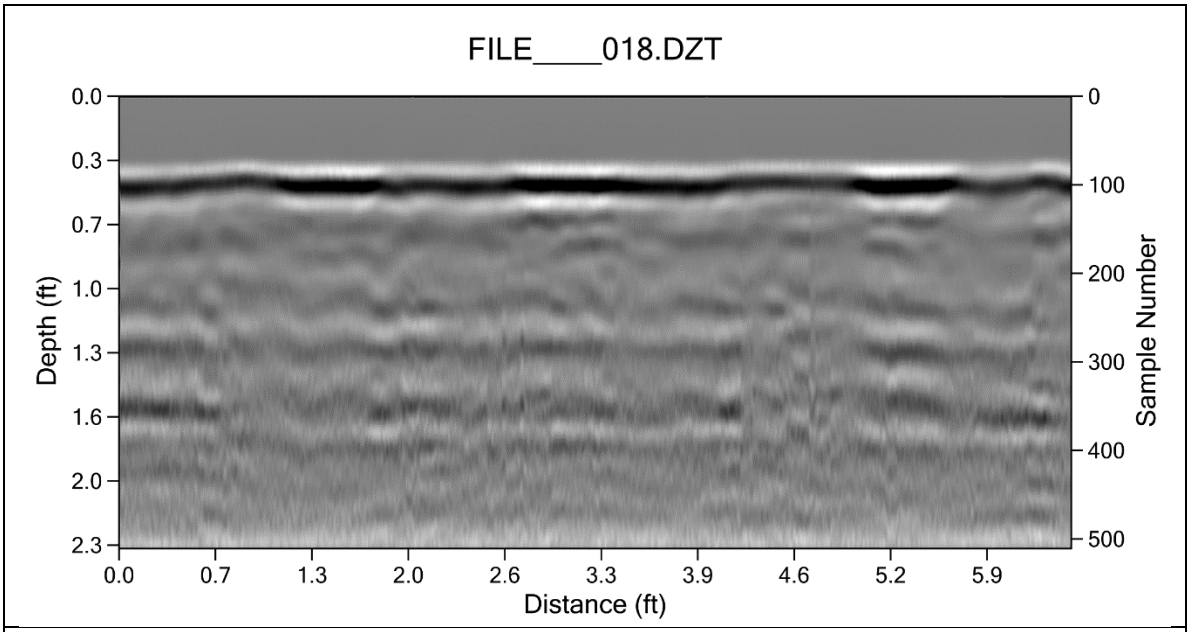


Figure 20: Horizontal scan above firebox from west to east in Laundry from the interior. Image shows first collar joint (faint) and second and third collar joints (1.25 ft. and 1.6 ft. on Depth scale).

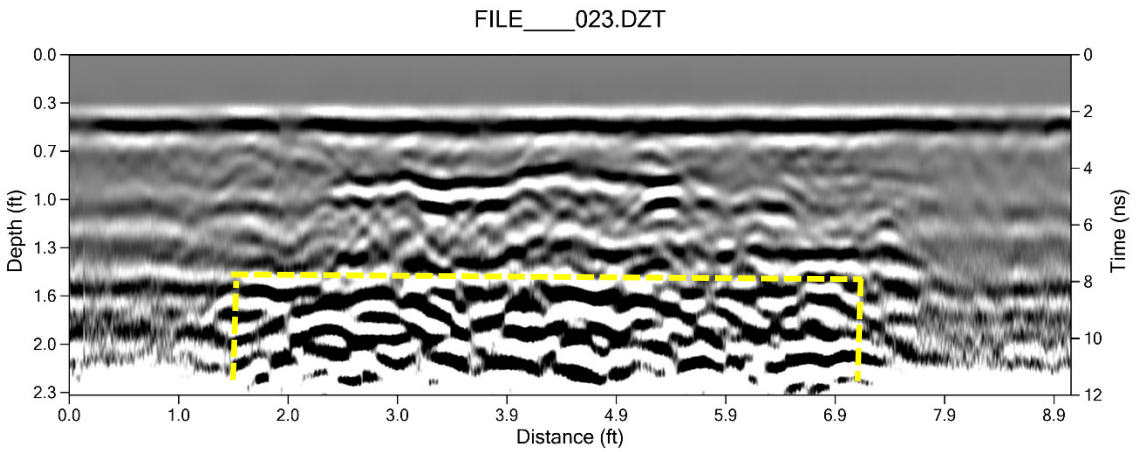


Figure 21: Horizontal scan of the north chimney from the exterior. The scan is approximately 2 ft. above grade. The center of the scan shows an open collar joint at a depth of 0.8 ft. and reflections from the firebox at a depth of 1.7 ft. and approximately at the 2 to 7 ft. distance (dashed yellow lines) on the horizontal scale.

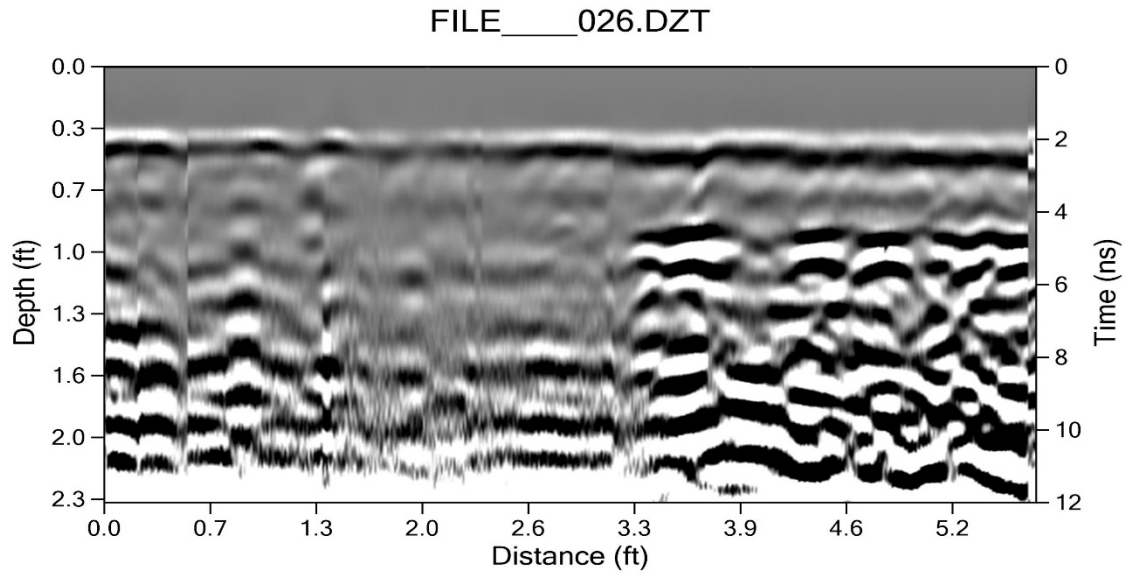


Figure 22. Vertical scan on east side of the north fireplace opening from the interior. The scan begins (at left) approximately 1 ft. above the floor. The transition at approximately 3.3 ft. indicates the area where the masonry was rebuilt when the new lintels were added. The first collar joint is inconsistently filled from course to course.

Lightning Protection System Description: Lightning rods and cables provide the lightning protection for the Kitchen-Laundry. There are three rods mounted: on each of the two chimneys and at the midpoint of the ridge. The grounding cables enter the ground at the northwest and southwest corners. The conductor cables are of woven metal.

Lightning Protection System Condition: The conductor cables at the ground level have had several of the wires cut that make up the diameter of the cable. The likely cause is the lawn-mowing operation. The cables are not protected from grass-cutting equipment.

Photo 68 (JDF2233 cropped): Close-up view of lightning cable on the ground level at one of the corners of the Kitchen-Laundry building. Note the cut wires. The likely cause of the cut wires is lawn-mowing equipment.

Walls Structure
Description: The overall framed wall cross-section thickness is 6 inches in the laundry and approximately 6½ inches in the kitchen walls. These dimensions include the exterior clapboards and the interior lath and plaster.

Condition
The condition of the wall structural members could not be evaluated due to the interior sheathing. Presumably, the work done by the NPS in 1995 (now over 20 years ago) replaced all moderately and severely deteriorated members. Photographs from the 1989-1990 in-progress work do show damage to the faces of the corner columns of the northeast and southeast.

Fascia /Soffit/Molding
Description: The east and west elevations have boxed eaves consisting of a simple soffit board and simple fascia board. On the east elevation, the joint between wall and soffit is without any molding or cover board; at the west elevation, the joint is covered by an extra partial

weatherboard that extends over the corner board. (see photo 2092 closeup). The upper joint of the fascia to the underside of projecting roof sheathing also differs between the two elevations: the east's molding is flat against the face of the fascia, the west's molding is angled. The boxed eave ends are covered by gable end weather boards. These joint cover moldings are all plain one by stock, as is the trim at the rakes of the north and south gable end elevations, under the roof shingle extensions. Plain stock of 1x4" equivalent dimensions has been used for door casings and window casings of the first story, with the corner bead on the corner of each board closest to the opening. The second story has no window casings. The four window frames have the equivalent to weatherboards as covers with the beaded edge set even with the outer wall face plane.

Photo 69 (JDF2092 cropped): Where the west elevation joins the south elevation, the joint is covered by an extra partial weatherboard that extends over the corner board, forming the closure of the end of the boxed eave. Note the presence of the lightning protection conductor cable.

The corner boards are of equivalent 1x4 dimension with a bead planed into one edge. The long dimension runs along the long elevations, and the edge is in plane with the gable elevations.

Condition: The fascia, soffit, rake moldings, and casings are in good condition. The second story windows are set into an area where moisture problems are significant (see photo 2215). The window frame and covering boards exhibit rot, particularly for the two windows on the north elevation, the northeast of the pair is quite deteriorated as can be observed in the photograph.

Photo 70 (JDF2215): Kitchen-Laundry: Deterioration of window frame and sill, northeast window.

Wood Weatherboards

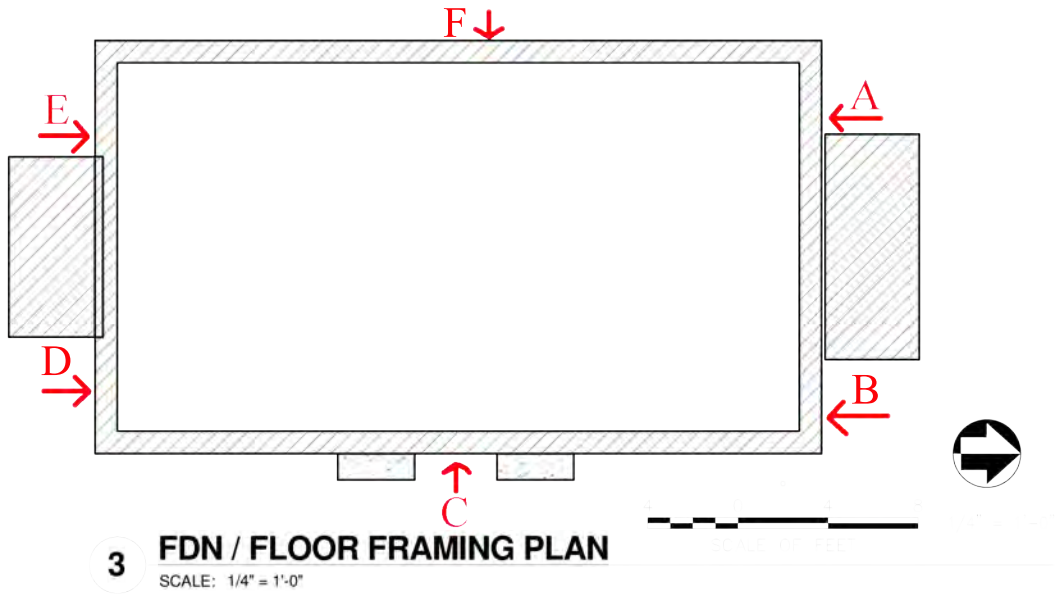
Description: The wood weatherboards on the Kitchen-Laundry appear to be similar in configuration to those of the Dairy and New Smokehouse. The backside of the weatherboards—the interior facing surface—is not visible to thereby allow visual confirmation of the lap dimension and thus the overall width dimension. Above the windows and door openings, to cover the long dimensions (32 feet, 3 inches) of the east and west elevations, each row typically has two boards, and the butt joints are staggered row to row.

By example, the third row from the top on the east elevation weatherboard is almost 19 feet, 6 inches in length. The significant length of the individual weatherboards, and the limit to just one butt joint per row, are important character defining features and are integral in defining the preservation approach for replacement. In addition, each butt joint is a potential location of moisture uptake in the end grain, thus, historically this good practice kept the number of butt

joints minimized. The desire to retain historic fabric should be secondary to the appearance of two pieces per row such that where deterioration of an original piece requires by the extent of deterioration of the board replacement rather than spot repair, an in-part (short run) replacement is not recommended. The removed board can be salvaged to allow the sound portions to be used for replacements for the shorter runs of the gable ends, or other areas where shorter lengths are present, such as the short length wall sections between the window and door openings. The exposed portions of the weatherboards average 6.25 inches. Each board has the characteristic bead planed into the lower 5/8 inches. Width is likely to be 8 inches. The boards are face nailed at about 1 inch from the bottom edge with one nail, and a second nail is expected to be under the lap, but the overlapping board's lower nail could serve as the second nail. The bottom board laps over the brick foundation, therefore the lower nail is not present, however a mid-exposure height nailing pattern is visible, which is at the location of the sill timber plate.

Condition:
The observed conditions for areas A-F appear on the following pages.

Figure 23: Weatherboards Condition



KEY PLAN

SKETCH KEY:	CONDITIONS KEY:
A= North elevation west of chimney B= North elevation east of chimney C= East elevation D= South elevation east of chimney E= South elevation west of chimney F= West elevation	CS= Center split, ES= end split, ME= missing edge material, Rot= rot Note on Conditions: end splits mean the condition varies from "significant," where there is separation, to fair condition where there is minimal separation. However, end splits will lead to rapid deterioration by rot so all weatherboards with end splits have been rated as poor.

Notes:
1. Gable ends have 37 boards of which 15 are above the wall top plate and 22 at and below.
2. Numbers assigned to weatherboards begin at the top of the elevation

Continued on next page

Figure 23 (cont.)

A North elevation west of chimney	*B North elevation east of chimney*
1—Obscured, behind chimney	1—Good
2—Obscured, behind chimney	2—Good
3—Poor (Rot)	3—Poor (Rot)
4—Poor (Rot)	4—Poor (Rot)
5—Poor (Rot)	5—Poor (Rot)
6—Good	6—Good
7—Good	7—Good
8—Good	8—Good
9—Good	9—Good
10—Good	10—Good
11—Good	11—Good
12—Good	12—Good
13—Good	13—Good
14—Good	14—Good
15—Poor (ES, CS, rot)	15—Poor (Rot)
16—Good	16—Poor (Rot)
17—Good	17—Poor (Rot)
18— Poor (Rot)	18—Poor (Rot)
19— Poor (Rot)	19—Poor (Rot)
20— Poor (Rot)	20—Poor (Rot)
21—Rot	21—Poor (Rot)
22—Good	22—Poor (Rot)
23—Good	23—Poor (Rot)
24—Good	24—Poor (Rot)
25—Good	25—Poor (Rot)
26—Rot	26—Poor (Rot)
27—Good	27—Poor (Rot)
28—Good	28—Poor (Rot)
29—Good	29—Poor (Rot)
30—Good	30—Poor (Rot)
31—Good	31—Poor (Rot)
32—Good	32—Poor (Rot)
33—Rot	33—Poor (Rot)
34—Rot	34—Poor (Rot)
35—Rot	35—Poor (Rot)
36—Rot	36—Poor (Rot)
37—Rot	37—Poor (Rot)

Continued on next page

Figure 23 (cont.)

C East elevation	*D South elevation east of chimney*
1—Good	1—Good
2—Good	2—Good
3—Good	3—Good
4—Poor (ES, CS, EM)	4—Good
5—Poor (ES)	5—Good
6—Poor (ES)	6—Good
7—Poor (ES)	7—Good
8—Good	8—Good
9—Good	9—Good
10—Good	10—Good
11—Good	11—Good
12—Good	12—Good
13—Good	13—Good
14—Good	14—Good
15—Good	15—Good
16—Good	16—Good
17—Good	17—Good
18—Good	18—Poor (ES, CS, Rot)
19—Good	19—Good
20—Good	20—Good
21—Good	21—Good
22—Good	22—Good
23—Poor (2 ES, EM)	23—Good
	24—Good
	25—Good
	26—Good
	27—Good
	28—Good
	29—Good
	30—Good
	31—Good
	32—Good
	33—Good
	34—Good
	35—Good
	36—Poor (ES, Rot)
	37—Good
	38—Good
	39—Good

Continued on next page

Figure 23 (cont.)

E South elevation west of chimney

1—Good
2—Good
3—Good
4—Good
5—Good
6—Good
7—Good
8—Good
9—Good
10—Good
11—Good
12—Good
13—Good
14—Good
15—Good
16—Good
17—Good
18—Good
19—Good
20—Good
21—Good
22—Good
23—Good
24—Good
25—Good
26—Poor (ES)
27— Poor (ES)
28— Poor (ES)
29— Poor (ES)
30— Poor (ES and Rot)
31— Poor (ES)
32—Good
33— Poor (ES and Rot)
34— Poor (ES and Rot)
35—Good
36—Good
37—Good
38—Poor (ES)
39—Poor (ES)

Photo 71 (JDF2230): Kitchen-Laundry: Southwest corner, lower portion.

Photo 72 (JDF2231): Kitchen-Laundry: Southwest corner, upper portion.

Continued on next page

Figure 23 (cont.)

F West elevation

1—Good
2—Good
3—Good
4—Good
5—Good
6—Good
7—Good
8—Good
9—Good
10—Good
11—Good

12—Good
13—Good
14—Poor (Rot, south of south window)
15—Poor (2 ES and Rot, north of north window)
16—Poor (ES)
17—Good
18—Good
19—Poor (ES and Rot on north end)
20—Good
21—Good
22—Good
23—Poor (Rot at door, ME)

Photo 73 (JDF2217): Kitchen-Laundry: Detail on north elevation, east of chimney. The brick courses at photo right are sloping toward the building and, due to the failed caulking of the joint between the flashing and brick, the wall is being soaked. Plus, due to the failed caulking of the joint between top of flashing and the weatherboards, the latter are rotting.

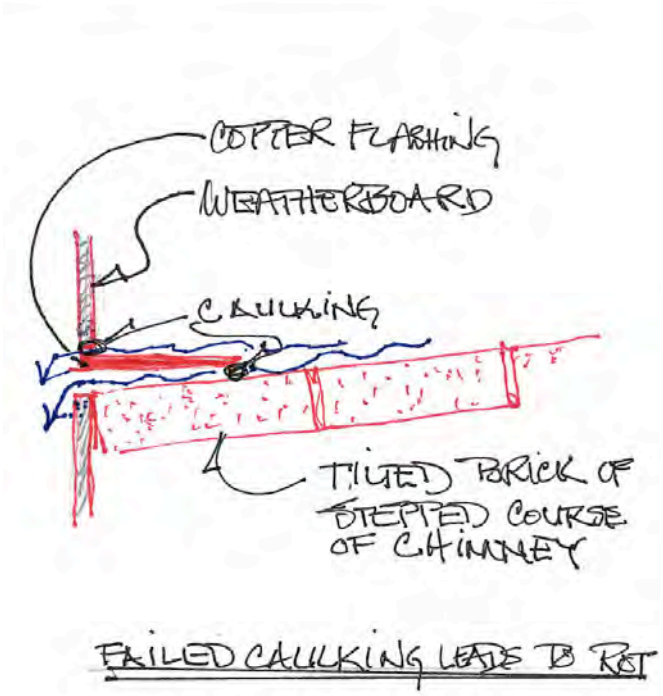


Figure 24: Example showing how failed caulking lets water be in contact wood weatherboards to the point of rot development.

Photo 74 (JDF2229): Kitchen-Laundry: Southeast corner.

Photo 75 (JDF2275): Kitchen-Laundry: South.

The following image illustrates various condition problems of the building's weatherboard siding.

Photo 76 (JDF2232): Kitchen-Laundry: Condition: End split.

Wood Doors
Description and Condition: The door schedule on the following pages identifies each door's number, location, and type as well as its dimensions and condition.

Kitchen-Laundry Door Schedule
Door No./Location
1/First story east elevation, north

Photo 77 (JDF2106): Kitchen-Laundry Door #1: East elevation, north door exterior.

Photo 78 (JDF2133): Kitchen-Laundry Door #1: First story, east elevation, north door interior.

Door 1 (cont.)

Type
Dutch, now fixed

Height
6 ft, 2 in

Width
3 ft, 0 in

Depth
1¼ in ±

Threshold
1x6 wood, no paint left

Frame/Casing
Frame face outside stop on left with striker plate, screen door (?) low

Glazing
n/a

Glazing Putty and Points
n/a

Paint
Partial paint on exterior

Weatherstripping/Fit
No/loss of wood at bottom

Operational
Yes.

Overall Condition
Fair

Other

Hardware
The overall condition of the hardware is fair.

Photo 79: The exterior knob is white porcelain.

Photo 80: The interior knob is Bennington style brown.

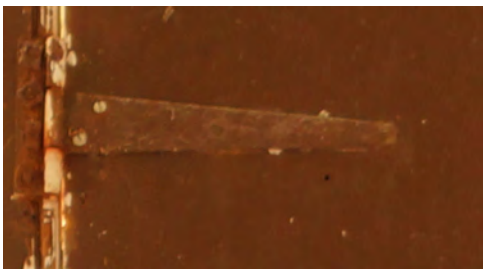


Photo 81: There is a pair of strap hinges, possibly stamped metal, and the lower hinge appears broken.

Door No./Location
2/First story east elevation, south

Photo 82 (JDF2107): Kitchen-Laundry Door #2: East elevation, south door exterior.

Photo 83 (JDF2134): Kitchen-Laundry Door #2: First story, east elevation, south door interior.

Door 2 (cont.)

Type
6 panel

Height
6 ft, 3 in

Width
3 ft, 5/8 in

Depth
1¼ in ±

Threshold
1 in high, 8 -1/4 in wide

Frame/Casing

Glazing
No

Glazing Putty and Points
No

Paint
Yes, on exterior

Weatherstripping/Fit
No/poor, drags on threshold

Operational
Yes

Overall Condition
Fair

Other
Rust lower left hinge stile; left loose joints, wood pegs: split lower right panel

Hardware
The overall condition of the hardware is poor.

Photo 84: Exterior's brown porcelain knob (split), key hole with plate.

Photo 85: Interior hardware is a rim lock.

Photo 86: HL hinge, note the rusted hinge provides metal reinforcement of the door's corner.

Door No./Location
3/First story west elevation, north

Photo 87 (JDF2112): Kitchen-Laundry Door #3: West elevation's door exterior.

Photo 88 (JDF2135): Kitchen-Laundry Door #3: West elevation's door's interior face.

Door 3 (cont.)

Type
8 vertical T&G planks 3 in to 5-1/4 in face dimensions

Height
6 ft, 1 in

Width
3 ft, 0 in

Depth
1¼ in ±

Threshold
1-1/4 in thick by 7-1/2 in

Frame/Casing

Glazing
No

Glazing Putty and Points
No

Paint
On the exterior

Weatherstripping/Fit
no/short at top

Operational
Yes

Overall Condition
Good

Other
Warped plank, 2nd on right

Hardware
The overall condition of the hardware is poor.

Photo 89: Pressed metal pull handle mounted on the exterior face; the exterior knob of the rim lock is missing.

Photo 90: Interior knob of rim lock

Photo 91: HL hinge

Door No./Location
4/First story, south closet door, north wall

Photo 92 (JDF2142): Kitchen-Laundry Door #4: South room, north elevation, closet door.

Door 4 (cont.)

Type
Three vertical planks on exterior face, cleats on interior face

Height
6 ft, 7 in

Width
2 ft, 3 in

Depth
1¼ in ±

Threshold
None

Frame/Casing

Glazing
None

Glazing Putty and Points

Paint

Weatherstripping/Fit
No/Fair

Operational
Yes

Overall Condition
Good

Other

Hardware
The overall condition of the hardware is fair.

Photo 93: One of two "T" strap hinges on south face.

Photo 94: Hasp and padlock on exterior face.

Door No./Location
5/Second story, north

Photo 95 (JDF2123): Second Story Kitchen-Laundry Door #5: North room door, north face.

Photo 96 (JDF2126): Second Story Kitchen-Laundry Door #5: North room door, south face.

Door 5 (cont.)

Type
6 panel wood

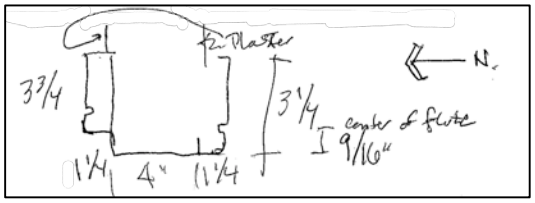
Height
6 ft

Width
2 ft, 2-5/8 in

Depth
1-1/4 in

Threshold
No

Frame/Casing



Glazing
No

Glazing Putty and Points
No

Paint
P on interior (north) face;
P on exterior (south) face

Weatherstripping/Fit
No/Good

Operational
Binds a bit

Overall Condition
Good

Other
Evidence of earlier lock locations

Hardware
The hardware is in fair condition.

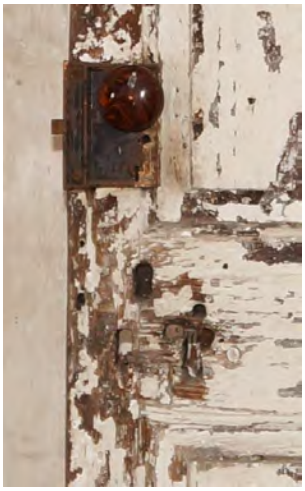


Photo 97: Black rim lock n. face, brown porcelain knobs, striker/catch loose and over paint.

Photo 98: Close-up view of knob.

Door No./Location
6/Second story, south

Photo 99 (JDF2127): Second Story Kitchen-Laundry Door #6: South face of south room door.

Photo 100 (JDF2129): Second Story Kitchen-Laundry Door #6: North face of south room door.

Door 6 (cont.)

Type
Upside down six panel

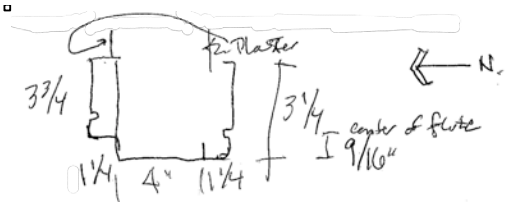
Height
6 ft

Width
2 ft, 11 in

Depth
1-3/16 in

Threshold
None

Frame/Casing
Same as door 5



Upper right missing piece; see photo south side

Glazing
No

Glazing Putty and Points
No

Paint
P on interior (south);
P on exterior (north)

Weatherstripping/Fit
No/floor heave bind spring, too tight hinge, side of door is warped.

Operational

Overall Condition
Fair

Other
Missing wood lock side stile. See south side of casing

Hardware
The overall condition of the hardware is fair.

Photo 101: Rim lock black-brown porcelain knob.

Photo 102: Hardware on both sides of the door.

Photo 103: "H" hinges.

Windows
Description and Condition: The window schedule on the following pages identifies each window's number and type as well as its dimensions and condition.

Kitchen-Laundry Window Schedule
Window No./Location
1/East elevation, north of pair

Photo 104 (JDF2105): Kitchen-Laundry: East elevation, north window.

Photo 105 (JDF2136): Kitchen-Laundry: East elevation, north window.

Window 1 (cont.)
Type
DH 9/9

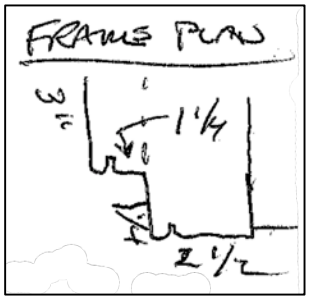
Height
5 ft, 3 in

Width
2 ft, 5 in

Depth
1-1/8 in

Sill
F, Wood, sloped 2 Dutchmen, Paint loss, fluted face

Frame
G



Upper Sash
F

Lower Sash
F

Meeting Bar
Chopped up

Glazing
G

Glazing Putty & Points
F

Paint (Ext)
P

Paint (Int)

Weatherstripping
Caulked short

Fit
Short

Hardware
None

Operational Character
Non-operable

Overall Condition
The window is in good condition.

Window No./Location
2/East elevation, south of pair

Photo 106 (JDF2108): Kitchen-Laundry: East elevation, south window.

Photo 107 (JDF2137): Kitchen-Laundry: East elevation, south window.

Window 2 (cont.)

Type
DH 9/9

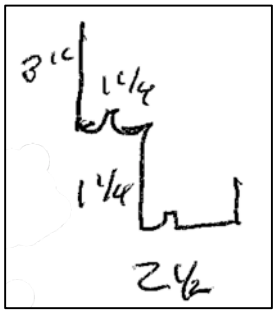
Height
5 ft, 3 in

Width
2 ft, 5 in

Depth
1-1/4 in

Sill
F; Depth is 7 in

Frame



Upper Sash
F = racked in frame, sashes overlap when closed

Lower Sash
G, sashes overlap when closed

Meeting Bar
G

Glazing
G

Glazing Putty & Points
G

Paint (Ext)
G

Paint (Int)
G

Weatherstripping
None

Fit
Racked

Hardware
n/a

Operational Character
Caulked shut in racked position

Overall Condition
The window is in good condition.

Window No./Location
3/West elevation, south

Photo 108 (JDF2111): Kitchen-Laundry: West elevation, south window.

Photo 109 (JDF2138): Kitchen-Laundry: West elevation, south window.

Window 3 (cont.)

Type
DH 9/9

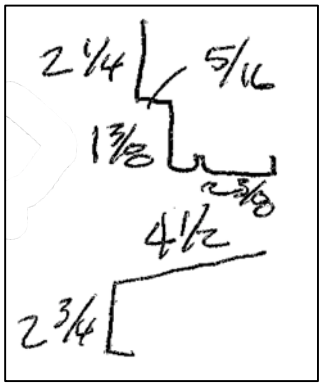
Height
5 ft, 3 in

Width
2 ft, 5 in

Depth
1-1/4 in

Sill
F; depth is 7 in

Frame



Upper Sash
G, sashes overlap with closed

Lower Sash
G, sashes overlap when closed

Meeting Bar
G

Glazing
G

Glazing Putty & Points
F

Paint (Ext)
G

Paint (Int)

Weatherstripping
n/a

Fit
Caulked shut

Hardware
None

Operational Character
n/a

Overall Condition
Good

Window No./Location
4/West elevation, north

Photo 110 (JDF2113): Kitchen-Laundry: West elevation, north window. Note: this window is six over six.

Photo 111 (JDF2139): Kitchen-Laundry: West elevation, north window.

Window 4 (cont.)

Type
DH 6/6 (wrong up, racked, older muntin width)

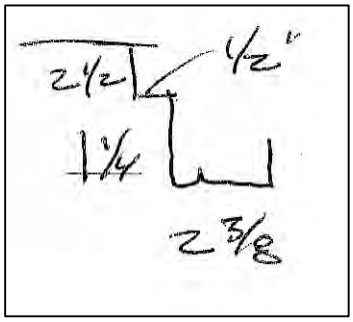
Height
5 ft, 3 in

Width
2 ft, 5 in

Depth
1-1/4 in

Sill
F=2-5/8, D=4-1/2

Frame
G



Upper Sash
G

Lower Sash
G

Meeting Bar
G, 1-1/4

Glazing
G

Glazing Putty & Points
F

Paint (Ext)
G

Paint (Int)

Weatherstripping
n/a

Fit
n/a

Hardware
n/a

Operational Character
Fixed

Overall Condition
Good

Window No./Location
5/2nd story, north, west

Photo 112 (JDF2114): Kitchen-Laundry: Northwest window exterior.

Photo 113 (JDF2116): Kitchen-Laundry: Interior of northwest window.

Window 5 (cont.)

Type
Casement, Hinged on west side, 2/2

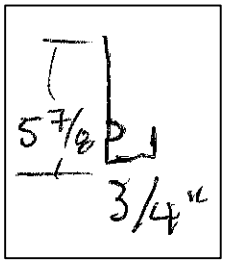
Height
1 ft, 11 in

Width
1 ft, 7-1/2 in

Depth
1-1/8 in

Sill
1-3/4 high, 6 in long, G

Frame
G



Upper Sash
n/a

Lower Sash
n/a

Meeting Bar
n/a

Glazing
G

Glazing Putty & Points
F

Paint (Ext)
G

Paint (Int)

Weatherstripping
n/a

Fit
Poor, gaps top and bottom

Hardware
2 butt hinges (probably 20th century), sash lock thumb turn type of wood
The hardware is in good condition

Operational Character
G

Overall Condition
Fair

Window No./Location
6/2nd story, northeast

Photo 114 (JDF2117): Kitchen-Laundry: Northeast window, exterior.

Photo 115 (JDF2118): Kitchen-Laundry: Northeast window, interior.

Window 6 (cont.)

Type
Casement, hinged on east side

Height
1 ft, 10-1/4 in

Width
1 ft, 7 in

Depth
1-3/8 in

Sill
Rotted

Frame
G (new)

Upper Sash
n/a

Lower Sash
n/a

Meeting Bar
n/a

Glazing
G

Glazing Putty & Points
Redo

Paint (Ext)
Good, but over glazing face

Paint (Int)
G

Weatherstripping
n/a

Fit
Poor

Hardware
pair of metal butt hinges in this case in brass finish, and a carved wood thumb sash lock. The window hardware condition is good.

Operational Character
Gap between sash and frame at top and large gap at bottom. Poor fit.

Overall Condition
Fair

Window No./Location
7/2nd story, southeast

Photo 116 (JDF2120): Kitchen-Laundry: Southeast window, exterior.

Photo 117 (JDF2121): Kitchen-Laundry: Southeast window, interior.

Window 7 (cont.)

Type
Casement, east side opens in

Height
1 ft, 11-3/8 in

Width
1 in, 7-3/4 in

Depth
1-1/8 in

Sill
Same

Frame
Same, P = exterior rot

Upper Sash
n/a

Lower Sash
n/a

Meeting Bar
n/a

Glazing
G

Glazing Putty & Points
G

Paint (Ext)
G

Paint (Int)
G

Weatherstripping
n/a

Fit
Gaps at bottom

Hardware
The hardware consists of a wood thumb turn sash lock and one complete but rusted upper metal hinge and one broken rusted lower hinge. The overall condition rating of the hardware is fair.

Operational Character
Tight

Overall Condition
It is in good condition.

Window No./Location
8/2nd story, Southwest

Photo 118 (JDF2122): Kitchen-Laundry: Southwest window, exterior.

Photo 119 (JDF02165 blowup): Kitchen-Laundry: Southwest window, interior.

Window 8 (cont.)
Type
Casement 2/2, west side opens in

Height
2 ft

Width
1 in, 7-3/4 in

Depth
1-1/8 in

Sill
F = wood loss

Frame
G

Upper Sash
n/a

Lower Sash
n/a

Meeting Bar
n/a

Glazing
One broken

Glazing Putty & Points
G

Paint (Ext)
G

Paint (Int)
G

Weatherstripping
n/a

Fit
G

Hardware
The hardware consists of a pair of metal butt hinges and a wood thumb turn sash lock. It is in good condition although the finish on the hinges has been compromised.

Operational Character
G

Overall Condition
G

First Story Floor Structure

A 6 x 9 inch timber plate bears on the masonry foundation and is mortised to accept tenons on the 3 x 4 inch studs and floor joists. The timber plates were all replaced with site-fabricated oak plates during the work project in 1989-1990. Floor joists are 7½ x 3¾ inch timber members at approximately 24 inches on center. Reportedly, nearly all floor joists were replaced in 1989-1990. The floor is constructed of 1¼ x 4½ to 7¼ inch tongue and groove boards nailed perpendicular to the floor joists. The current floor was installed during the 1989-1990 work. A center floor support, running north-south, is present in the crawl space at approximately mid-span (8 feet 8 inches). This is clearly of the modern era with a triple 2 x 8 inch (nominal) ganged beam supported on concrete pads with a concrete masonry unit providing a bearing surface. From the documentation of the 1989-1990 work, the new structure was intended to reduce mid-span deflections of the floor joists.

Photo 120 (DW723): View of the crawl space from the access hatch in the laundry closet, looking to the north. The new built-up beam was installed during the 1989-1990 work to support floor joists at mid-span. Support is a concrete block on top of a paired concrete footing.

Second Story Floor Structure

The half-story floor is supported by 7 x 3 inch joists at approximately 24 inches on center. A wood lath and plaster ceiling is present on the underside of the joists and 1-inch-thick wood planking forms the floor surface of the half-story rooms.

Photo 121 (DW0598): View of underside of the roof between the knee wall and eave as observed through an existing hole in the plaster/lath. In the lower portion of the image, the floor joists likely through-lap over the west wall top plate and extend to form the overhang on the west elevation. Roof rafters bear on a raising plate attached to the joists.

Wood Floors

Description: The first-story plank floors are replacements of earlier wood plank flooring, completed in 1989-1990. The work description is as follows: *"Fabricated and installed yellow pine flooring in first story North and South rooms. Top surfaces were hand planed and two coats of tung oil applied as a finish."* The surface may have been smoothed with a draw knife rather than a plane, given the width of the planks.

The dimensions of the first-story flooring planks are an average of 6 inches in width; the widths range from 4.5 inches to 7.25 inches. This first story is the level with the most use and most foot traffic; it contains both kitchen and laundry functions. Prior to the replacement, the wear patterns would have provided information on use, and the floors near the hearths would have provided further information by the stains and char marks. The second story wood floor was not replaced at the same time (1989-1990), probably because wear resulting from foot traffic from the second story use as sleeping quarters would not have been as intense as for the first story functions. The 23 second story floor planks have an average exposed width of 7.2 inches.

Condition: The first story floor planks exhibit some water staining and the perimeter planks appear to have lifted and rotated somewhat. The tung oil finish applied in 1989-1990 does not appear to have been renewed, at least not lately, if ever. The gaps between the floor planks differ in width, likely due to variable rates of shrinkage. The second story floor planks exhibit numerous areas of water staining. Other condition issues may be present; however, several areas of the second story floor were obscured by plaster renewal construction staging (see photos 122 and 123). The floor planks on both stories were assessed as being in good condition.

Photo 122 (JDF2178): Kitchen-Laundry: Second story, north room looking at south half of floor.

Photo 123 (JDF2173 cropped): Close-up view of second story's northwest floor. Note water stains.

Foundation

Description: The Kitchen-Laundry is a traditional timber-framed structure approximately 32 x 18 feet in plan (excluding chimneys). The foundation is of fired-clay masonry construction and appears to be at least 2 feet below grade as seen from the interior crawl space. Archeology done in 1988 indicates eight courses encountered.[30] The brick foundation was re-laid as part of the 1989-1990 repair campaign.

Interior Finishes of Lath and Plaster

Description: The walls and ceilings of both the first and second story are plaster (made of aggregate and lime binder) over predominantly split wood lath. The plaster is partially covered by whitewash. Spot repairs appear to have been the normal maintenance procedure. In association with the work on the building in 1989-1990 while completing the preservation of the foundation and the installation of the new first story structure, the proposed lifting and leveling of the building was aborted due to plaster loss. References are made in the 1989-1990 construction administrative documents to some plaster repair work being executed. National Park Service maintenance staff have been engaged in patching and repair of the plaster in the recent past as time has allowed.[31] Repair supplies and tools were evident in the second story rooms and staging in the stairwell.

Condition: Typical condition issues for plaster are: surface powdering due to moisture, cracks, areas of missing plaster, and attachment loss due to broken plaster keys and/or loss of attachment of the lath to the framing members.

Plaster is sensitive to building movement, showing up as cracks. Cracking patterns can be evaluated to provide information about building movement. Ceiling crack patterns relate to racking forces of the frame by one pattern of cracks and upper level (second story) ceilings may relate to roof structure deflections by another pattern of cracks. First story ceiling cracks may relate to floor joist deflections by tension cracks, definable by the crack's sides being largely

[30]B. S. Blades, "An Archaeological Survey of Historic Occupation at City Point, Virginia," July 1988.
[31]Personal conversation with Sandy Eickmeyer, October 2016.

parallel. The lath is nailed to the joists perpendicular to the axis of the joists. The largest width cracks are most often seen at or near mid-span where deflection is likely to be the greatest. Cracks may appear between multiple laths in a series, as the plaster surface accommodates by cracking the greater length of the curve of the deflection. Cracks in alignment with floor joists and roof structure collar ties can relate to movement in the members and in side compression forces, as for example, the top of the north wall and its massive chimney pushing in on the roof structure. Sidewall cracks are most often narrower at one end than the other. The narrow end is the hinge point. If one wall is pushing out, there may be a crack in the corner where the two walls join, an important location to inspect. These cracks may have been previously repaired and subsequently the information possible to be retrieved from their location, configuration, size, and pattern will have been lost unless documentary photographs were taken.

With these concerns in mind, the plaster walls and ceilings of the Kitchen-Laundry were inspected to assess conditions. Given the lime wash coating, any surface powdering was not readily discernible. Detachment conditions were not determined as the backside of the plaster and lath was not directly visible. Detachment can be determined by pushing on the surface, however one has to be ready for area to let go: cleared below or beside of any artifacts, nearby surfaces protected by padding, and be willing to lose the original plaster. A conservation approach is to be ready to repair any loose areas before testing for detachment. Support the area in question first.

Current cracks and areas of missing plaster are visible condition issues. There is no need for backside visual access to see the issue, nor any special investigative tools or precautions.

First Story North Room

1. South wall: Two areas of missing plaster, one continuous of .75 sf, one discontinuous with concern that the intervening area is loose with 2.5 sf. Three vertical cracks. One diagonal crack at southeast corner. The cracks are minor.
2. West wall: Wainscot covers a portion of the lower wall; cupboards and closets cover a significant portion of the remaining wall. No missing plaster. Some minor cracking in the area 9 inches below the ceiling and another minor vertical crack above the south closet height cabinet.
3. North wall: Much of the wall is the chimney, and there is a continuation of the wainscot. The area of plaster beside the chimney face appears to have been redone.
4. East wall: The wainscot continues in its coverage of the lower wall section. There are no areas of missing plaster. There are three minor cracks in the area between the window and the northeast corner. These are indicative of some movement of the corner. The area above the window appears to have been patched.
5. Ceiling: The ceiling's plaster surface is quite rough, perhaps evidence of older repairs. There are some minor cracks and one area of plaster adjacent to a crack that has powdered. Given the water stains on the second story floor, it is likely that water has come through the floor at some time and affected the plaster.

First Story South Room

1. South wall: Better than one-half of this wall is the chimney face. There are no areas of missing plaster, although there are several small areas of what could be missing finish coat. There are no visible cracks, although the wall does seem to have had some minor repairs in the past, particularly in the 12 to 18 inches adjacent to the chimney face.
2. West wall: There is no area with missing plaster. There is an area (upper left) that may have missing finish coat. It is gray in coloration. There are three minor cracks north of the window.
3. South Wall: There are no areas of missing plaster. The wall does exhibit some previous plaster repairs, especially below the shelf. There are no significant cracks.
4. West Wall: There are no areas of missing plaster. The wall does exhibit some previous plaster repairs, especially below the shelf in the north portion. There are no significant cracks. There are a few quite small cracks around the window.
5. Ceiling: The situation and character of this ceiling is the same as for the north room ceiling. The minor cracks appear in the area near the chimney face out into the room some 5 feet. There are three possible causes: thermal differential from the heat of the nearby chimney, floor load from the hearth above causing some deflection of the floor joists, and potentially water coming through the two windows flanking the chimney, for even in a closed position they could leak with the wind in the right direction. The water would cause the powdering beside and associated with a few of the cracks.

Staircase Walls and Ceiling and Upstairs Central Hall Walls and Ceiling

1. The walls and ceiling plaster repairs are ongoing. Thus, the repaired walls are in good condition and the unrepaired walls are in poor condition.
2. The poor conditions include missing plaster and numerous cracks (see photos 2160 and 2161). The plaster is so thin in areas that the lath is "photoing" through (see photo 2162).

Photo 124 (JDF2160): Kitchen-Laundry: Second story, continued view of ceiling over stairs.

Photo 125 (JDF2161): Kitchen-Laundry: Second story, center section, north wall, west.

Photo 126 (JDF2162): Kitchen-Laundry: Second story, center section, north wall, east.

Second Story North Room

1. South wall: No areas of missing plaster and no significant cracks are visible.
2. West wall: One area of missing plaster of about ½ sf where the wall plane meets the roof slope about 30% of the way from north to south. This distance is important, as the east wall has similarly located issues. This same area has the most cracks running down from the flat ceiling on the sloped ceiling to and down the wall to the floor. The cracks are not at all wide, but their location indicates structural problems have been (or still are) present at this end of the second story.
3. North wall: Similar issues to the south wall of the south room, except the plaster loss is even more extensive: above the east window, beside it, and below it; and below the west window. All together there is about 7½ sf of missing and loose plaster. The diagonal cracking of the comparison elevation is also seen here. However, one large area above and to the right of the fireplace has evidently been re-plastered, perhaps recently.
4. East wall: Missing plaster area of 2 sf is located at the junction of the flat and sloped roofs at the north end. There are vertical cracks running down the wall at several locations along its length. Note that floor slope measurements were taken and as seen in photograph 2174 there is a hinged gap in the baseboard some 30% of the distance in from the north wall. The floor slope measurements support the conclusion that the floor has "jackknifed" at this location.

Photo 127 (JDF2174): Kitchen-Laundry: Second story, north room looking south at east elevation.

5. Ceiling: At approximately the same distance back from the north wall, there is a significant crack in the ceiling, running east-west, with the most deflection where the collar tie joins the roof rafters. It is a crack with out-of-plane bulging, indicative of compression. The north wall appears to be leaning to the south, applying pressure to the roof structure.

Second Story South Room

1. South wall: Missing plaster under the southeast window, 4 sf. Numerous small cracks and two more significant cracks from upper left corner above the window, migrating down toward the window. Some companion cracks on the other side, likely both sides indicating settlement of the fireplace. Note that the exposed lath under the window, where the plaster is missing, does not appear to be all the same as in other exposed areas of lath. Detailed examination is warranted: split versus sawn, size of lath, spacing of lath. Extra lath was seen stacked in the room, which may match this exposed area's larger lath pieces. However, it does not appear that this is an area currently under repair as there is some broken plaster between the laths under the window.
2. West wall: Missing plaster in one ¾-sf location. Cracking is minor and is mainly located just below the point where the short sidewall meets the sloping ceiling and also just above the baseboard.
3. North wall: No missing plaster and no significant cracks.
4. East wall: One area of missing plaster that is about ½ sf and one area of partially missing plaster with loose plaster around it, both in the southeast corner area. Numerous minor cracks most of which are in the sloped ceiling portion, which also has one area of missing plaster close to the southeast corner.
5. Ceiling: One area of missing plaster and lath measures about 8 sf. Numerous small cracks indicating some deflection of the collar ties that support the flat portion of the ceiling.

The plaster of the interior is a significant character defining feature. Its appearance was probably quite variable, in good times it was repaired when needed and was whitewashed every two years, which was the practice in the area. In bad times, the interior would have probably looked somewhat like it did at the time of the October 2016 site visit. Probably much like it did from 1864 to 1865 when the property was vacated by the Eppes family and occupied by the Union Army. Given the need for sanitary conditions in a kitchen, while the building was used for the vast majority of its functional history, the plaster would have been kept in repair and the walls regularly whitewashed. With this in mind, the overall condition ratings for the plaster are fair for the first story, and poor for the second story.

Graffiti

The presence of the graffiti in photo 128 on the south wall of the kitchen room is fairly well known. As only part of it is visible, attempts to make it more apparent were made by the use of ImageJ. This software is an image processing program that was developed by Wayne Rasband at the National Institutes of Health. Using it, one can manipulate images comparing contrasts in color, various color substitutions, and contrasts. The project developer, Wayne Rasband, retired from the Research Services Branch of the National Institute of Mental Health in 2010, but continues to develop the software. The images shown in photos 129 and 130 were generated as a result of using ImageJ's features that focused on contrast features.[32]

[32] https://en.wikipedia.org/wiki/ImageJ (22 March 2017).

Photo 128 (JDF2283): Kitchen-Laundry: "Graffiti" at south elevation's north room of first story, unfiltered.

Photo 129 (DSC02283_ybg): Kitchen-Laundry: "Graffiti" at south elevation's north room of first story, ybg filter.

Photo 130 (DSC02283-imagej): Kitchen-Laundry: "Graffiti" at south elevation's north room of first story, using color replacement filter.

Utility Systems, Electrical System

Description: One short section of knob and tube wiring is attached to the ceiling of the second story's south room. There are a few short runs of "Romex" electrical wire with junction boxes under the first story floor. According to a communication with Greg Sprinkle (NPS staff member at PETE) on Feb. 10, 2017, the wiring is believed to have served an abandoned outlet in the Dairy and a future root cellar exhibit.

Condition: Defunct, uncharged.

Built-In Features

The built-in features of the Kitchen-Laundry are: shelves, cupboards, and wainscot (kitchen only).

Shelves Description: The floor plans for the Kitchen-Laundry delineate the locations of shelves. In summary, on the second story there are shelves over the fireplaces with the one over the south fireplace extending over both of the flanking windows while the north fireplace shelf extends to just the width of the fireplace brick work. Both shelves are supported by wood brackets. The two first-story fireplaces do not have any shelves over the openings although mantel shelves above fireplace openings for this period are standard.

In the kitchen, there is a long shelf along the south wall, 3'-6" above the floor. It is located just below the graffiti and extends from the doorway in the dividing wall to over the top of the wainscot on the west wall. In association with the cabinet work of the west wall, the middle cabinet extends from floor to window sill and therefore its top surface serves as a shelf.

In the laundry are three shelves, one to the right of the east entry door on the dividing wall, a second is to the left of the entry door extending from the doorway to the south window opening, and the final shelf is on the west wall extending from the window opening toward (but just short of) the southwest corner of the room.

Shelves Condition: The coatings on the brackets were not sampled. The top surfaces' coatings appear to vary from plain wood to painted wood. An example of what appears to be unfinished wood is the west shelf in the laundry. This preliminary conclusion may be verified after the top is carefully cleaned. It is at a reasonable height as a work surface, is somewhat dished due perhaps to use, and an unfinished wood surface potentially was useful in preparation of baked goods as a place to roll out flour. While the laundry room was used for laundry purposes five to six days a week, it is possible that when a large amount of food had to be prepared/cooked for special events, such as holidays, space in the laundry room would be pressed into service to supplement the efforts of the kitchen. Put another way, under certain circumstances, both rooms were used for cooking and for food preparation. The painted shelves in the kitchen are in good condition. The shelves over the fireplaces of the second floor may have been finished at one time; however, no detailed inspection was undertaken to find paint residues in the grain and no paint analysis samples were taken. The brackets all have coatings, although coverage is less than complete. The north second story fireplace mantle shelf is warped.

There are no structural issues with the shelves although they were not "load tested." Future interpretive activities in the rooms may require the shelves to hold greater numbers of heavier objects than is current and prior to this increased loading the shelves should be evaluated for capacity. More testing is required before the shelves coatings types are decided. The shelves are in variable condition, from fair to good with the lesser rating applicable to the second story shelves, including the warpage issue.

There is one conjecture: Is the second story south mantle shelf original to that room or was it moved from the fireplace below, given that its length matches what would have been the length for the first story south fireplace mantel shelf?

Cupboards Description: Three cupboards line the west wall of the kitchen, beginning at the west doorway and continuing to the corner. The middle cupboard extends from floor to window sill (2'-10½" high) and the two flanking cabinets extend from floor to 9'-1" in height (see photograph 131). The two flanking cabinets have two doors each, while the center cabinet has one door hinged on the south edge. The cabinet doors are paneled, with a slight edge relief visible on the face, as would be used to set the panel into receiving rabbets in the rails and stiles. The tall flanking cabinets are of one over one configuration and the shorter middle cabinet is of one beside one configuration. The panels are each one board, quite wide. The hardware consists of hinges on the inside, thumb latches on the exterior, and lock sets set on the inside face of each of the two tall cabinets. The north door of the south tall cabinet has a round pull knob. These cabinets are painted with the color of the top surface matching the top surface color of the wainscot of the kitchen. There are shelves set into the cabinet interior.

Photo 131 (JDF2152): Kitchen-Laundry: North room, west elevation.

Cupboards Condition: There are condition issues like missing wood, such as at the bottom corners of the north cabinet, most of which is covered by metal patches. Likewise, the bottom right corner of the middle cabinet has similar damage. It is possible such damage was caused by rodents. The middle cabinet door is sagging, due to the door's connections between rails and stiles at the outer edge being loose. The hinges are not the issue/cause.

There are some areas of material loss on portions of the south tall cabinet's doors. The left door's upper panel has an area appearing to have been part of the log; sap pocket or similar. Close examination might provide more possibilities as there is one round hole in this "divot." There is some loss in the lower left corner of the upper panel of the companion door. The last area of loss is directly to the left of the ghost of a mid-height strap hinge, which possibly was used as a part of a fabricated hasp to lock the cupboard: the strap hinge on the right door and the clasp on the left. The conjecture is that the wood loss would have been attributable to prying off the clasp plate as the fastener holes are still there. Perhaps, someone lost the key or someone broke in. Although fixing the missing wood is generally a reasonable treatment, in this case the areas of missing wood are part of the interpretation of the kitchen. Repair to the middle cabinet door to remove the sag is reasonable. The overall condition rating is good.

Wainscot Description: As seen on the kitchen floor plans, there is wainscot of two different configurations covering the lower portions of some or all of each elevation. There is a 41-inch high wainscot, composed of many narrow boards, perhaps of tongue and groove configuration, running clockwise from the east doorway of the kitchen around the south wall to the west doorway. The second wainscot type is composed of three wide horizontal planks making up a height of 32 inches, and running counterclockwise from the east doorway to the fireplace brick, and, continuing beyond the fireplace brick, the wainscot once again begins running to the face of

the cupboards. The latter wainscot appears, by virtue of its wide planks, to be the older. Very evenly spaced saw marks, perpendicular to the edge, can be seen on one exposed section of the wood where the paint coating has been lost.

Photo 132 (JDF2151 cropped): Kitchen-Laundry: North room, looking at south elevation. Note the 41-inch high wainscot, composed of many narrow boards to the left of the open doorway.

Photo 133 (JDF2154 cropped): Kitchen-Laundry: North room, east elevation.

<u>Wainscot</u> Condition: The primary condition issues are paint loss. The overall condition rating is good.

Materials Analyses

Paint Analysis—Summary of the Report in the Appendices Portion of this HSR

Windows: Of particular interest was whether the paint analysis would indicate differences in early color layers for the windows. It was expected that the two southerly windows of the east and west elevations would have the same first layers, and the two north windows with their different configuration of overlapping sashes might have exhibited a different first layer. This difference in color layers might have indicated different construction periods for the north half versus the south half; an ongoing avenue of inquiry. The second avenue of inquiry was whether the two north windows differed from each other as the east is of nine over nine configuration and the west is six over six. As for all samples the concern was whether the lead paint abatement had stripped all of the layers of early importance.

The east windows had at most two layers and these were both white. The west windows did differ. Both of them had four layers, more than the two of the east but still considerably less than should have been expected. The south windows first layer was a dark brown and it is important to note that this was a very small part of the sample, possibly indicative of it having escaped the lead paint abatement stripping process. The identified color—10R3/1—is also seen on the second story baseboard sample and south room door, both as layer #3; not the oldest. The sampling did not provide clear answers to either question.

While it is possible to determine if paint is oil based or white wash, actual chemical analysis would require XRF testing.

Exterior Doors: The east elevation's north door exhibited two layers, both white for sample #32; however, sample #33 had seven layers and its colors and sequencing were close to the interior's results as indicated for sample #34. The earliest color was a medium red-brown that was also used on the wainscot. It appeared slightly darker on the wainscot, typical of a hand-mixed paint.

Interior: The sampled areas were the wainscot (#s 35 & 36), second story door (#38), and second story baseboard (#s 40 & 39), and one window casing (#37). Only three of these samples had more than a few layers, six for #s 36, 38, and 39. Sample #s 38 and 39—respectively south room's south door face and north room's baseboard—had the same layer colors. This is reviewable on the following summary sheet.

Summary of Kitchen-Laundry Paint Analysis Tables

Table 8: Kitchen-Laundry Exterior Windows

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
West: north	23	White	Gray	White	White 4*
West: south	24	10R3/1 Dark brown (very small area)	2.5Y8.5/4 creamy yellow	White	White 4
East: north	25	White	White	—	2
East: south	26	White	—	—	1
East: north window sill	27	White	White	Creamy white	3
East: south window sill	28	White	White	Very light cream white	3

*Incomplete layers, may have a first coat of shellac primer; spotty

Table 9: Kitchen-Laundry Exterior Siding and Molding

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Wall siding in groove, east	29	White	White	Very light cream white	3
Wall siding in groove, east	30	White (extremely weathered)	White	White	3
Wall: northeast corner molding (looks like green early)	31	White (extremely weathered)	White	White	3

Table 10: Kitchen-Laundry Exterior Doors

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East, north door, not lead abated	32	White	White	—	2
East, south door, not lead abated	33	10R4/6 medium red brown / N5/1 9.8% R med. gray	N7/4 3.1% R gray / Creamy white	White	Creamy white / White	7

Table 11: Kitchen-Laundry Interior

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East elevation, 1st story north door: brown	34	10R4/6 medium red brown	N5/19.8%R medium gray	10R3/1 dark red brown	White	4
North room, 1st story, south wall wainscot	35	10R4/6 to black	—	—	1
North room, 1st story, east wall wainscot	36	Creamy white / White	Butter-scotch white / 2.5Y8.5/4 creamy yellow	Med. Brown	Dk. Brown	6
First story, south room, window casing, east window	37	White	White	—	2
2nd story, south room, door, south face	38	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd story, north room, west elevation baseboard	39	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd story, north room, west elevation baseboard	40	10R4/6 thin	—	—	1

Mortar Analysis

Summary: Mortar hardness testing, with the Schmidt Type PM pendulum hammer, indicated that much of the previous mortar repointing work on the masonry chimney exterior surfaces was done with an excessively hard, high-strength mortar. Mortar analysis, by acid digestion, provided information to develop appropriate replacement mortars for future repointing work.

Mortar hardness was measured on the exterior mortar joints on the north and south chimneys using a Schmidt Type PM pendulum hammer that was developed to evaluate mortar hardness (see Table 12 below). Mortar hardness can generally be correlated with compressive strength within a certain hardness range. Figure 25 shows the general relationship between mortar hardness, as measured with the pendulum hammer, and compressive strength for ASTM C 270 mortar Types S, N, O and K. Note that the device is not sensitive to harder mortars such as Type N and S. For mortars with a rebound number above 80, the hardness may vary only within the standard error of the test method while the compressive strength can vary by a factor of two. The expected rebound numbers for appropriate mortars should be in the range of 30 to 40 for lime-sand mortars.

Table 12: Results from mortar hardness testing with Schmidt Hammer, Type PM.

Location	Average Rebound No. (no dimension)
North Chimney Exterior – West Face – appropriate hardness	38
North Chimney Exterior – North Face – inappropriate hardness	46
North Chimney Exterior – North Face – appropriate hardness	34
North Chimney Exterior – East Face – appropriate hardness	31
South Chimney Exterior – West Face – inappropriate hardness	53
South Chimney Exterior – South Face – obvious gray Portland mix	84
South Chimney Exterior – South Face – inappropriate hardness	66
South Chimney Exterior – East Face – appropriate hardness	33

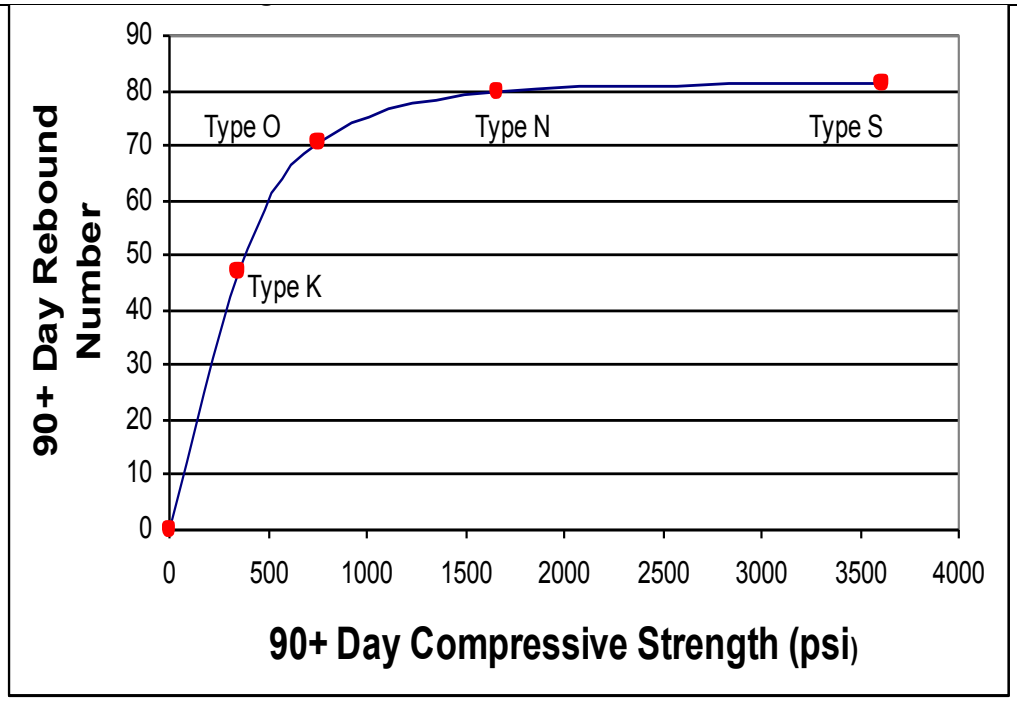


Figure 25: Graph of mortar compressive strength versus rebound number with Schmidt Type PM pendulum hammer.

Four mortar samples and one interior plaster sample were removed by Atkinson-Noland & Associates (ANA) from the Kitchen-Laundry outbuilding at Appomattox Manor in Hopewell, VA and tested in the Atkinson-Noland & Associates laboratory for composition. In addition, one mortar sample was removed and tested from the brick that is believed to have been used for the foundation of the Old Smokehouse at the Manor. The objective was to identify binder/aggregate ratio, aggregate color, and aggregate size gradation to provide an appropriate compatible replacement mortar formulation.

Aggregate Sieve Analysis

The mortar evaluation followed the requirements of ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. This method is based on the use of acid digestion of the binder and sieve analysis of the aggregate. The analysis process used does not distinguish between cement and lime-based binders. The sample identification list is shown in Table 13.

Table 13: Sample identification and location.

Sample ID	Location
S-1	S. Chimney Laundry Interior
S-2	S. Chimney Laundry Exterior
S-3	N. Chimney Kitchen Exterior
S-4	N. Chimney Kitchen Interior
S-5	Old Smokehouse Foundation
S-6	K-L Second Story, north room N. North Wall Plaster

The results of acid digestion of the sample are shown in Table 14. The binder component was found to be approximately 34%-44%, and the aggregate component was found to be approximately 56%-66%.

Table 14: Results of acid digestion of mortar and plaster samples.

Sample ID	Mass before acid diges-tion (g)	Mass after acid digestion (g)	Binder mass (g)	Aggregate mass (g)	Binder volume (cm^3)	Aggregate volume (cm^3)	Total volume (cm^3)	Binder (%)	Aggregate (%)
S1	60.59	43.68	16.91	43.68	26.39	34.09	60.48	44	56
S2	50.15	39.96	10.19	39.96	15.90	31.18	47.09	34	66
S3	61.78	45.36	16.42	45.36	25.63	35.40	61.02	42	58
S4	75.05	57.12	17.93	57.12	27.98	44.57	72.56	39	61
S5	62.75	45.90	16.85	45.90	26.30	35.82	62.12	42	58
S6	65.78	49.30	16.48	49.30	25.72	38.47	64.19	40	60

The aggregate gradation curve, plotted in Figure 26, shows that the aggregate from S-1 to S-6 generally contained finer aggregate than that for modern mortar as specified by ASTM C144, Standard Specification for Aggregate for Masonry Mortars.

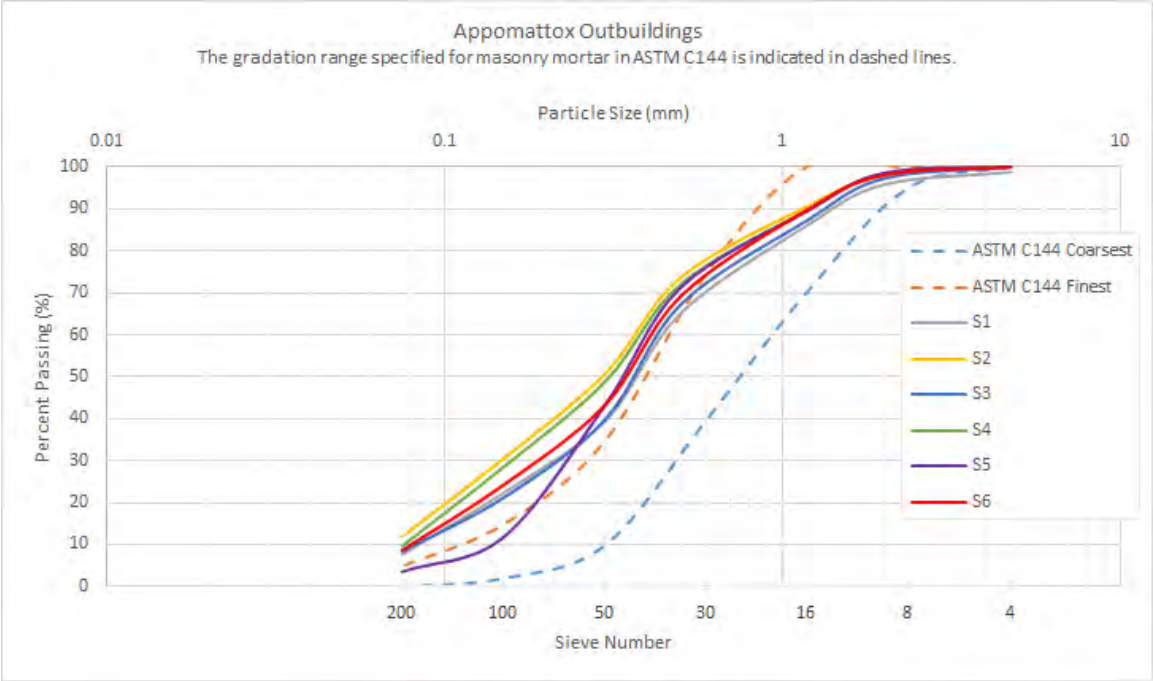


Figure 26: Aggregate distribution by sieve size for mortar sample.

The aggregate size distribution and colors are shown in Figure 27. Ideally, the aggregate for the replacement mortar should match the color and gradation of the existing aggregates. Trial mixtures may be required to produce a repair material that matches the original with respect to color and texture.

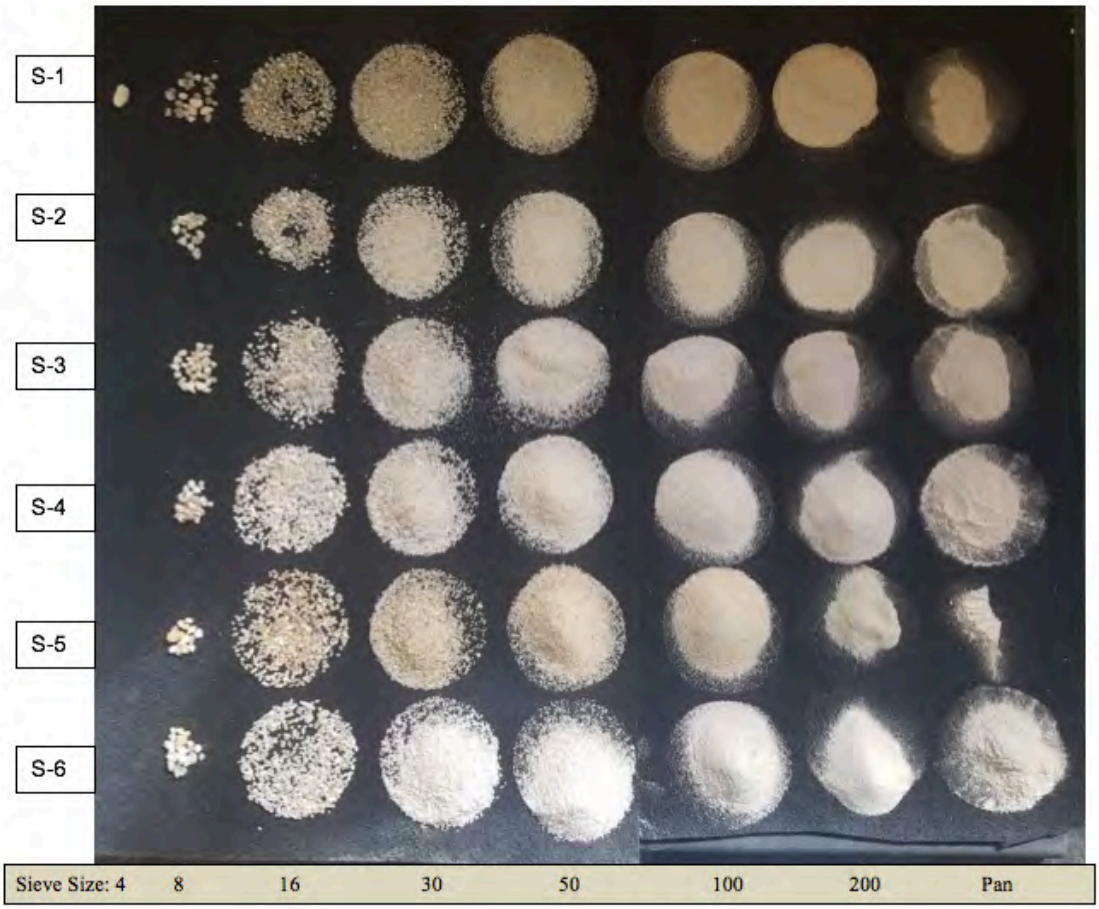


Figure 27: Aggregate distribution and color for mortar samples (S-1 through S-5) and *plaster sample (S-6).*

Recommended Mortar Formulation

Mortar used for repointing joints, crack repair, and rebuilding should be a sand-lime mortar with a feebly hydraulic lime NHL2 or a lime putty and sand mortar. Aggregate fraction (by volume) should be 1½ to 2 times the volume of the binder. These relatively soft repointing mortars should be compatible with both the stiffness and the vapor permeability of the surrounding masonry units, avoiding stress concentrations and moisture problems that could damage masonry units.

The use of pigments may be required to match the hardened mortar color. Pigments conforming to ASTM C979, Standard Specification for Pigments for Integrally Colored Concrete, are suitable for mortar, but should not exceed 5% by weight of binder content in the mortar. Trial mixtures should be required to arrive at a mix that matches the original mortar with respect to color and texture.

IR Report

Introduction: Infrared imaging can be of great assistance in making visible a number of elements and conditions that would otherwise be undetected. For this project, the IR images provided knowledge about:

1. the location and spacing of timber framing elements hidden in the walls as well as their relative size,
2. areas where the heat is transferring through the walls providing in part knowledge on the fit of windows and doors,
3. areas where moisture is present, typically observed as saturated materials, and
4. voids in walls, displaying a different heat signature from the adjacent material.

The information from the IR images assists in the corroboration of information derived from other diagnostic techniques, such as moisture detectors and radar. In allowing the evaluation personnel to detect small differences in surface temperatures using wave lengths beyond those of visible light, the buildings provide more diagnostic information to the field team than is otherwise available. This allows follow-ups to corroborate suspected issue areas. By example, the IR images indicate moisture penetration at the Kitchen-Laundry chimneys, the field visual observations indicated the likely path of moisture intrusion given the stepped portions of the brick chimneys having gaps with the flashing of the joint with the weatherboard siding. The suspected issue was thus confirmed.

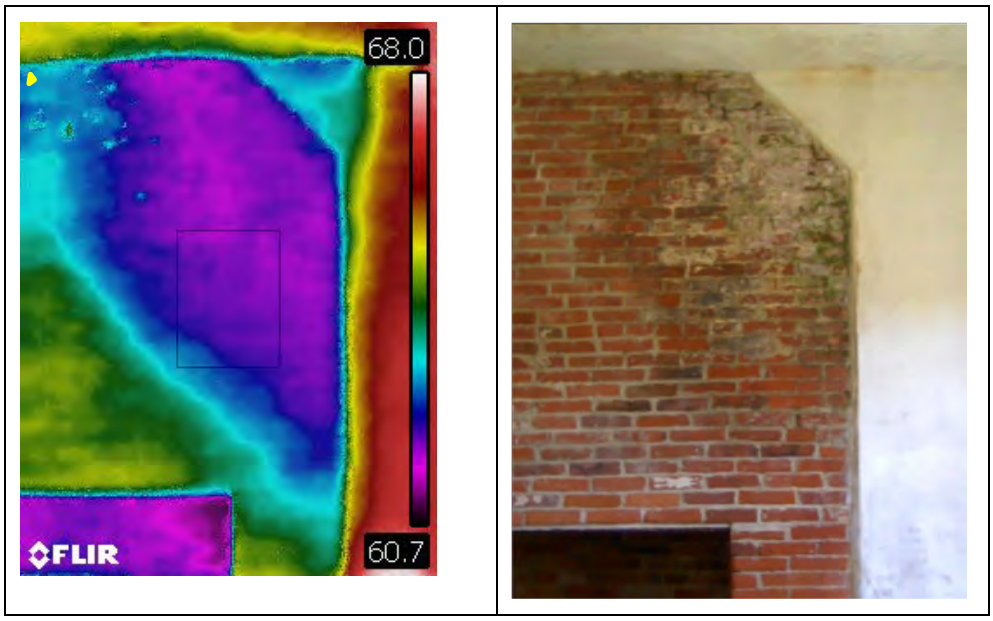


Figure 28: Image of the east portion of the fireplace in the kitchen – infrared (IR) image at left, visible light at right. Cooler area (circled) in IR image indicates moisture in masonry. Color scale at right of IR image is the surface temperature in degrees Fahrenheit between the two bounding temperatures. Efflorescence on surface of masonry indicates frequent wetting that brings soluble salts to the interior surface.

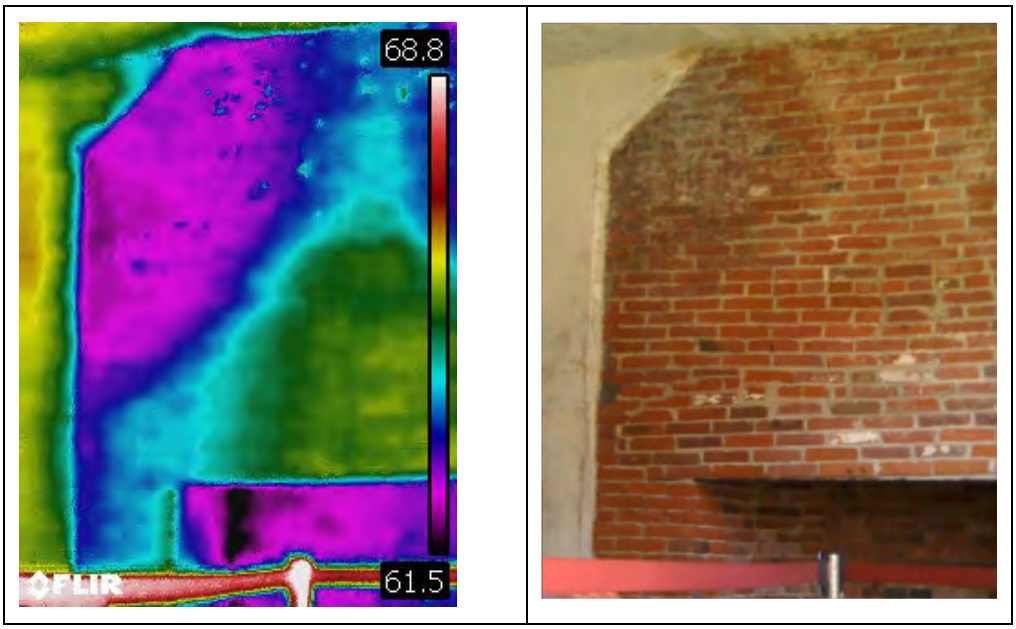


Figure 29: Image of the west portion of the fireplace in the kitchen. Similar conditions as previous figure. Moisture ingress occurs at the stepped portion of the chimney as it interfaces with the weatherboards on the exterior.

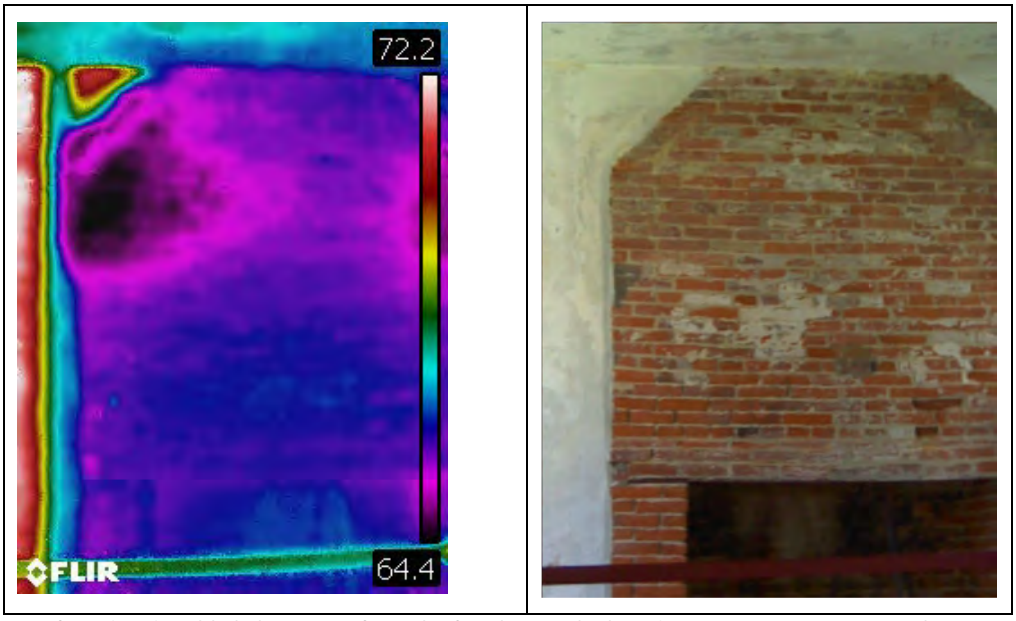


Figure 30: Infrared and visible light images from the fireplace in the laundry. Moisture intrusion at chimney shoulder on south chimney is visible as cooler black and purple colors in IR image.

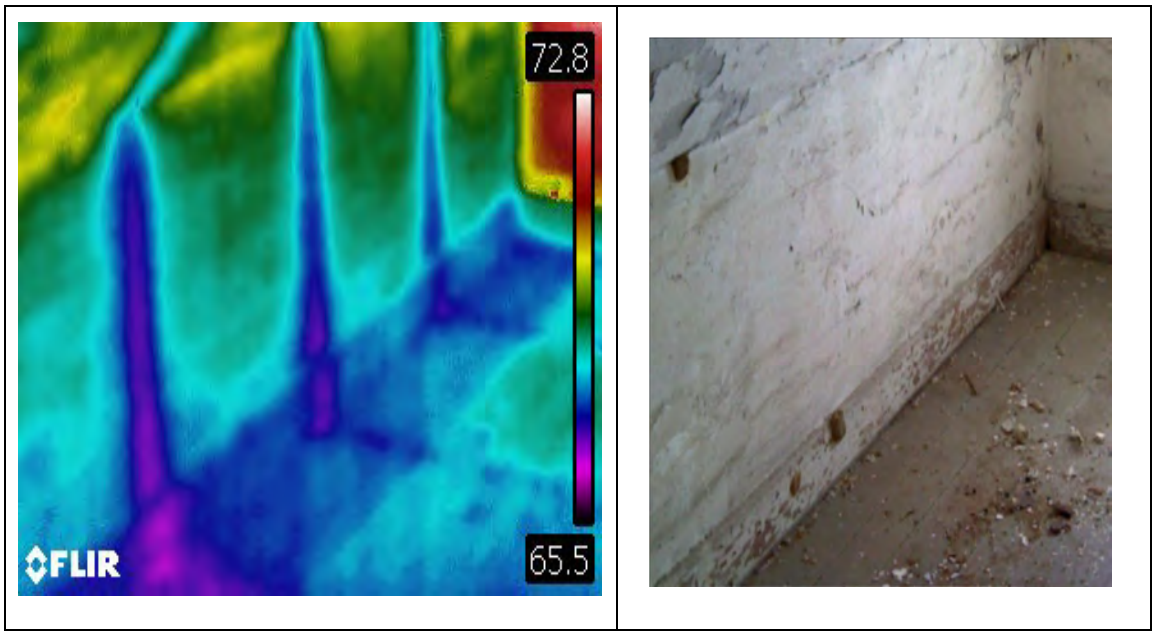


Figure 31: Images from southeast corner of half-story south room. Studs and floor joists show cooler in IR image and indicate alignment of the knee wall studs and floor joists.

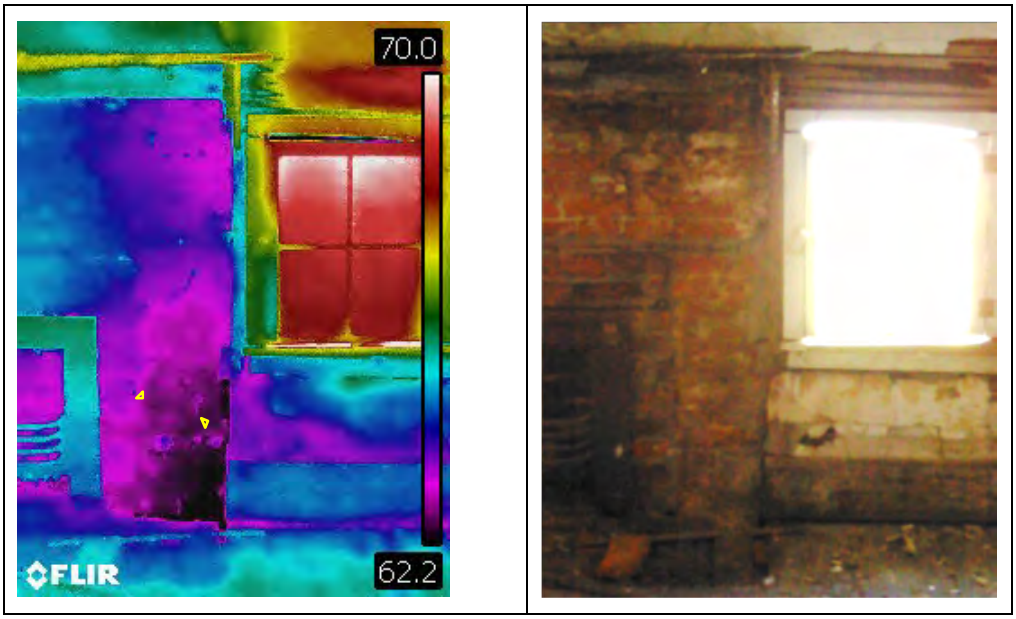


Figure 32: Infrared and visible light images of the fireplace in the north half-story room. The lower right side of the clay masonry fireplace is cooler than the surrounding masonry due to the presence of moisture in the masonry. The plaster visible above the baseboard is also cooler due to the presence of moisture – either wicked from the damp masonry or due to leakage from the window.

Character Defining Features

The four buildings are each purpose-built to perform specific functions in support of the operation of Appomattox Manor. With the exception of the Old Smokehouse with its present interior finishes, each building is an accurate representation of its functional requirements providing an integration of building form and function. The traveler in 1860 would recognize each building type by its exterior, immediately realizing the functions contained within. The traveler in 2017 who was familiar with the plantations of the Tidewater and beyond, would likewise recognize the function of each building by its exterior. The arrangement of the buildings on the site was common enough to have these travelers also recognize that this area was devoted to household support functions.

Functional Considerations

1. Massive brick chimneys at each gable end announce the building's functions. Each chimney differs in design and brick size.
2. Two tall-height rooms downstairs and two short-height rooms upstairs making the building 1½ stories in height.
3. The gabled form of the roof with axis running north-south.
4. Roofing of wood shingles, with rounded butts, a projecting comb ridge, and red paint.
5. Lapped weatherboards.
6. Windows placed at the first story for cross ventilation are in line with the hearth area. Windows are double hung and the north windows upper and lower sash overlap when closed. Therefore, there is no meeting rail. The south windows are of normal double hung configuration with the characteristic meeting rail. The south pair of windows has sash dividers narrower than those of the northeast. Three windows are of nine-over-nine sash configuration, the northwest is six over six.
7. Two entry doors on the east elevation indicate on the exterior the interior division into two functional areas of kitchen and laundry. The interior is further divided by a separation wall previously (HABs drawing indicated) with a door. The doors differ in construction: the north door has two very wide vertical planks with three horizontal battens on the exterior, the south door is a six panel without edge molding of the panels. The single west elevation door provides access to the kitchen, is constructed of eight random width vertical planks with battens in a "Z" configuration on the interior face.
8. The first story of the interior is divided by an east-west wall in which there is an existing opening. As seen in the HABs drawings, this opening previously had a door.
9. The second story is divided by the central stairway, hall, and an open "closet area." These spaces are formed by two east-west walls in which there are wood panel doors entering each of the two rooms.
10. The second story doors are of frame and panel configuration, with six panels (two small horizontal over two large vertical, which are over two more large vertical). Although notably, the south room entry door is upside down, with the small panels on the bottom. This installation may have occurred by accident, or due to wear, or due to an intentional philosophical position. In the normal installation position, six panel doors are at times referred to as the "cross and bible" door.
11. The gable walls of the second-story level each have two casement windows, located adjacent to the chimney, each window swings inward, and is of two over two glazing configuration with narrow sash dividers.
12. The form of the space of the upper story's two main rooms is of short sidewalls formed by a pony wall, a sloped ceiling attached to the roof rafters, and a center flat ceiling attached to the collar ties (see the Kitchen-Laundry Section on Sheet A4 of the plans).
13. The flooring is composed of planks.

14. The interior surfaces of walls and ceilings are of rough plaster over predominantly split wood lath and some sawn wood lath. The appearance of the plaster on the ceilings is particularly rough. The plaster of the upper story is thin enough to show the pattern of underlying lath. The surface appearance is important. Some of the previous repairs did not respect the qualities of the surface appearance. One plaster sample was taken and analyzed from the interior of the second story. No fibers were found in the one sample and no fibers were observed in broken edges.
15. The hardware of the doors is of rim lock configuration, typically with "Bennington" style fired clay knobs (circa 1840). Please note that the hardware is described in detail in the Conditions Section of the report.
16. Brick foundation.
17. Plain moldings as corner boards, casing, rake moldings, and fascia to underside of roof joint cover board. Boxed eaves.

Aesthetic Considerations

18. A bead is planed into the lower edge of the weatherboards, and outer edge of corner boards, and casing.

Construction Considerations

19. Wall and roof construction is of hewn timbers and sawn timbers with mortise and tenon joints with wood peg fasteners. There is more information about the period of the cutting of the individual members available by both close inspection and dendrochronology. Currently, visual and physical access is extremely limited.

Ancillary Elements

One ferrous bar traverses the area above the throat of the south chimney. Bars in this general location were used to suspend meat for light smoking or to suspend a trammel for in turn adjustments of hanging cooking pots by their bail.

Remedial Treatments and Interventions

The treatments are detailed in Part Two of the report, "Treatments and Work Recommendations," in which the recommended treatments and interventions are presented, many in substantial detail where the complexity warrants deeper explanation. As the Kitchen-Laundry is both the largest building and has all of the materials and systems of the others, it is at that building where the detailed treatment recommendations are set out in a comprehensive manner. Where the same treatments are required for one of the smaller buildings, there is a reference back to the treatment as set out for the Kitchen-Laundry. By example, lime whitewash is present in the Kitchen-Laundry interior and exterior; as well, it is present in the interior of the Dairy. The comprehensive explanation of the treatment is presented for the Kitchen-Laundry and referenced thereto in the Dairy lime whitewash recommended treatment. Where a treatment is particular to just that building, such as tung oil wood floor finish, it is presented for just that building. Another example is a revised foundation for the Old Smokehouse; no other building has this recommended treatment.

Below are listed short descriptive titles of the recommended treatments provided for your consideration, for this building:

1. Repair wood shingles
2. Repair and or replace deteriorated weatherboards
3. Repairs to doors, windows, and their hardware.
4. Brick chimney repairs; re-pointing and deteriorated brick replacement.
5. Whitewash renewal on chimneys

6. Flashing repairs
7. Caulking replacement
8. Plaster repairs
9. Refresh tung oil floor finish
10. Replace brick in fireplace, back and sides
11. Repair built-in cupboards.
12. Renew interior finishes as needed, paint and lime whitewash
13. Repair and protect lightning cable conductors at ground level.
14. Regrade site for positive flow away from building, particularly at north chimney

Future Research Needs
The north 5 to 10 feet of the second story of the Kitchen-Laundry exhibits floor slopes with a low point evidenced most particularly in the baseboards, and plaster cracking at the walls and ceilings. On the exterior, the stepped coursing of the chimney is sloping toward the building. This condition is perhaps indicative of settlement of the chimney; leaning into the building causing the slight buckling of the second story floor. The challenge is how to monitor the potential movement in a least cost manner, hopefully using park staff.

There are two alternate recommended approaches to monitoring any potential movement of the chimneys. In either case, it is recommended to repeat these measurements annually.

The low-tech approach would utilize a self-leveling laser level with a 90-degree prism that produces both plumb and level reference beams. Chimney plumb can be monitored by placing the laser level on a flat surface adjacent to the chimney and measuring the offset to the plumb laser beam at two reference points—one near the base and one high on the chimney. The difference (by subtraction) between these two measurements will be a constant, if there is no change in plumb. If this measurement is periodically repeated, with the same reference points, any rotational movement will become evident. Subsidence of the chimney can be monitored by placing the laser level on a reference position (e.g., one of the horizontal steps) on the chimney and noting where the level beam of the laser level meets the perpendicular Manor wall. Again, repeating this measurement periodically, with the same setup, will indicate any vertical movement of the chimney.

Alternately, NPS can elect to have a surveyor establish reference points on the chimneys, with respect to a known reference point, and annually resurvey these points.

Brick

All of us in preservation are in a constant search to find ways of doing things easier, cheaper, and better. One example is the quest to have the dimensions of materials tell us about the period of construction or at least the probable date of the material. The taking of dimensions is both easy and cheap. By example, a wood framing material of nominal 2-inch by 4-inch dimension of today is expected to be 1.5 inches by 3.5 inches. The date when a full sized 2 by 4 evolved to a smaller size varies by period of time and locale. Manufacturing trade groups in the southeastern United States banded together to create size standards for their members to follow. Note the three factors, manufacturers (not the individual smaller independent sawmill), members, and the geographic isolation.

In brick use, there is also a history to be discovered: from where were bricks sourced prior to local production and do these bricks have distinctive characteristics such as size and color. One country supplying bricks to their colonies was Holland. The bricks did vary in color and size but one particular brick, ijselstene, was both small and yellow and was a long fired durable brick. The Dutch began brick production in their North American colony at New Amsterdam by 1628, however the imported bricks were considered more durable.

Brick kilns were present in Virginia from the earliest period of colonization. Extensive archeological work at Jamestown uncovered an early brick kiln, described in greater detail below. The importance of this discovery lies in its limited use. It is believed that at most it was used twice. In essence, these kilns were built to fire the bricks for either the landowner's house or at most just a few buildings. They were not built as manufacturing facilities with continuing long-term production meeting a widespread geographic need for quality bricks. The dedicated facility for manufacturing brick lay in Virginia's future.

One could term these early kilns as "homebuilt": constructed of clay bricks to be fired on the site of the home to be built from the homebuilt bricks. While this was an early practice of the 1600s in Virginia during the documented period of the Jamestown kiln, it is an ongoing practice today in developing nations. In a visit to Malawi (Africa) in the autumn of 2012, the common house construction material was brick, fired on the premises. One can readily observe the remains of kilns in the front yards of the houses, from which the majority of bricks have previously been removed. Larger fancier homes, while rare, employ the same technique of building a homebuilt kiln from site produced bricks, firing the kiln with wood, and after cooling dismantling the kiln and using the resultant bricks in the house construction. The homebuilt kilns of Malawi are remarkably similar to the Jamestown kiln, which is in turn similar to kilns of the same period in England.

Photo 3455: A brick kiln in Malawi (Africa). Source: John Feinberg, October 2012.

The process of brick manufacture during the 1600s in Virginia is similar as well. Once the clay body is mined, it is dried and then pulverized. Mixed with water and possibly some sand, the clay is placed into forms as molds. Typically six brick molds were used, constructed of wood, and dusted with sand before the balls of clay were thrown into the mold and the top struck off with a flat board. The molds were turned out and the individual bricks dried outside or under a shelter or both. These bricks were used to both create the kiln and fill the kiln. This process could result in different size bricks from this kiln and in comparison with a nearby kiln. Here are the size differentiating factors:

1. The clay deposits can vary in type and shrinkage.
2. The mold dimensions can vary both initially and due to wear.
3. The proximity of an individual brick to the heat source results in differing quality to the brick and its size. The bricks closest to the fire source can be much darker in color (the almost black bricks being termed clinkers) and can be both smaller and less uniform in shape; distorted. Conversely those furthest from the heat source will be less durable, and of more uniform color and size.

This variability in the dimensions, color, and durability of the final product required selection by the user of the bricks most suitable for a particular use. The clinkers were often separated out for use as pavers. The least well fired bricks were used in the interior wythe or wythes of a wall with no weather exposure. The best bricks were placed on the primary elevation of the building. High quality bricks would be used not only where weather exposure was greatest, they were also used in the fireboxes of the fireplace where the deleterious effects of the fireplace were greatest. Here the bricks did not need to look good they just needed to perform well. For this selection process,

the masons had the responsibility for choosing which variable quality bricks would be used in which location.

There are three other effectors of brick dimensions: the rule of practice by the masons, the rule of standardization by governments, and the rule of aesthetics.

1. The rule of practice: Masons of any time period prefer to not cut bricks and therefore desire the aggregate length of the wall, length between wall openings, and heights of walls to be in multiples of units of brick size and mortar joint.
2. The rule of government standards: Governing bodies change dimensions, which may relate directly to bricks or may apply more universally. Most of the governments of Europe and Great Britain have changed a specific standard length at various times in their history, by example the yard by royal decree was set by Queen Elizabeth I in 1588, and amended by an Act of Parliament in 1842. Brick sizes in England were set by a Charter in 1571, and Parliament in the 18th century set a brick size, albeit not regularly followed.
3. The rule of aesthetics: Societal tastes favor different brick lengths at different times such as the popularity of the Roman brick, and different joints widths such as the butter joint.

With a handmade brick, one could alter the basic size by altering the mold size. When machine based brick manufacturing began, alteration of the brick size was more costly and thus less likely to willfully occur.

The brick kiln at Jamestown followed the English tradition, which is not significantly different than other countries then current practices. The Jamestown archeological excavation found much of the back wall intact at the lower level, indicating it was likely to have been retained for a second firing. Partial arches in the front wall for the firing tunnel openings were substantiated by the altered condition of the soil where the heat had been the highest. The bricks to be fired were laid in open or gapped herringbone patterns on benches of previously fired bricks, also indicative of the intent to re-use this kiln. Unlike in current day Malawi practice, the outside was not covered with clay. In Jamestown, the estimate was that firing of the kiln took six days. The mason who laid the kiln was likely to have been the same mason who directed the making of the bricks; however, these two trades may have been completed by different individuals. The education in the practice in England was governed by the trade guilds, and perhaps there were people in Virginia with this education and practice background who were regularly employed to make bricks at Jamestown and the Tidewater plantations. For reasonable certainty, enslaved people and indentured servants did much of the harvesting and mixing of clay for the bricks, the removal of bricks from the molds, drying of the bricks and construction of the kilns. It is estimated that six people provided support to the individual brick maker who in a 10-hour day was capable of producing 3,500 bricks.

As to color of the bricks:

> *There was also some change in the normal brick size during the Colonial period, and possibly some change during Jamestown's history. Study of the bricks from all structures excavated at Jamestown suggests that the bricks made during the first half of the century were slightly longer and thinner than those made during the latter part of the century. Similarly, there is marked trend toward shorter, narrower, and thicker bricks during the next century. Because of the dearth of historic records by which foundations can be dated, and the meagerness of other architectural criteria, such as would be available in a standing structure, bricks tend to assume too much importance in dating foundations, such as those at Jamestown. …the bricks in Jamestown foundations run about 8-3/4 to 9 inches in length, 4 to 4-3/8 inches in width, and 2-1/4 to 2-1/2 inches in thickness. There are bricks departing markedly from this range in structures, presumably of the Jamestown period, in other parts of Tidewater Virginia. For example, the Thorogood House in Princess Anne County (believed to date from about 1640) has a very uniform brick measuring 8-1/2 by 4-1/8 by 2-1/4 inches. In many seventeenth century structures, however, such as St. Luke's Church in Isle of Wight County, the Warren House (Rolfe House) and Bacon's Castle in Surry County, and Christ's Cross in New Kent County, the bricks run about the same as those at Jamestown.*
>
> —*Seventeenth Century Brickmaking and Tilemaking at Jamestown*, p. 35

The bricks found in a building, whether walls, foundations, or chimneys, may have come from one source, multiple sources, or been salvaged from another building. Thus, for example, at Appomattox Manor, archeological excavations of the earlier main house found both mortar and brick in the cellar hole excavation. This evidence of earlier brick construction would raise the possibility of the re-use of some or all of the salvageable bricks for outbuilding foundations and/or Kitchen-Laundry building chimneys.

Previous researchers have shown interest in the possibility of the building being completed in two time periods with two considerations: the detailing of the attachment of the chimneys to the frame structure with the south end standing off for the upper section, the north end up against the frame structure for its entire height, and the two chimneys having slightly different dimensions. The work at Jamestown relative to brick sizes has its own independent conclusions:

> *In appearance, the bricks used at Jamestown have the usual wide range of colors and textures found in handmade bricks. They vary from light yellows and oranges to deep reds, browns, red-purple, olive green, and even chocolate. On the whole, the colors are relatively soft shades of brown, salmon, and medium to dark red. The wide variety of colors, used at random throughout the walls, produced the pleasing brick surfaces common in that period.*
>
> —*Seventeenth Century Brickmaking and Tilemaking at Jamestown*, p. 35

The sizes of bricks and the excavated kiln photographs are provided below.

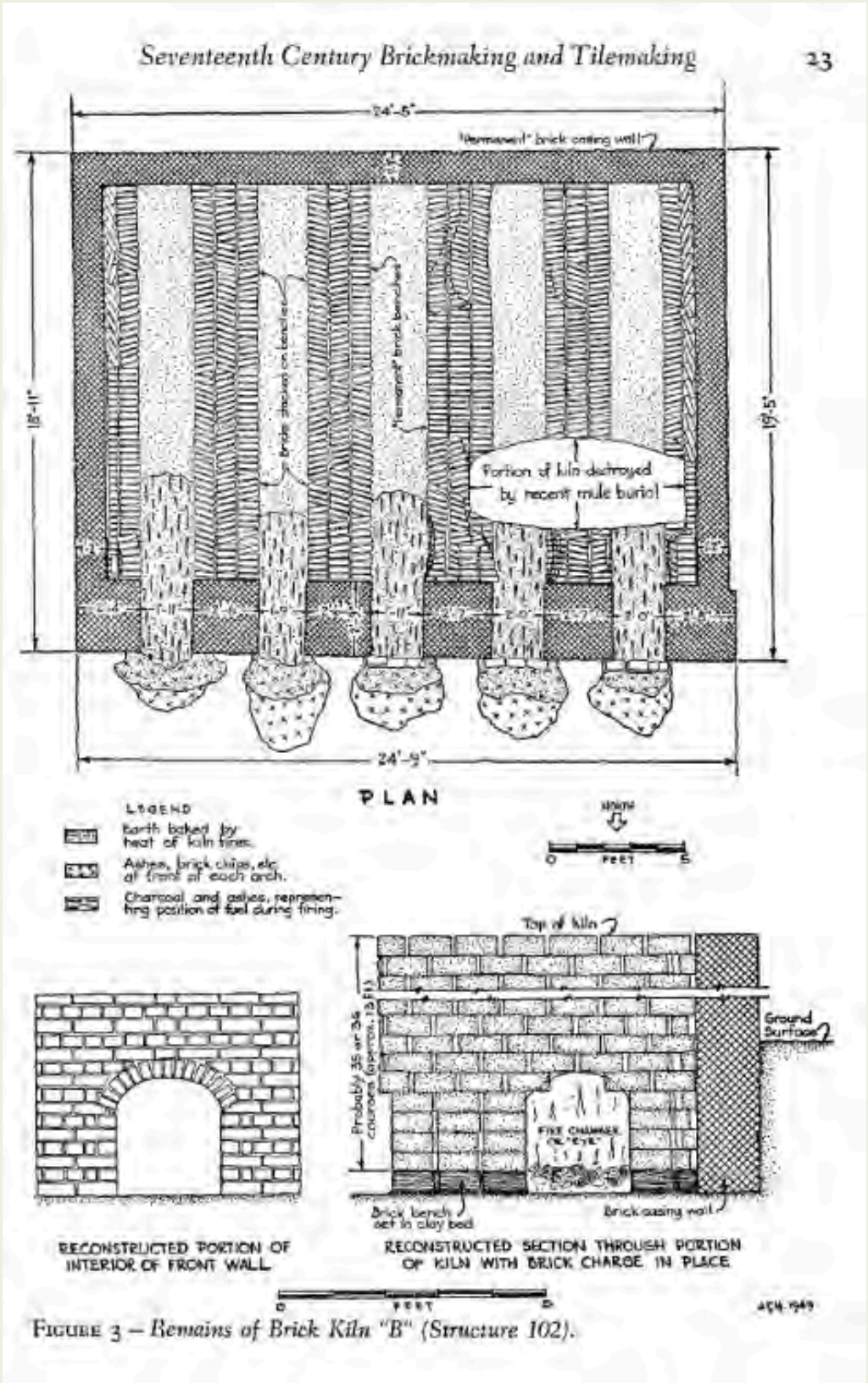
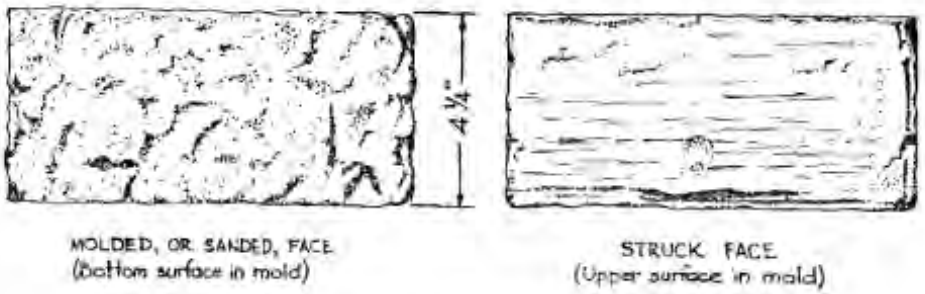


FIGURE 3 – *Remains of Brick Kiln "B" (Structure 102).*

Source: ***Seventeenth Century Brickmaking and Tilemaking at Jamestown, Virginia*****, p. 23**



Source: ***Seventeenth Century Brickmaking and Tilemaking at Jamestown, Virginia*****, p. 36.**

APPENDIX

Sizes of Bricks from Seventeenth Century Structures at Jamestown

THE dimensions given below are those of the average brick, or most common size, and not an average of a series of measurements. The structures listed are representative of some 150 separate structures excavated at Jamestown.

	Measurement in Inches		
	Length	*Width*	*Thickness*
Statutory size (Eng., before 1625)	9	4¼	2¼
Statutory size (Eng., after 1625)	9	4⅜	2¼
JAMESTOWN ISLAND:			
Brick kiln (Structure 162)	9	4¼	2⅜
Church tower (c. 1640)	8¾	4	2¼
First Statehouse (earlier portion; c. 1632)	9	4¼	2⅜
First Statehouse (later portion; 1642-1655)	8¾	4¼	2⅜
Structure 6 (date unknown)	8¾	4	2¼
Structure 16 (date unknown)	8½	4	2¼
Structure 19-A (date unknown)	9⅛	4¼	2½
Structure 19-B (date unknown; later than 19-A)	8⅞	4⅜	2½
Structure 21 (date unknown)	9	4¼	2¼
Structure 26 (date unknown)	8¼	4	2½
Structure 31 (c. 1680)*	8⅛	4¼	2⅜
Structure 48 (date unknown)	8⅞	4⅜	2⅜
Structure 72 (date unknown)	9	4⅜	2½
Structure 86 (1661-1662)**	8¾	4¼	2⅜
Last Statehouse Group (c. 1665)	8¾	4⅛	2½

*Probably William Sherwood's house, built over foundation of earlier "Country House."
**Built by William May, later owned by Henry Hartwell.

Source: ***Seventeenth Century Brickmaking and Tilemaking at Jamestown, Virginia*****, p. 39.**

Overall view of Brick Kiln "B" (Structure 102) from the front, or north, side at completion of excavation.

Overall view of Brick Kiln "B" from the rear at completion of excavation.

Source: ***Seventeenth Century Brickmaking and Tilemaking at Jamestown, Virginia*****.**

Part 1—Developmental History

Physical Description—Dairy

Dairy

General Description:

The Dairy is a one-story timber framed wood structure with a pyramidal shaped roof. The building is equal sided and is square in plan. Each elevation is 12 feet-2 inches in length. The exterior face of the walls is covered with painted lapped weatherboards, with a bead planed into each board's lower edge. The boards terminate in a butt joint with the corner boards also having a bead. The roofing is of round butt painted wood shingles with a sheet metal finial and flashing piece at the peak. The join of the roof to wall has a boxed eave with classic moldings: *ovolo* and *cyma reversa*. The foundation is of brick, and the brick floor is sunk into the earth. The interior is of exposed structure with whitewash. On the south elevation, there is one entry door constructed of eight vertical random width boards for the exterior face and three horizontal cleats on the interior face. The hardware consists of a rim lock with "Bennington" style knobs and a pair of "T" strap hinges mounted on the interior face. At the top of each elevation wall, there are six wood ventilation openings with fixed wood louvers.

Shingles—A History of Use in the Tidewater

Was the wood shingle always the roof covering of choice?

Not always but mostly. Early roofs were thatched and the second material was wood clapboards. Wood shingles followed and continued to be popular until the introduction of sheet metal in the Industrial Revolution Period. There was a short period of fired clay roofing tiles, fired in the same kilns as the local brick, occurring generally between the end of the clapboard era and the widespread use of wood shingles. Slate was also used on the grander buildings, such as government buildings.

Was the wood shingle configuration always with a rounded butt and why?

The rounded butt was fashionable; the shape had no benefits in terms of shedding water. The rounded butt was thus simply a decorative device and may reflect a desire to have the wood shingles appear more like fired clay tiles. Square butts came into fashion beginning in the period of the Civil War and continuing thereafter.

What surface treatments were used?

Two treatments were used: the surface was painted red-brown using red oxide and linseed oil; in the second treatment, "tar" was applied. The tar was likely "pine tar," a well-known wood preservative. The latter would have darkened the surface replicating somewhat the color of slate. Dark gray paint was also used to replicate the color of slate. Both paint and pine tar were used together, gaining both the preservative benefits of pine tar and the desired color of the paint.

What were the species of choice for wood shingles?

Both cypress and Atlantic white cedar were used for their rot resistance and local availability. Both species are native to the region with the range for cypress from the Chesapeake to East Texas, and the range for Atlantic white cedar covering the eastern seaboard.

Were wood shingles attached with different techniques at different times?

The earliest attachment method of wood shingles was by wood pegs rather than the more expensive wrought nails. As more iron became available, wrought nails became the attachment of choice. As nail making became mechanized cut nails reduced the costs of fasteners still further.

Sources: Bulletin of the Association for Preservation Technology, Vol. II, Nos. 1-2, 1970; C. Carson and C.R. Lounsbury, eds., *The Chesapeake House: Architectural Investigation by Colonial Williamsburg*. Chapel Hill, NC: In Association with the Colonial Williamsburg Foundation by The University of North Carolina Press, 2013.

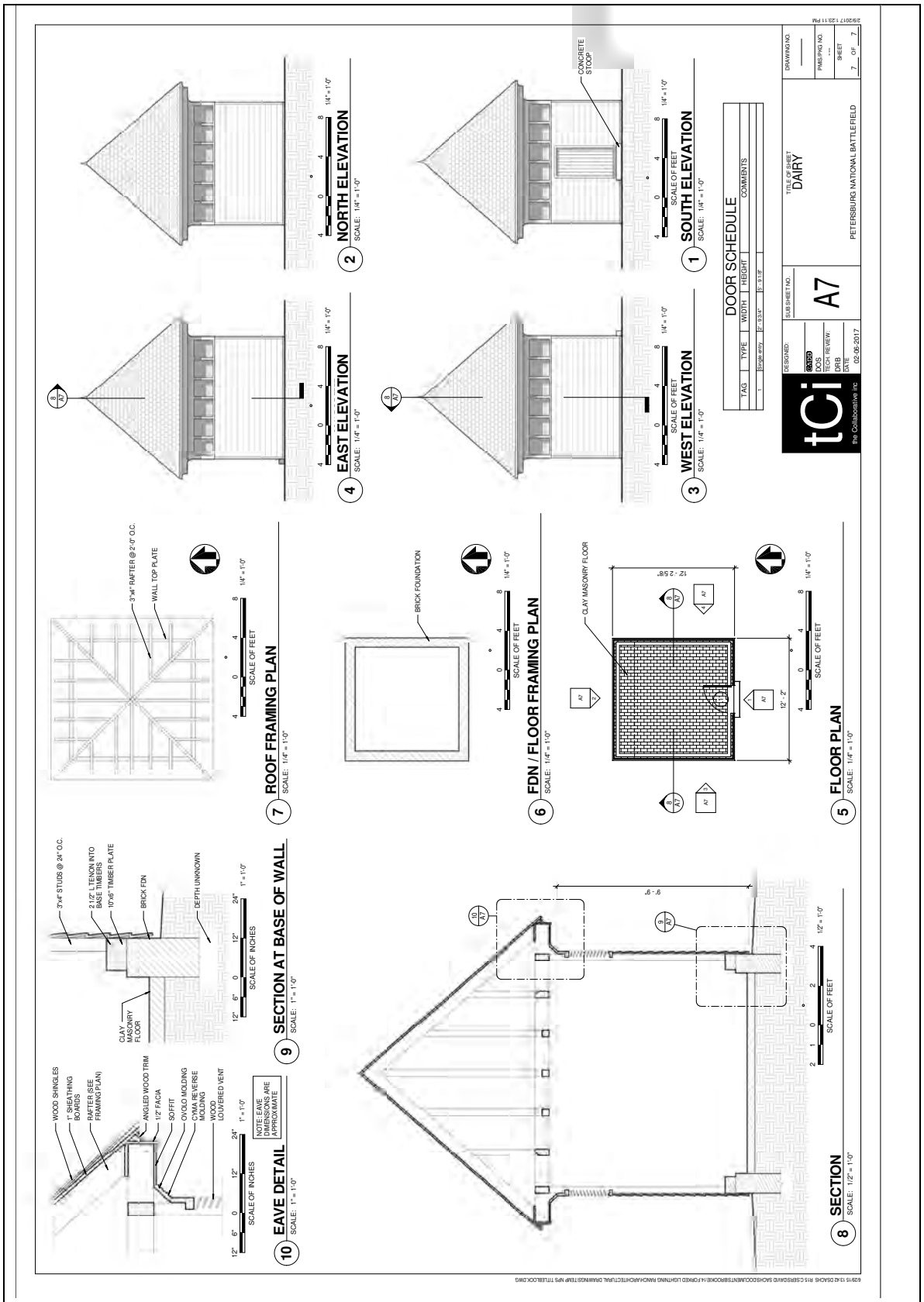


Figure 33: Dairy Floor Plan, Roof Framing Plan, Elevations, Details, Section.

Photo 134 (JDF2076): Dairy: North elevation.

Photo 135 (JDF2077): Dairy: East elevation.

Photo 136 (JDF2078): Dairy: South elevation.

Photo 137 (JDF2079): Dairy: West elevation, north half.

Photo 138 (JDF2080): Dairy: West elevation, oblique view.

Photo 139 (JDF2182): Dairy: South interior elevation.

Photo 140 (JDF2183): Dairy: West interior elevation.

Photo 141 (JDF2184): Dairy: North interior elevation.

Photo 142 (JDF2185): Dairy: East interior elevation.

Records of Repairs and Alterations
The Dairy was the subject of a 2010 preservation project completed by Sandra Eickmeyer, a member of the on-site NPS staff. The source documents are construction period photographs. The repairs and alterations indicated below from this 2010 work are set out with this date. Documentation of other work is denoted by its known date of construction or, if not known, this is so noted.

Photo 143: View of the in-process renovation in 2010 of the front of the Dairy. Note removed corner boards.

- "Foundation: Pour concrete pads at the exterior corners as platforms for the jacks in lifting the building. Placement of bricks between the pads as linear foundations of three courses in height. Top the bricks with new sill beams, mortised to receive the tenons of the timber 'studs' also referred to as posts and diagonals (2010)." The brick foundation was present before the renovation work; only rehab work was done on it. The corners of the foundation were (inappropriately) repaired with concrete instead of brick.

- Wall structure: The bottom foot of many of the south elevation timbers appear to have been treated (see cropped photo 2189). The original sill was repaired, not replaced. Where repairs were made, it was done with epoxy and molded to shape. There is nothing between the sill and the foundation.

Photo 144 (JDF2189 cropped): Close-up view of the interior of the Dairy's south elevation.

- Wall weatherboards: Some have been replaced, in whole or in part, in 2010. Specifically, the west wall has three replaced clapboards, the north wall has four replaced clapboards, the east wall has three replaced clapboards, and the south wall has no replaced clapboards.
- Moldings: Given the lack of rot at the bottom 6 inches, likely changed out in 2010.
- "Door: Replicated door, date unknown"
- Window: None
- Roof structure: Several new lookouts have been added, west side (see cropped photo 2187).

Photo 145 (JDF2187 cropped): Close-up view of the Dairy's west wall and associated roof structure. Note the two lookouts without whitewash, indicative of their being replacements.

- Roofing: Wood shingles of cedar replaced, date unknown. The roof shingles are likely to be 35 years or older. A peak cover appears in a 1977 photo. It is unknown if it is the same one or not or when it was last painted. However, it is not in 2010.
- Interior: Brick floor, previously covered by earth, has simply been exposed as of the 2010 work. The floor's unevenness was not altered and no floor bricks were relaid. Reference JS conversation of 10/12/16 and email dated March 2, 2017.

Description and Condition of Elements
The materials of the Dairy are wood shingles, wood beams roof structure and sheathing, wood weatherboards as siding, wood timber for wall construction, wood soffit/fascia, wood moldings, wood louvered openings for ventilation, wood entry door, metal door hardware, metal roof cap at peak, metal fasteners, concrete foundation piers at the corners, brick foundation, brick floor, exterior paint, and interior lime whitewash

Roofing, Wood Shingles
Description: The partially round butt wood shingles replaced previous asphalt shingles as seen in the 1977 photographs of the Dairy. A 1980 NPS Individual Building Data sheet (Form 10768) indicates the Dairy roof as "Peaked asphalt shingle roofs." The views in the 1986 photographs show the roofing as round butt shingles. The shingles are an average of 15.5 inches in length by 5 inches in width. Exposure averages 7.5 inches and lap 8 inches (see photos 146 and 147). Note these dimensions result in just a double layer roof. Longer special cut shingles cover the ridges of the four hips. The installation included a red paint coating.

Photo 146 (JDF2214): Dairy shingle with dimensions.

Photo 147 (JDF2213): Dairy shingle with dimensions.

Condition: The condition issues of the roof shingles include: loss of paint coating, missing wood at exposed lower half edges, splits, cupping, and missing shingles. Each of these conditions has some inter-relationship leading to loss of the shingle and the functional compromise of not keeping rain out of the building. Loss of paint exacerbates cupping. Cupping eventually leads to a split or splits generally at the fasteners. The nail head pulls through the shingle releasing the shingle to fall.

There is a potential conflict between using period-correct wrought or cut square nails and modern big headed roofing nails. The square cut nails, unless installed through a previously drilled pilot hole, have a tendency to split the wood. The shingles being of tapered profile means that the wood thickness at the location of the fasteners is quite thin. Small headed nails tend to pull through the wood more than nails with larger diameter heads. Cut nails do come in two configurations that may reduce splitting and provide a bigger head to reduce pull-through; the Tremont Nail Company's slating nail and their shingle nail may be considered.

The thickness of the applied shingles is a likely contributor to their accelerated deterioration. The thicker the material, the more material can be lost to ultraviolet deterioration and windborne particle erosion. Thicker shingles tend to have greater resistance to splitting. Simply put, thicker shingles last longer. The original wood shingles were of unknown size and configuration. Typically split from the heartwood of a log cut to the desired length, the sides were made parallel and one or both surfaces were smoothed with a drawknife. The roughness of the unexposed side is an advantage as the cupping problem is principally caused by unequal drying, the top surface being exposed to the sun, it dries faster shrinks and cupping occurs. A rough surface on the under edge allows for better air circulation. Cupping's other cause is grain; the best shingles are all vertical grain.

Typically, shingles replacement may not be necessary on all sides of a building with shingle siding due to differential weathering caused by prevailing wind direction and sun exposure. Given

the pyramidal shaped roof form, there are four sides all with uniform slope but differing exposures, similar to the wall siding. The levels of deterioration should differ for each roof slope based on its exposure. Thus, the north slope of the roof will receive much less sun exposure than the south slope and there should be apparent differences in the percentages of shingles with cupping issues. Wind direction at the site might be of effect; however, there is not a significantly predominant direction. Essentially the four-sided roof is the perfect shape for relating shingle condition issues to exposure. A detailed evaluation was completed for the Dairy roof, except that the south elevation is partially obscured by vegetation, and has had extensive replacement of shingles since original installation and therefore it was not assessed for the condition issues set forth for the other three elevations and set out in the table below.

Table 15: Dairy Roofing Shingle Condition Problems*

Elevation	Cupping		Splits		Paint Loss**		Edge Loss		Missing	
	#	%	#	%	#	%	#	%	#	%
North	16	2.5	7	2	212	33	75	11.7	2	<1
East	32	10	150	44	129	38	8	1 or less	5	1
South***	—	—	—	—	—	—	—	—	—	—
West	30	9	160	47	320	97	8	1 or less	3	<1

*NOTE: Each slope averages 340 shingles.
**Paint loss of at least 25% of the exposed surface.
***South slope has had shingle repairs, and visual access is obscured by vegetation.

Certain overall conclusions can be drawn from the data.

1. For elevations exposed to the sun, the ratio in the numbers of shingles displaying cupping and splits have strong correlation at 1:5. The shingles with splits were likely to have been cupped before the split relieved the tension forces.
2. Paint loss numbers are significantly higher for the west elevation, 97% with the next highest being the north elevation at 33%. The high west slope paint loss numbers do not have an apparent cause related to exposure although west winds might be the strongest in force but not be a predominant direction.
3. Edge loss is highest for the north elevation at 11.7%, and the other two elevations do not show nearly as much at 1% or less. Longer term higher moisture is a north elevation characteristic due to a lack of sun exposure as compared to the other roof slope exposures. Cupping of north elevation shingles is correspondingly very low at 2.5%.

The overall condition of the roofs of the Dairy is poor. Immediate replacement is strongly recommended. The percentages of shingles requiring replacement is sufficiently high to rule out spot replacement in favor of more cost effective total replacement.

Wood Roof Structure

Description: Joists are 4 x 6 inch timbers running north-south. The joists are through-lapped over the top plate and cantilever approximately 18 inches to form a large roof overhang for the Dairy walls. On the east and west walls, lookouts are angle notched into the outside joists, are through-lapped over the top plate, and cantilever 18 inches beyond the top plate.

The roof of the Dairy is pyramidal with four hip rafters, originating at the ends of the cantilevered corner lookouts, and meeting at the center point of the square building. Four common rafters, originating at the eave at the middle of each wall length, also meet at the center point. Jack rafters, aligned with the joists intersect and support the hip rafters at regular intervals between eave and peak. The common and jack rafters on the east and west elevation do not typically align

with the lookouts. The roof is sheathed with 1 x 8 planks on average, with narrower planks at the peak.

Photo 148: View of the Dairy roof framing at the northeast corner. A typical lookout is visible in the lower right of the image. This member is seated in a beveled notch in the end joist, through-laps the top plate and extends approximately 18 inches to support one of the jack rafters. A diagonal lookout is also visible near the center of the image. This member is half-lapped with the end joist (and pegged) and cantilevers over the corner post to support the hip rafter and corner of the roof.

Condition: The following photographs illustrate condition problems.

Photo 149: View of the underside of the Dairy roof showing fractured and partially missing common rafter near peak of roof. A new, in-kind member should be installed.

Photo 150: View of the Dairy roof framing at the east elevation. The common and jack rafters bear on a 1 x 6 raising plate atop the lookouts. The rafters and lookouts do not necessarily align and the raising plate is loaded in the weak direction. In some cases, the roof loads are distributed through the plate near mid-span between lookouts. In these cases, additional blocking or stiffening should be installed to transmit loads to the lookouts.

Photo 151: View of one of the Dairy roof lookouts. The lookout is seated in a beveled notch in the joist. However, it is not pinned to prevent uplift from roof loads applied downward at the cantilevered end (to right). As a result, several of the lookouts have rotated out of the beveled seat.

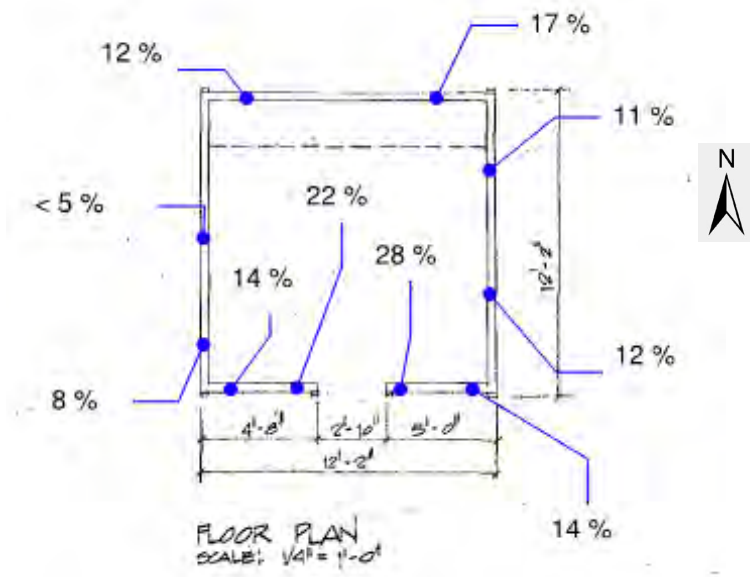


Figure 34: Moisture content in percent for timber sill. Note higher readings in the vicinity of the door.

Roof Appurtenances
Vents: There are no vents on this building, nor does it appear to have had them in the past.

Gutters: There are no gutters on this building, nor does it appear to have had them in the past.

Metal Roof Peak Cap Description: A fabricated sheet metal roof cap is present that has a central spire and extends metal flashing down each roof slope some 8-12 inches.

Metal Roof Peak Cap Condition: Due to access issues of loose shingles, the roof peak cap condition was not fully assessed on the exterior. The interior view of the underside indicates no apparent condition issues. A more complete examination of condition should be done in the future, in association with recommended re-roofing.

Wood Wall Structure
Description: The Dairy is of timber framed construction on a fired-clay masonry foundation with a fired-clay paver floor. A 10 x 8-inch replacement plate (installed in 2010) bears on the masonry foundation and is connected at the corners with mortise and tenon joints that are pinned with a 1½ inch diameter wood peg. Corner posts are approximately 3 x 13 inches and are tenoned into mortises in the top and bottom plates. The posts and bottom plate are mortised to accept tenons formed on the ends of the 4 x 6½ - 7 inch down braces (diagonals). The down brace mortise and tenon joints are secured in the posts with wood pegs. Studs are typically 3 x 4 inch members at roughly 24 inches on center with tenons that extend approximately 2½ inches into mortises in the bottom and top plates. Weatherboards are installed on the lower portion of the exterior walls with a system of exterior wood louvers installed to vent the upper portion of the walls. There are currently no interior finishes. A later interior wall was removed in the 2010 rehabilitation work on the building.

Condition:
The timber framed walls are generally in good condition.

Wood Soffit, Fascia, and Exterior Moldings

Description: One emphasis of the Dairy design is the airflow through the louvered openings at the tops of all four walls, and enhancements at the eaves to allow for smooth flow. The wood fascia and soffit have moldings to essentially reduce turbulence. These moldings executed in the classical profiles of *ovolo* and *cyma reversa*, cover two joints: wall to underside of soffit, and fascia to underside of the extension of the roof sheathing. Essentially similar details are present for the New Smokehouse. The primary difference is a New Smokehouse detail of a series of small diameter holes spaced along the fascia, 6 to 7 per elevation.

Photo 152 (JDF2221): Dairy molding.

There are corner board moldings to which the weatherboards are butted. The corner boards are equivalent to a 1x4, with the long dimension on the north and south elevations. A bead has been planed in to the outward end of the board at these same elevations. The corner board moldings extend from just below the lower edge of the lowest weatherboard up to the casing of the ventilation openings, which in turn continue the bead detailing at the corners. The latter vertical corner casings are approximately equivalent to a 1x6, and the vertical members of the exterior are 1x4 covering the interior timber studs. The entry door casings are approximately 2¾" for the side pieces, and 4-3/16" for the top piece.

Condition: Concern is present wherever a piece of wood with rot is in contact with another piece. Rot spores are easily transmitted. As the weatherboards butt up to the corner board, this joint is critical. The weatherboards absorbent end grain need protection from moisture contact, and the corner boards should not be in contact with the rotted end of a weatherboard. The end grain should be exposed to drying as well. Lastly, as wood is dynamic—picking up and losing moisture content—the length of a board will increase and decrease in small increments. This key joint has to perform a number of functions, keep water out, breathe, be flexible, and mitigate the potential

to perform a number of functions, keep water out, breathe, be flexible, and mitigate the potential of deteriorated wood contacting sound wood. In the modern era, this joint is caulked with any number of products available in the marketplace: polyurethane, polysulfide, butyl rubber, silicone, and so on. In the historic times, joints were often caulked with natural products such as jute treated with pine tar, known as oakum. It is not unusual to open up a wall adjacent to an entry door in a house and find oakum filling the joint, placed there 150 to 200 years prior, and still in excellent condition and fulfilling its intended function.

Looking at the corner boards of the New Smokehouse, of similar design, the lower ends are rotted. Looking at the corner boards of the Kitchen-Laundry, also of similar design, the lower ends are rotted. There appears to be a design and a materials selection problem. These two elements—corner boards and sheathing board ends—do not appear to have been treated with any preservative. The problem with the corner boards is moisture uptake at the bottom exposed end grain, probably due to splash back from the drip line of the roof drainage, and contact with adjacent rotted weatherboards. The reason the Dairy does not exhibit the same issue is that these were replaced in 2010. What material was used in caulking the critical joint is not as yet known.

Wood Weatherboards as Siding
Description: The wood weatherboards on the Dairy are similar to those used on all four structures in size and configuration (except the Old Smokehouse is without the beaded lower edge). Species identification was performed on two weatherboards, one from the Old Smokehouse, and one from the Dairy. The species of both were Southern Yellow Pine. The width of the boards of the Dairy is 8 inches, thickness is 1/2 inch (plus or minus), and the lap is 1½ inch (plus or minus). A bead has been planed into the lower edge. The exterior face is painted.

Replacement of the weatherboards is a normal process, and the length of the cycle will vary based upon conditions typically related directly to exposure. Where an individual building has eaves, there is some protection for the wall below with the boards at the upper section of the wall having the most protection, and the lowest boards the least protection from the direct rainfall. Moving down the wall, wind-driven rain accumulates, also affecting the lowest boards the most. By example, the north and south walls of the Old Smokehouse have virtually no eave protection and likewise the north and south gable end walls of the Kitchen-Laundry. Both the Dairy and the New Smokehouse have eaves over all of their walls. Wind direction is of effect with those winds accompanying rain events having the most potential. Summer thunderstorms may be more intense than a several days long spring rain, but the length of the storm and the time before the drying sun begins to shine differ.

Examination of historic photographs of the buildings from different time periods provides evidence indicating these patterns of deterioration have been present for each period represented. If any of the original weatherboards exist, they would be the top boards on the most protected elevation. While paint analysis is typically of assistance in determining originality, the weatherboards were reportedly the subject of a lead paint mitigation project during which all of the paint was removed with no paint samples taken prior to removal. Without such confirming documentation, there is not a method to determine the relative date of the individual weatherboards. A technique useful on full timbers—dendrochronology—is not able to date a slice of a tree; there are typically not enough tree rings.

The repairs to the weatherboards have varied in terms of technique: replacement of existing material with in-kind material, and reversing the exterior face for the interior face. Where the latter method was used, the previously exterior painted face is visible on the interior. Such exposure of the interior surface of the exterior wall is only present for the Dairy and New

Smokehouse. The Old Smokehouse has wood on the interior face of the wall framing and the Kitchen-Laundry has lath and plaster. For the Dairy, the replacement weatherboards are discernible by their new appearance—a much lighter color than the older boards—as seen in the interior photographs of 2016's site visit (see photo 153]. Note the boards are not always full length, reflective of the desire to retain as much sound older material as possible. In the New Smokehouse, the color difference is of more contrast, dark stained weatherboards, perhaps reflective of smoke staining, in contrast with the there-reversed white painted weatherboards (see photo 154).]

Photo 153 (JDF2184): North interior elevation of the Dairy. The light-colored boards are new.

Photo 154 (JDF2191): New Smokehouse: south interior elevation. Reversed weatherboards appear white.

Nail heads are visible on the exterior surface, indicating face nailing as the installation process. Whether there are nails under the lap could not be determined as the area was not visible. The nail heads' geometry is variable: round, square, and ellipsoidal. None of the nails were removed during the field visit to determine their configuration below the head: shaft shape, taper, and length. Sandra Eickmeyer reported her process for weatherboard replacement included drilling pilot holes for the nails, an excellent practice to reduce the potential of splitting the board by the "wedging" forces of the nail.

Condition: The condition issues of the weatherboards were assessed and tabulated in the field for each elevation commencing with the top board as number 1 (highest on the wall) and working down. These results are provided in the table below.

Table 16: Siding Condition Assessment of the Dairy

Elevation	Type	Number	Condition (from top)	Other
North	Lapped, 6 inch exposure, face nailed, individual pieces 8 inches +/- 1½ inch lap x ½ inch	14	4: end split 8: end split 9: center split 11: end split 12: end split 13: 2 end splits General: nail pops	Square nails and new

Continued on following page

Table 16: Siding Condition Assessment of the Dairy (continued)

Elevation	Type	Number	Condition (from top)	Other
East	Lapped, 6 inch exposure, face nailed, individual pieces 8 inches +/- 1½ inch lap x ½ inch	14	1: end split 3: 3 end splits (two pieces) 5: end split 6: end split 8: end split + middle 9: end split 10: two end splits 12: two end splits	
South		14, but divided by door, except nos. 1 & 14	*West of Door* 2: end split 4: two end splits 5: end split 6: two end splits 7: end split 9: end split 12: end split *East of Door* 3: end split 4: end split 5: end split + center split 10: end split 11: end split 12: end split	
West		14	1: end split 2: end split 3: two end splits 4: end split 5: two end splits 6: two end splits 7: end split 8: two end splits, edge piece is missing 9: missing corner 10: end split 11: missing corner 12: end split 13: center split 14: two bottom splits and missing piece from edge.	

An overall condition assessment must be reflective of the conditions tabulated above: some boards are good, some poor, and some fair. As seen in the photograph of the northwest corner, end splits are prevalent, and current effects vary. The evolution is minor splits get bigger and rot ensues.

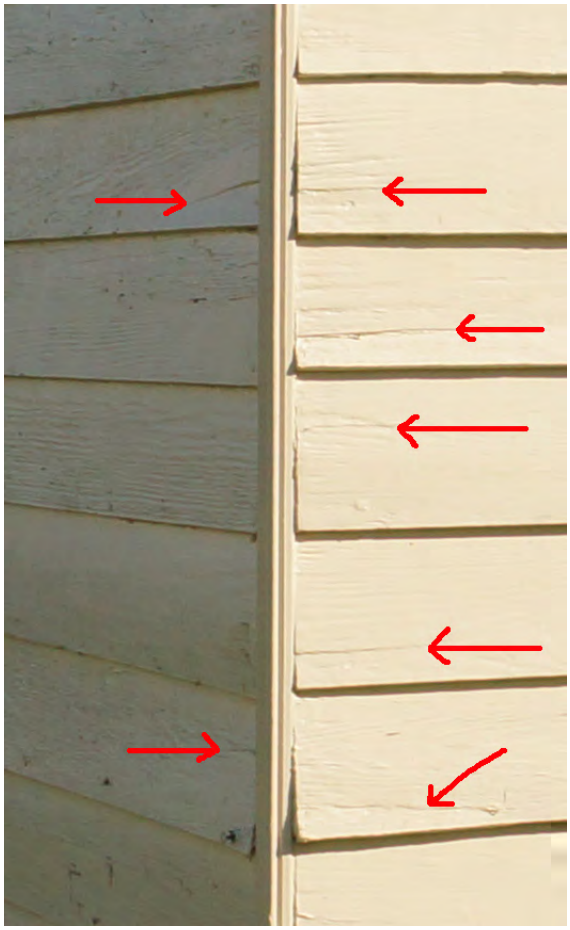


Photo 155 (JDF2079): Northwest of Dairy, showing close up of end splits.

Wood Ventilation Openings

Description: There are six louvered ventilation openings in the top of each elevation, each with 11 fixed wood louvers.

Photo 156 (JDF2080): Dairy: North and west elevations, close-up photo of louvers.

Condition: There are minor amounts of material missing from the edges of the majority of the louvers. These losses do not affect in any significant way the appearance of the louvers; it is consistent with their age.

Door and Window
Wood Entry Door Description: The entry door, which is on the south elevation, has eight vertical planks. There are three horizontal cleats on the interior. The dimensions of the door are 5 feet, 9 inches high, 33¾ inches wide, and 15/16 inch deep. The threshold is 6 inches by 1-3/8 inches. Below the following two photographs of the door is a sketch of the frame. The hardware is a rim lock with porcelain handles, brown Bennington style, and a pair of "T" shaped strap hinges. The door swings in off the east jamb.

Photo 157 (JDF2095): Dairy: Door.

Photo 158 (JDF2182 cropped): Interior view of Dairy door.

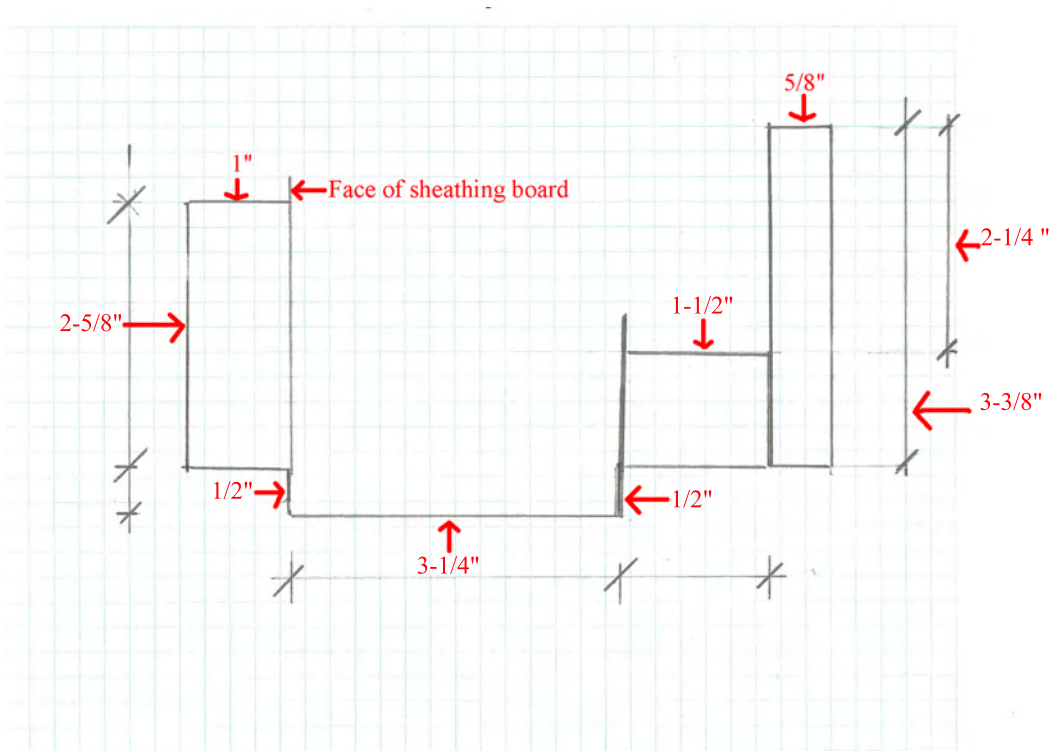


Figure 35: Sketch of door frame in the Dairy's south elevation.

Wood Entry Door Condition: The lower edge of the door plank exhibits water stains. The lower hinge is loose at the door frame.

Window Description: There are no windows on this structure.

Brick Floor
Description: After reading Olmert's book *Kitchens, Smokehouses, and Privies: Outbuildings and the Architecture of Daily Life in the Eighteenth-Century Mid-Atlantic*, Mr. Dabney, Curator at the Petersburg National Battlefield, suggested that the park's maintenance staff should remove the wood floor during the renovation project of 2010 and see if there was a brick floor under it. Indeed, a brick floor was found.

Condition: The floor is in good condition.

Photo 159 (JDF2189): View of the Dairy's floor.

Brick and Concrete Foundation
Description: The Dairy sits on a fired-clay masonry foundation with poured concrete corners. The foundation was repaired in September of 2010. The sill plate was repaired as well.

Condition: The fired-clay masonry foundation is in good condition likely due to the renovation work done in 2010.

Interior Finishes
The only finishes are the brick floor and lime based whitewash.

Materials Analyses

Paint Analysis Summary: Three samples were taken from the exterior siding. Each sample was taken from an area that might have escaped the lead paint removal campaign, such as under the entry door's threshold. This under-sill sample yielded the most layers with five. The first intact layer was a white, N9.5/90.0%R. The interior had two samples of the whitewash coating and one was taken of an area of the surface of the east elevation's north diagonal exhibiting red paint. At least two other timbers exhibited painted portions with a top coat of gray green. Do note these are just fairly small areas of paint in an otherwise predominantly whitewashed space. Upon conjecture, at some point in the Dairy's history, it may have been used for storage including paint and, as a result, these small areas of paint can be understood. The dark red almost brown color was assessed as Munsell 5YR2.5/2. It is important to note that the four most basic early colors were a dark red (red oxide), a dark green, white, and black. The grey green observed on the timber frame may match one of the colors used in the Manor.

Summary of Paint Analysis

Table 17: Summary of Paint Analysis—Dairy

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: northwest corner column: white	1	White Wash	White Wash	—	2
Interior: northeast diagonal, north wall: white	2	White Wash	White Wash	—	2
Interior: east elevation, north diagonal: red	3	5YR2.5/2	10GY3/1	10R4/10	3
Exterior: east elevation lap siding bottom edge of third from bottom: cream	4	N9.5/90.0%R white	10YR9/2 putty yellow	10YR10/2 creamy white	3
Exterior: bottom of threshold of south door: cream	5	* N9.5/90.0%R white **	N8/59.1%R	10YR10/2 creamy white	5
Exterior: north lap siding under edge, 9th up: cream	6	White	10YR9/2 Putty Yellow	10YR9/2	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

**Spots of N8/59.1%R only

Mortar Analysis: There is no original mortar in the Dairy. Thus, no mortar was sampled from the Dairy.

Wood: One wood sample from the Dairy siding was identified as Southern Yellow Pine (*Pinus* spp).

IR Report

Introduction: Infrared imaging can be of great assistance in making visible a number of elements and conditions that would otherwise be undetected. For this project, the IR images provided knowledge about:

1. the location and spacing of timber framing elements hidden in the walls as well as their relative size,
2. areas where the heat is transferring through the walls providing in part knowledge on fit of windows and doors,
3. areas where moisture is present, typically observed as saturated materials, and
4. voids in walls, displaying a different heat signature from the adjacent material.

The information from IR images assists in corroboration of information derived from other diagnostic techniques such as moisture detectors and radar. In allowing the evaluation personnel to detect small differences in surface temperatures using wave lengths beyond those of visible light, the buildings provide more diagnostic information to the field team than is otherwise available. This allows follow-ups to corroborate suspected issue areas.

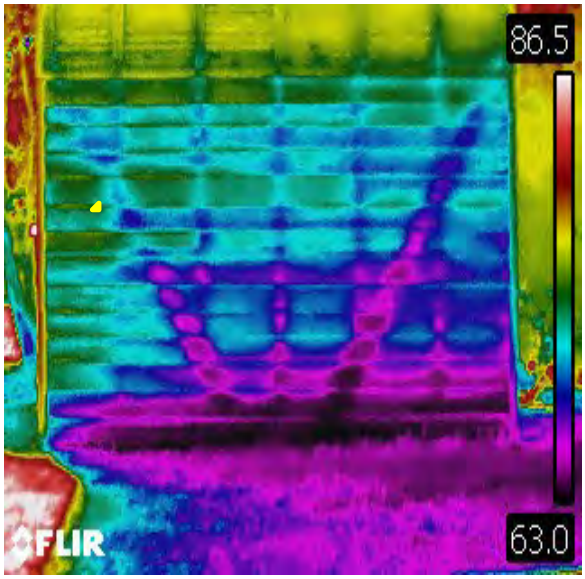


Figure 36: Infrared and visible light images of the north wall of the Dairy showing the interior framing. The fact that the left-most stud is not visible may be due to a small gap between the weather boards and framing.

Character Defining Features

The four buildings are each purpose-built to perform specific functions in support of the operation of Appomattox Manor. With the exception of the Old Smokehouse with its present interior finishes, each building is an accurate representation of its functional requirements providing an integration of building form and function. The traveler in 1860 would recognize each building type by its exterior, immediately realizing the functions contained within. The traveler in 2016 who was familiar with the plantations of the Tidewater and beyond, would likewise recognize the function of each building by its exterior. The arrangement of the buildings on the site was common enough to have these travelers also recognize that this area was devoted to household support functions.

Functional Considerations of the Dairy

1. Square in plan view.
2. Pyramidal shaped roof.
3. Peak of roof finial, functional as flashing.
4. For coolness: Ventilation openings at top of all four walls, with wooden louvers, and at the time cheesecloth coverings.
5. Tight envelope to keep out bugs, lapped weatherboards, corner boards, and moldings over joints.
6. No windows, and tight entry door with lock.
7. Sunken floor to capture the coolness of the earth.
8. Brick floor, cooler and more sanitary.
9. Eaves extended with fascia and soffit to shade the walls and assist in ventilation air flow.
10. Close to the well with access to its water to cool milk jugs.
11. Interior surfaces all whitewashed in the effort to provide a sanitary environment.

Aesthetic Considerations of the Dairy

12. Bead planed in to the lower face at edge of the weatherboards and corner boards.
13. Molding profiles of soffit to wall are using *ovolo* over *cyma reversa* as classical ornamental moldings.
14. Decorative aspect of the peak of roof finial.

Construction Considerations of the Dairy

15. Timber framed walls and roof structure, characteristic construction of the day of timber framing with hewn beams. Walls are built with corner posts, studs, diagonals, and top/bottom wall plate timbers, all connected with mortise and tenon joints with wood pegs. Roof structure is also constructed of hewn beams with similar connectors.
16. Brick foundation with lime mortar, upon which the sill plate is set.
17. Painted exterior and painted shingles to extend their service life.

Ancillary Elements of the Dairy (not present)
Shelving, likely on several walls, for which their ghosts can be seen on the face of some of the interior exposed wood structural members of the walls. To contain the milk, earthenware jugs or metal milk cans were typically employed. To keep the fresh milk cool, the milk containers often were set in a trough that was partially filled with cold well water.

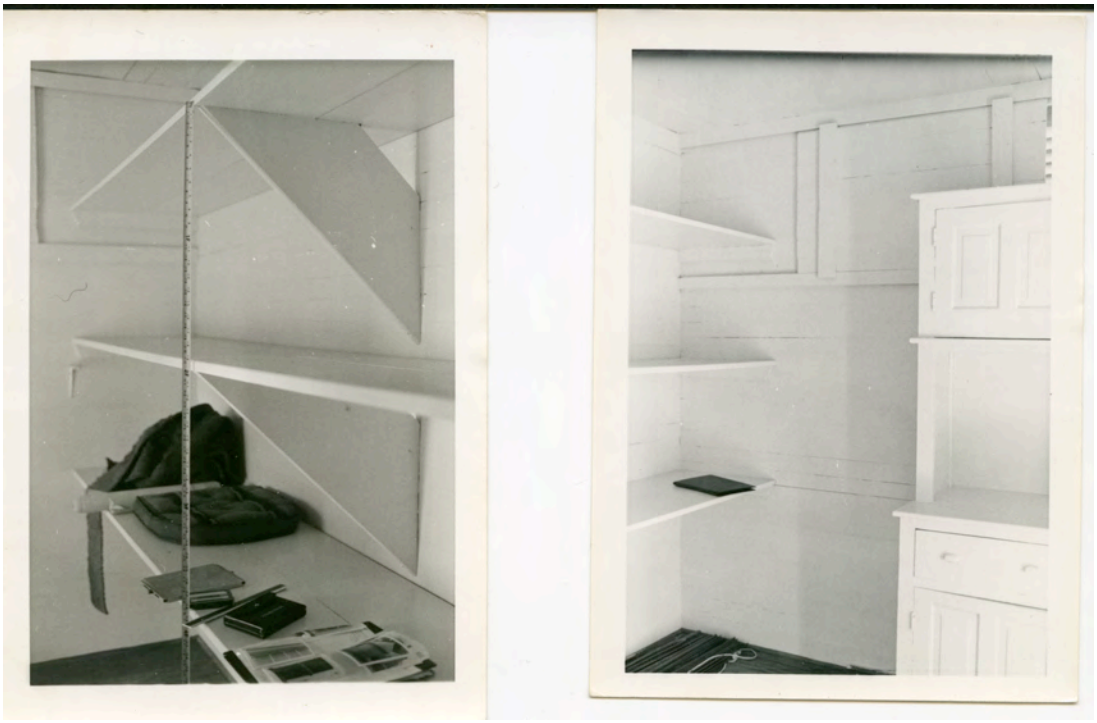


Photo 160: A composite of two undated pictures of shelving in the dairy building. The shelving and cabinets are no longer present. The photos are presumed to have been taken not long after 1979 and before 1982; thus, during the early period of NPS ownership.
Source: E. Dabney, email dated May 23, 2017.

Remedial Treatments and Interventions
The treatments are detailed in Part Two of the report, "Treatments and Work Recommendations" in which the recommended treatments and interventions are presented, many in substantial detail where the complexity warrants deeper explanation. As the Kitchen-Laundry is both the largest building and has all of the materials and systems of the others, it is at that building where the detailed treatment recommendations are set out in a comprehensive manner. Where the same treatments are required for one of the smaller buildings there is a reference back to the treatment as set out for the Kitchen-Laundry. By example, lime whitewash is present in the Kitchen-Laundry interior and exterior; it is also present in the interior of the Dairy. The comprehensive explanation of the treatment is presented for the Kitchen-Laundry and referenced thereto in the Dairy lime whitewash recommended treatment. Where a treatment is particular to just that building, such as tung oil wood floor finish, it is presented for just that building. Another example is a revised foundation for the Old Smokehouse; no other building has this recommended treatment.

Below are listed short descriptive titles of the recommended treatments provided for your consideration, for this building:

1. Because the overall condition of the Dairy's roof shingles is poor, immediate replacement is strongly recommended.

2. Replace partial rafter in roof.
3. Reconsolidate one diagonal on east elevation near the northeast corner.
4. Install additional blocking where roof joists bear on raising plate near midspan between lookouts on east and west eaves.
5. Pin or brace rotated lookouts at east and west joists.
6. Replace and/or repair deteriorated weatherboards per detailed treatment discussion at Kitchen-Laundry.
7. Seal bottom of door planks.
8. Remove rust off of hinges; restore finish.

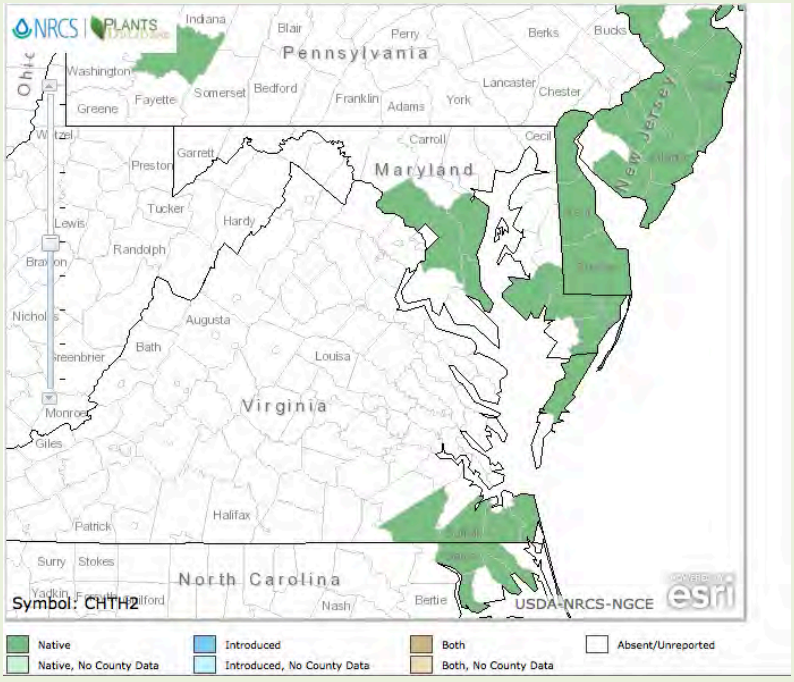
Future Research Needs
Inspection as to the condition of the roof peak cap.

Wood Shingles

Two types of treatment are recommended: repair and replacement. Repairs are recommended for the New Smokehouse, the Old Smokehouse, and the Kitchen-Laundry wood shingled roofs. Replacement is recommended for the Dairy.

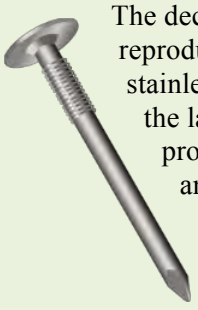
Types of Repairs and Recommended Treatments

Edge loss: replace
Split: replace
Missing: replace
Curled: No treatment
Paint Loss: repaint with same materials as previous. Hand clean surfaces of all loose paint using a bronze wire brush. Prime. Apply two coats of paint by brush, color to match existing.



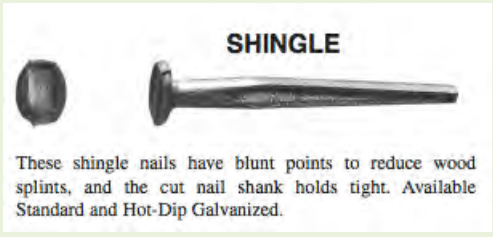
Wood Shingles Sidebar Photo 1: Range of Atlantic white cedar per USDA Forest Service per County reporting.

The replacement wood shingles should normally be "in kind." However, the existing remaining wood shingles appear to be of red cedar, a species imported from the west coast of the United States and not native to the east coast. The original shingles are likely to have been cypress or Atlantic white cedar *(Chamaecyparis thyoides* [L.] Britton, Sterns, & Poggeng.), or of significantly less possibility, some other local rot resistant wood. The use of Atlantic white cedar shingles for wood roofing shingles is documented for the colonial era buildings of the east coast. It is therefore recommended that the species used for the replacement repairs be of Atlantic white cedar. The other aspects of "in kind" can be met, such as size and configuration.



The decision on fasteners is a choice between historic reproduction forged nails, and modern roofing nails in stainless steel. While most of the nail's length is under the lap and thus not exposed to view, the nail will protrude on the inner surface of the roof sheathing and is thus visible on those buildings with no

Wood Shingles Sidebar Photo 2: Stainless steel roofing nail



Wood Shingles Sidebar Photo 3: Historic reproduction forged nail for shingles

ceiling finish: the Dairy, the New Smokehouse, and the Old Smokehouse. Protruding bright finished nails will be most visible against a black background as is present in the New Smokehouse with its smoke darkened roof sheathing. The other aspects of the selection of roofing nails is head size, grip on the fibers, and potential for splitting the wood; all discussed previously as part of the condition analysis. If wrought nails were selected there would be the extra step during their installation of drilling a pilot hole. One other concern is not likely for the two nail materials being considered, the oils and tannins in the cedar affecting the long-term stability of the metal. By example, while galvanized nails are often recommended for wood shingle installation, they are prone to long-term deterioration by the acidity of the oils and tannins.

Replacement Recommendation for Entire Roof of the Dairy
Remove shingles. Inspect sheathing for deterioration and replace deteriorated sheathing in-kind. Do not replaced any sheathing with evidence of past use or interpretation potential. An alternative is to install a breathable membrane, which will not increase roof edge thickness. Install Grade A Atlantic white cedar shingles of suggested 18-inch length and 5/8-inch thickness at the butt. Shape the butt to match existing rounded butts. If the decision is made to continue using a color on the shingle, use a penetrating stain of low VOC, such as a waterborne, with at least two coats. It is preferred that the shingles bear a Forest Stewardship Council (FSC) certification indicating the wood source as a sustainable forest. Install per manufacturers recommendation with consideration of the use of forged nails with big heads and proper length, drill pilot holes. Expected installation specifications include: edge to edge overlap to be no closer than 1-1/2 inches, install with 1/8-inch keyway between shingles, and nail placement to be with two nails per shingle 3/4 inch from each edge and one inch above butt line. Exposure of 6 inches will match the other roofs with their triple lap (three layers of shingles). Special cut hip shingles will be required and may match the existing in configuration, however these shingles will require additional fasteners.

Door Hardware

The Door Locks
Door hardware in the Colonial Period associated with English settlement was primarily crafted by the blacksmith. Each piece was individually formed and while an individual blacksmith may have incorporated stylistic elements, this was rare. Such elements would be an aid to identification by later researchers. However, most typically the door hardware pieces were without adornment. There were blacksmiths who specifically made door hardware of wrought iron, primarily located in the northeast.[1] The northeast appears to have dominated as a location of the successful filers of U.S. Patents for door hardware, with the first door lock patent issued to A.O. Stansbury of New York in 1807. Many of the first locks in America were imported to the English Colonies from England, and were surface-mounted rim locks. A 1774 English patent was issued to George Black for a rim lock.

Many of the imported English rim locks were manufactured by Carpenter Co. and these may be identified by an embossed brass disk with their name mounted on the lock case. Other manufacturers cast their name and patent date into the lock case face. Patents were important to protect the mechanism from being copied by other companies. First you patented your lock, then you manufactured. In the 1830s, the evolution in lock making had clearly moved from the province of the individual to the company. In the United States for example, the F.T. Stanley Company of New Britain, Connecticut was manufacturing rim locks in 1833. The working of metal for interchangeable parts was centered in the Connecticut River Valley as an outgrowth of the manufacturing of firearms at The Springfield Armory, the epicenter of precision metalworking. The valley was the cradle of invention and metal manufacturing.

Commencing in the 1830s, the number of lock making companies grew, as did production numbers. Every manufacturer needed a new change to allow for a new patent. One of those changes was not small. The mortise lock arrives. The evolution from rim lock to the mortise lock was dependent on an increase in door thickness from the 1.25 inch or less doors of the Colonial Period to the 1.5 to 2-inch-thick doors that followed. While mortise locks were made in England in about 1790, they were not patented in the United States until 1836. In the same time period, manufacturing followed of mortise locks and doors evolved to the greater thickness to accommodate the locks. Of course, for existing doors in homes and other buildings if one wanted to change to a mortise lock it meant more expense than just the lock. Considering that both the rim and the mortise lock types were performing the same functions with near equal facility, the frugal building owners of the day were unlikely to change out their doors to simply have a different style of lock. The two periods of rim locks and mortise locks overlap.

The doors of the four outbuildings of Appomattox Manor each have rim locks. A detailed examination might find markings indicating the manufacturer. The field examination of 2016 did not find any readable manufacturer's markings on the exposed faces. The rim locks were possibly manufactured as early as the late 1830s. The typical depth of the doors is 1.25 inches with the few exceptions such as the stout door of the New Smokehouse.

The Doorknobs
A specific reference for doorknobs as "Bennington" has evolved to become more of a generic term for brown glazed knobs, often with a swirl pattern or a mottled pattern. These are all fired clay with a glazed surface. The clay body character provides a better identifier than the glaze as glazes could be replicated. The difficulty is in exposing the clay body; it is apparent only for the unglazed portion that is visible in the indentation that receives the spindle. A true Bennington doorknob has a cream-colored clay body.

Two different glazes found for the Bennington knobs are the Rockingham glaze and the Flint Enamel glaze. The application of the glaze can be done by a variety of techniques that will result in differences in pattern and the degree of exposure of the cream colored underlying clay body: "spattering, dripping, sponging or brushing in an uneven manner." The basis of the glaze is manganese. The Flint Enamel glaze is "characterized by a rich appearance of mingling colors produced by sprinkling metallic salts on the knob

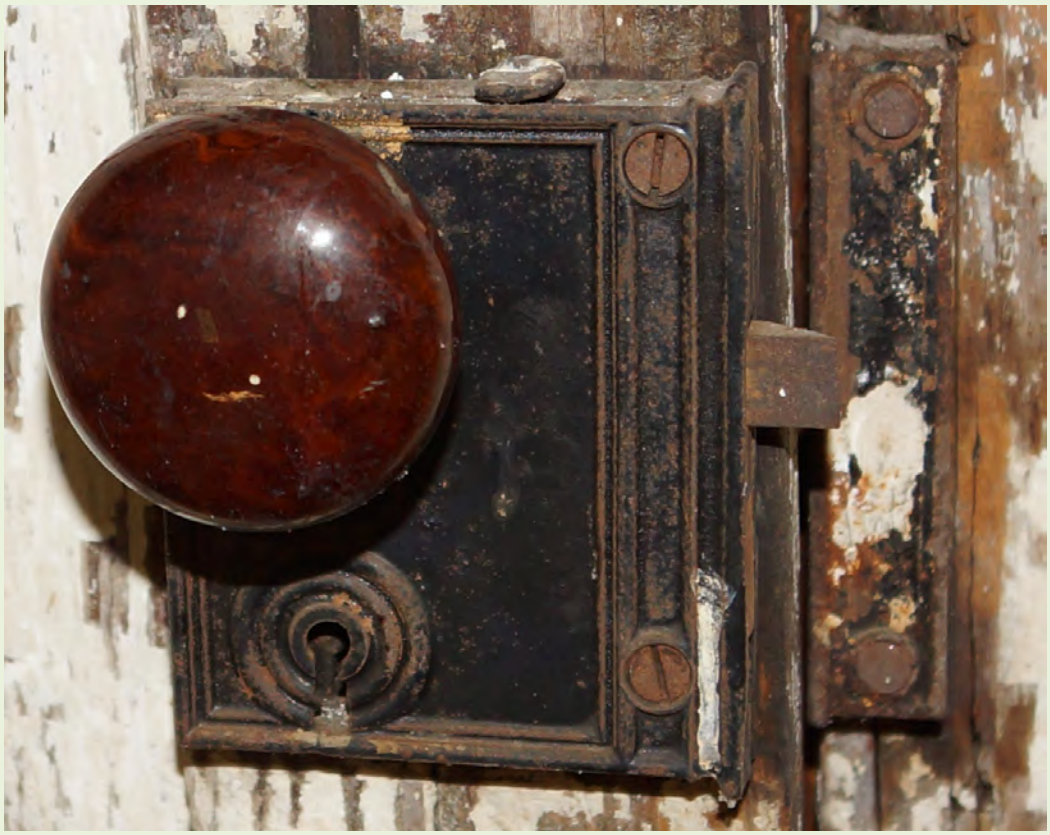
[1]Hennessy, p.113.

over a transparent under glaze." This glaze was developed by Christopher Fenton in 1849. The source of this information is "The Antique Doorknob," by Maud L. Eastwood and the website of the Antique Doorknob Collectors of America < http://antiquedoorknobs.org/>.

On page 57 of her book, Maud Eastwood reminds the reader of her book "…that you can only attribute a knob to the Bennington pottery in the years 1847 to 1867, when Fenton moved West."

To give the ceramic knobs a striated look, resembling marble, it appears two techniques were used by manufacturers. One created the striations in the glaze and the other used a semi-transparent glaze over a deliberately striated clay body. To give ceramic knobs a mottled look, the clay body could be deliberately mixed with different clay colors or the mottling could occur with the glazing. The latter glazing alternative was used by Bennington, and another glaze with similar results was the Japanese Tenmoku glaze that results in a glossy very dark brown appearance (firing at very high temperatures in reduction atmosphere). Essentially, combinations of clay bodies, glazes, glazing application techniques, and firing procedures could create a wide variety of appearances.

The sophistication of the ceramics manufacturers in the United States is perhaps best exemplified by the pottery produced for the home and kitchen. Indeed the dating of pottery sherds in archeological excavations is a critical identifier of period. The doorknobs found in place may or may not be associated with the door hardware. Some manufacturers of door locks sold the hardware complete with knobs while others did not. As replaceable elements, some doorknobs may have been exchanged due to changes in taste or because of damage. The sophisticated doorknob collector may be able to ascribe a range of dates to a doorknob, yet many popular knobs were replicated by other than the original manufacturer. There are no patents on glazes. A Bennington knob may have been a brown glazed knob produced by someone other than Bennington Pottery.



Door Hardware Sidebar Photo 1: Close up of knob of door 6, in south room of second story, with Bennington style knob.

Door Hardware Sidebar Photo 2: Edge shot of hardware of door 6, in south room of second story, Kitchen-Laundry.

Door Hardware Sidebar Photo 3: "Flint Enamel Foot Warmer 1847-1858," Bennington Pottery and Porcelain.

Door Hardware Sidebar Photo 3: "Rockingham Glazed Chamber Pot," Bennington Pottery and Porcelain.

Part 1—Developmental History

Physical Description—New Smokehouse

New Smokehouse

The New Smokehouse is a one-story timber framed wood structure with pyramidal shaped roof. The building is equal sided, is square in plan, and each elevation is 14 feet in length. The exterior face of the walls is covered with painted lapped weatherboards, with a bead planed into each board's lower edge. The boards terminate in a butt joint with the corner boards, also with a bead. The roofing is of round butt wood shingles with a sheet metal finial and flashing piece at the peak. The join of roof to wall has a boxed eave with classic moldings (see the plans for details). The fascia of the boxed eave has ventilation holes for the smoke. The foundation is composed of a sill beam placed on to a brick sill. The interior is of exposed structure, the timbers are blackened by the smoke, as are the interior face of the historic weatherboards. On the south elevation, there is one entry door constructed of vertical boards (7 full and 2 partial) for the exterior face and 15 diagonal boards on the interior face. The hardware consists of a pair of pintle and gudgeon strap hinges and a hasp and clasp lock mounted on the exterior face.

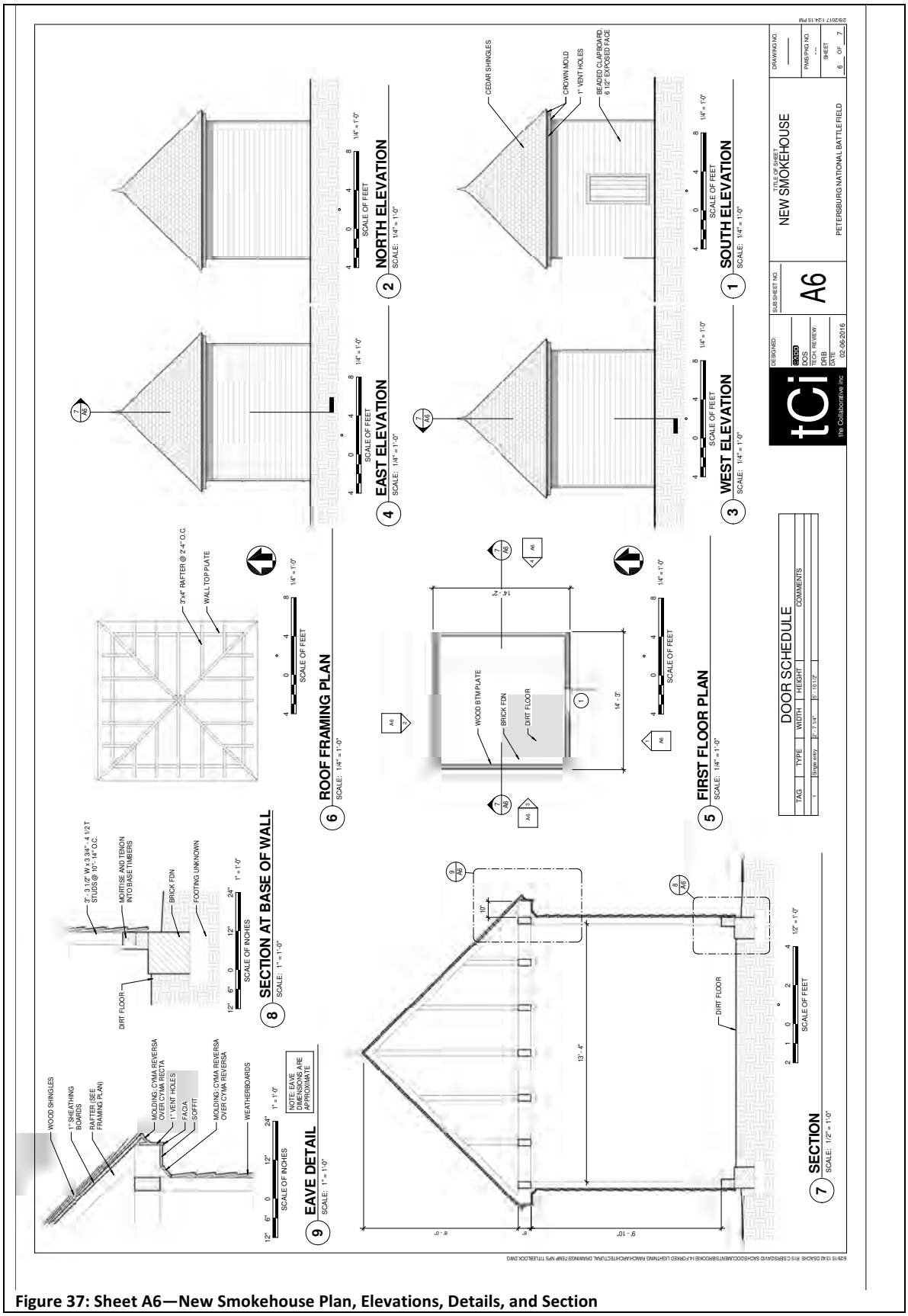


Figure 37: Sheet A6—New Smokehouse Plan, Elevations, Details, and Section

Photo 161 (JDF2081): New Smokehouse: North elevation.

Photo 162 (JDF2082): New Smokehouse: East elevation. Note outline of removed window.

Photo 163 (JDF2083): New Smokehouse: South elevation.

Photo 164 (JDF2084): New Smokehouse: West elevation.

Photo 165 (JDF2191): New Smokehouse: South interior elevation.

Photo 166 (JDF2192): New Smokehouse: West interior elevation.

Photo 167 (JDF2193): New Smokehouse: North interior elevation.

Photo 168 (JDF2194): New Smokehouse: East interior elevation. The center portion was where a window had been installed, after its smokehouse use and since removed. The new studs are those of a lighter color.

Photo 169 (JDF2195): New Smokehouse: South half of roof structure.

Photo 170 (JDF2196): New Smokehouse: North half of roof structure.

Photo 171 (JDF2197): New Smokehouse: Roof structure, looking straight up.

Photo 172 (JDF2198): New Smokehouse: North half of floor.

Photo 173 (JDF2199): New Smokehouse: South half of floor.

Record of Repairs and Alterations

- "Door (S): The 'Hogs Photograph' … has the entry door's interior facing surface visible. It has diagonal boards. The existing door is likewise configured. Sandy stated it was a replica. No documentation has as yet been found of when the door was reproduced." NOTE: The current door is a recreation of the historic door, which can be seen in the historic photograph from the 1890s, where the door has diagonal planking on its interior face. While the re-created door has diagonal planking as well, the planks are running in the wrong direction. Instead of running from the upper outer corner toward the lower hinge, and supporting the door in compression, the planks are running from the top inner corner to bottom outer corner.

- "Window (S): While windows were not used in smokehouses due to their function and smoke deposition on all surfaces, the New Smokehouse had a window in its east elevation for many years. The window has been removed and the opening closed with weatherboards. The window is clearly visible in a 1977 photograph. It is a six over six double hung. It is also visible in a 1986 photograph. The date of its removal is as yet unknown."

- "Roof Structure: All of the members of the roof structure are smoke stained, an indication that no replacements have been made after its use as a smokehouse."

- "Roofing: The roofing appears to be of less age as for the Old Smokehouse. In 1977, the Old Smokehouse photograph indicates roofing as dark asphalt shingles. The 1977 photograph of the New Smokehouse indicates asphalt shingles as well, but the condition appears to be better and the color is lighter. The current roofing is similar to the New Smokehouse, but is of double layer configuration and in far poorer condition. It would be logical to replace the roofing on all three buildings at the same time for economies of scale, one administrative

cost, and all requiring replacement due to condition. A 1986 view of the New Smokehouse appears to show it being roofed in round butt wood shingles. It is an oblique view and the Old Smokehouse gable roof is in deep shadow displaying no information about its shingles. Sometime between 1977 and 1986 the asphalt shingles of the New Smokehouse were changed to round butt wood shingles."

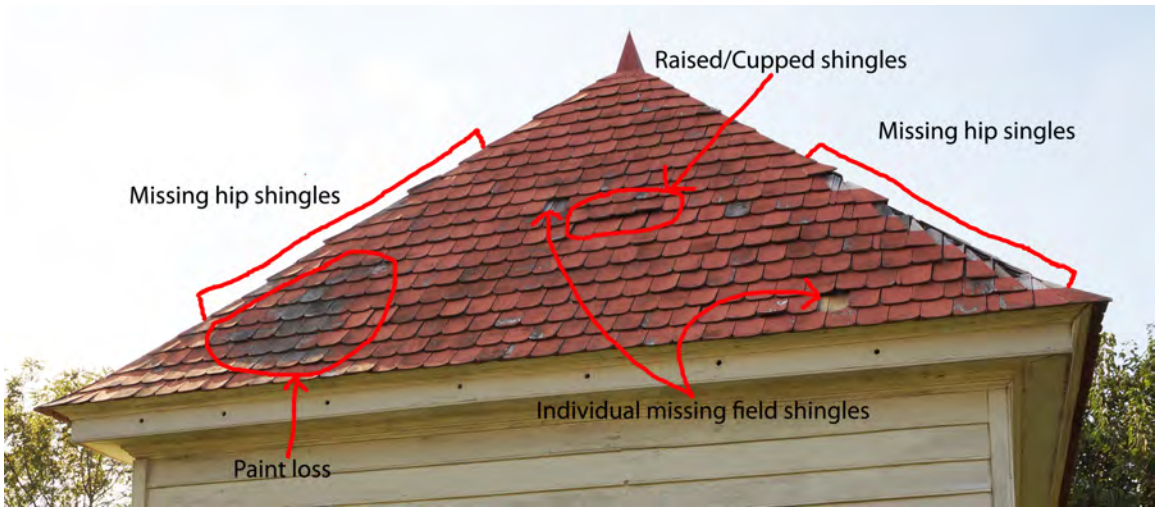
- "Systems: The building may have had lighting, but none of the few historic photographs from the last quarter of the 20th century (1977 and 1980) indicate any overhead power supply nor panel boxes on the exterior. For more on electricity see the discussion under the Kitchen-Laundry." As yet there has been no documentation found on the date of electrical system removal, although it is possible electricity was not installed even though in a letter of August 1, 1965, from Elise Eppes Cutchin as President addressed to the Directors of the Appomattox Foundation, Inc. is a reference to "Putting lights in the smokehouse and Dairy ($90.00)." A May 1, 1964-May 1, 1965, tabulation of receipts and disbursements also indicates "Improvements (Lights in the Dairy and Smokehouse) for $90."[33]

Description and Condition of Elements
The materials of the New Smokehouse are wood shingles, wood beams roof structure and wood sheathing, wood weatherboards as siding, wood timbers as wall construction, wood fascia/soffit/moldings, wood entry door, metal door hardware, metal roof cap at peak, metal fasteners, bricks under treated foundation timber, and exterior paint.

Roofing—Wood Shingles
Description: These shingles appear to be thicker than those of the Dairy, and similar in thickness to those of the Old Smokehouse. While there are no fully exposed shingles to measure the length of the shingles on this roof, the shingles on the Old Smokehouse do have exposed edges of shingles that are measurable. As the appearance of the shingles on both the Old Smokehouse and the New Smokehouse appear the same, the shingles are an average of 18 inches in length by 5 inches in width; the exposure averages 6 inches. The length to exposure relationship results in a triple layer roof. Longer special cut shingles cover the ridges of the four hips. The installation included a red paint coating of the exposed area of the shingles. Each roof slope contains approximately 400 shingles in 20 rows.

Condition: The condition analysis for the Dairy was completed in great detail in order to assess the effects of exposure on conditions and to thereby determine the extent to which exposure was a factor confirmed by the similarly configured—pyramidal form—roof of the New Smokehouse. In general, the shingles of the New Smokehouse exhibit an overall condition that is judged to be fair, in comparison to the poor rating of the Dairy. Where the Dairy's north facing roof slope shingles had very high percentages of paint loss at 62% and edge loss at 22%, the north slope shingles of the New Smokehouse had less than 10% of the shingles with more than 25% paint loss, and none with edge loss. Again, the New Smokehouse shingles appear to be thicker than those of the Dairy, appear newer, and are configured as triple layer. There are eight locations with missing shingles from the hips of the north slope of the New Smokehouse.

[33]May 1, 1964-May 1, 1965, The Appomattox Manor Foundation, Inc., 1964-1968, PETE 19999, Petersburg National Battlefield.



2082: New Smokehouse East Elevation: Shingle condition issues

This hip shingles loss continues on to the east facing roof slope with eight, plus the loss of two in the field. Paint loss has two patterns of location, one area of 21 and a scattering of another 10. Cupping and splits condition issues were observed for less than 2% of the shingles. By comparison, the east slope of the Dairy had 38% with paint loss issues, 44% with splits, and 10% with significant cupping.

The south slope of the New Smokehouse has three missing hip shingles and one and one half in the field. The half is due to a split, of which there are 12 additional shingles with splits. There is more cupping on the south elevation than the east, with 22, naturally expected due to increased sun intensity.

Of the four roof slopes the west slope has the most missing shingles. All but four of the shingles of the northwest hip are missing; 16 in total. Five more are missing from the field. Both cupping and splitting are less than for the south facing roof slope. There are 20 shingles exhibiting greater than 25% paint loss, 20 with cupping, and 10 with splits.

Conclusions can be drawn by the comparison of the two roofs of the Dairy and the New Smokehouse related to exposure, materials, and installation. Exposure to the sun affects the longevity of the paint coating; that is, the more sun exposure, the shorter the life of the paint. Additionally, the more sun, the higher the percentage of shingles with cupping, particularly after paint loss commences. The west slope of the Dairy indicates the potential of wind as an exposure force as this was the most deteriorated slope, even with its partial protection of the adjacent building. Such upwind protection will not create a lee from the northwest winds. Perhaps this is the direction of heavier wind driven rain; higher velocity and greater quantity.

The selected materials in play are the shingles, the paint, and the fasteners. The thicker the shingle the greater the longevity. While no species identification analysis was performed, most shingles are "cedar." True cedars (*Cedrus*) only grows in Lebanon, but the United States has a number of species referred to as cedar such as Western Red Cedar (*Thuja plicata*) that is actually an arborvitae, as is Eastern White Cedar (*Thuja occidentalis*). Small mills do exist that will make shingles or shakes to the specifications required, such as Dow's Eastern White Cedar Shingles in Corinth Maine: doweasternwhiteshingles.com. The best grades are cut or split from clear wood.

The paint applied to shingles prior to the concern about lead paint was, of course, lead paint. The lead provided anti-microbial properties and extended the life of the shingle. Painting shingles particularly extended the life of poor quality wood shingles. By example, the shingle mill referenced above (Dow) claims a life span for their shingles—without paint—of 100 years. In general, Western Red Cedar will not last as long as Eastern White Cedar, does not take paint or stain well, and will not weather to the warm grey.

Fasteners are the third material and are perhaps the most complex of the material decisions: metal type, metal finish, shape of shaft, shape of head, rings or no rings, and historic versus non-historic. In some historic applications, instead of nailing the shingle through the portion under the lap, the nailing occurs in the exposed portion; known as being face nailed. If face nailed, the visual characteristics of the nail head become important in the decision process. Otherwise the nail head is not exposed and there is no affect on the visual aspect and the in-kind preservation consideration is the remaining question to be resolved.

Installation can be a significant cause of condition problems, as evidenced by the loss of shingles at the hip of the New Smokehouse, the high number of splits, and both the consolidated areas of paint loss and high percentages of shingles with loss. One highly significant installation issue may actually be related to what was specified by people other than the contractor: owners, architects, or architectural conservator. In the case of shingles, their installation should have triple coverage. The exposed portion should be one-third of the shingle length, which it is for the New Smokehouse but not for the Dairy.

Given the critical role of all roofing in the protection of buildings, the proportion of material cost to installation labor, the disruption factor to the operation of a facility in re-roofing, the risks associated with the removal of an old roof and installation of a new roof, and the potential for collateral damage, roofing material selection and proper installation are critical. Longevity is the key criterion.

Roof Structure
Description: The roof of the New Smokehouse is pyramidal with four hip rafters, originating at the cantilevered corner lookouts, and meeting at the center point of the square building. Four common rafters, originating at the eave at the middle of each wall length, also meet at the center point. Jack rafters, aligned with either the joists or lookouts, intersect and support the hip rafters at regular intervals between eave and peak. The roof is sheathed with 1-inch planks of 12-inch average width.

There are five joists that run north-south in the New Smokehouse at approximately 28 inches on center. The joists are through lapped with the top plate and cantilever approximately 10 inches beyond the outer face of the plate. At the east and west walls, lookouts are half-lapped into the outermost joists and are through lapped with the top plate and again, cantilever 10 inches past the outer face of the plate. There is no raising plate as the joists and lookouts align with the roof rafters. It is assumed that there is some joinery connecting the joists and lookouts with the rafters, however the connection could not be observed.

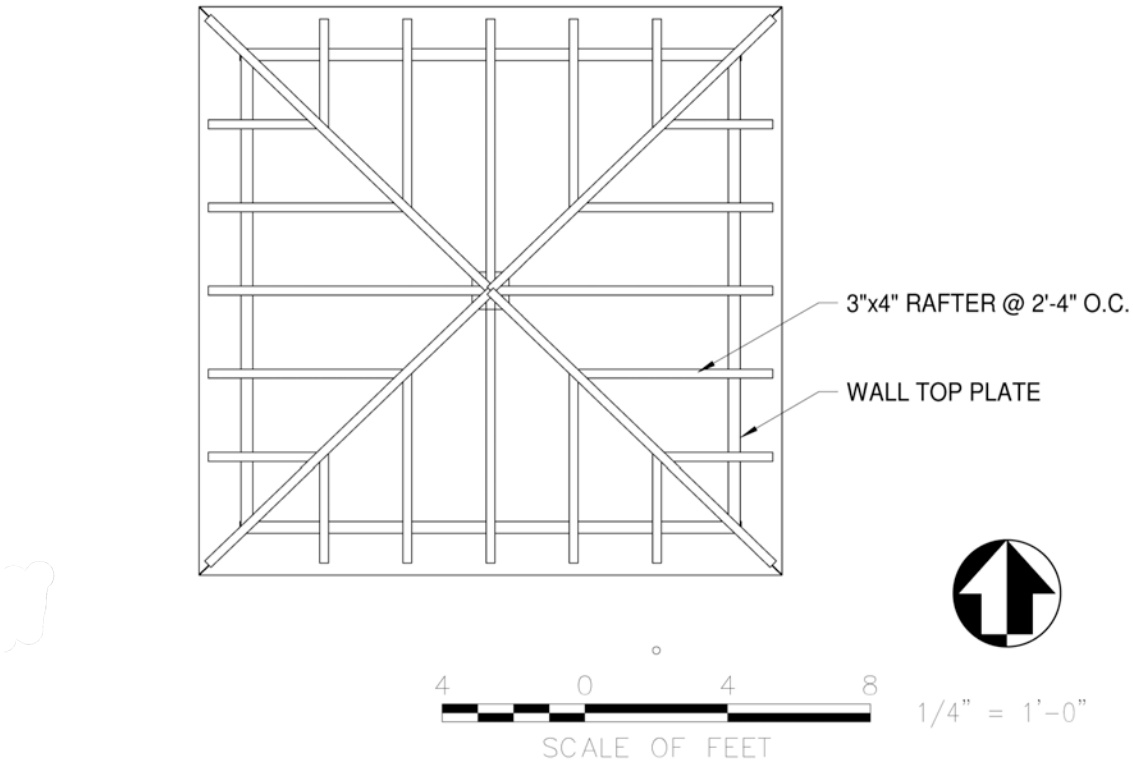


Figure 38: New Smokehouse roof framing plan

Photo 174: View of the New Smokehouse roof framing at the southeast corner. A typical lookout is visible in the lower left of the image. This member is seated in a half lap in the end joist, through-laps the top plate, and extends approximately 10 inches to support one of the jack rafters. A diagonal lookout is also visible near the center of the image. This member is half-lapped with the end joist and cantilevers over the corner post to support the hip rafter and corner of the roof.

Condition: It appears that there might be some termite activity in the sill plate. There is insufficient support of the roof sheathing where Union gunboat shells damaged the roof (see figures x1 and x2).

Figure 39: Two views of the interior of the New Smokehouse roof showing two small areas where the roof sheathing is damaged. The left image (DW0688) is in the north-facing roof and the right image (DW0687) is in the south-facing roof. Both repairs should have an objective of providing support to the sheathing rather than replacement. Communication, Emmanuel Dabney, 2017: "These are critical to the understanding of the buildings as they represent Union naval bombardment damage which occurred in the spring or summer of 1862."

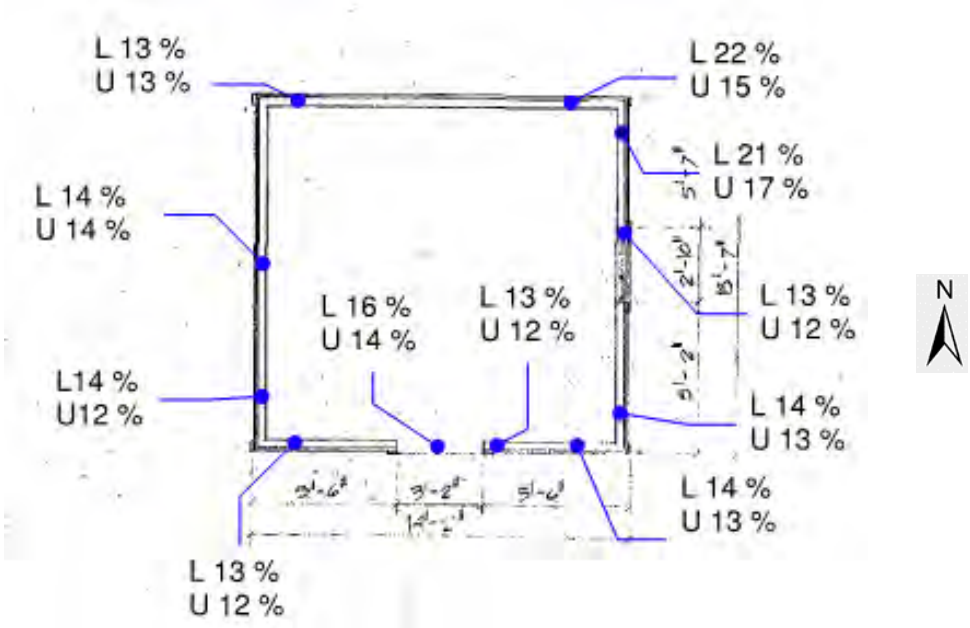


Figure 40: Moisture content in percent for lower sill (L xx%) and upper sill (U xx%). Note higher readings in the vicinity of the northeast corner, which correlate with roof shingle damage at the northeast hip.

Roof Appurtenances—Metal Roof Peak Cap
Description: There is a fabricated sheet metal roof cap that has a central spire and extends metal flashing down each roof slope some 8-12 inches. This covers the hole where a wood plug was used as a part of the smoke evacuation system.

Condition: The interior surface appears in good condition. Due to access issues, the roof peak cap's exterior face condition was not assessed. More in-depth examination of conditions is recommended for completion in the future.

Roof Appurtenances—Gutters
Description: There are no gutters.

Walls Structure
Description: The New Smokehouse walls are timber framed and each has a double stacked plate, each of which is 8 x 11 inches (h x w), with the lower plate of modern pressure-treated timber. It is unknown if the upper bottom plate is original or is a replacement. The lower plate is founded on a fired-clay masonry footing that extends approximately 7 to 8 inches to the interior of the New Smokehouse and is the same elevation as the earthen floor of the building. The depth of the footing is unknown. The upper bottom plate is mortised to accept tenoned studs that are typically 3 to 3½ inch wide by 3¾ to 4¼ inch deep and are at 10 to 14 inch on center. The studs are also tenoned into the 4 x 8 inch top plate. Down braces are typically 3½ to 4 inch deep and 7½ to 8 inch wide and are attached to the upper bottom plate and top plate with pegged mortise and tenon joints.

Condition: The timber framed walls are in good condition and require only consolidation of one stud at the northwest corner and one down brace in the west elevation near the southwest corner. One stud is missing in the north elevation and a replacement stud should be made and installed.

Fascia/Soffit/Moldings
Description: The wood fascia and soffit and the appurtenant moldings of the New Smokehouse are similar to the Dairy except, as previously noted, there are spaced ventilation holes in the New Smokehouse fascia, six on the north and south elevations and seven on the east and west elevations. The appurtenant moldings cover the same joints as at the Dairy: wall to soffit, soffit to underside of roof sheathing. The molding profiles are similar to those of the Dairy, here using *cyma recta* over *cyma reversa* as classical ornamental moldings. This profile is present for both moldings: wall to soffit and fascia to roof sheathing. The fascia extends slightly below the soffit and is finished with the same bead profile as the lower edge of the weatherboards.

There are corner board moldings to which the weatherboards are butted. The corner boards are equivalent to a 1x4, with the long dimension on the east and west elevations. A bead has been planed in to the outward end of the board at these same elevations. The corner board moldings extend from just below the lower edge of the lowest weatherboard up to the molding covering the joint between the wall and the soffit. The entry door has the equivalent of 1x4 plain wood casings. The head casing is topped by a sloped wood flashing, sometimes referred to by its classical reference as an architrave. This detail also can be seen in the 1890s photograph of the slaughtered hogs being prepared for the smokehouse, which is in the following section "*Door and Window*."

Condition: The fascia and soffit and the associated moldings are in good condition as are the entry door casings. The corner boards have rot at their lowest 6 to 9 inches (see photos 175, 176,

and 177 seen in the following section *Wood Weatherboards*). The corner boards are judged to be in poor condition even though just this lower portion evidence rot.

Wood Weatherboards

Description: The wood weatherboards of the New Smokehouse appear to have been originally full length, extending from corner board to corner board. Some replacement boards have removed deteriorated portions and replaced the removed sections with partial length pieces. It is interesting to note that the number of weatherboards on each elevation is not equal. The west elevation and south elevation have 20, and the north and east elevation have 19. As the height of the four elevations are the same, and the width of each weatherboard is believed to be the same (not all were measured), the variation in numbers is expected to relate to the inches of exposure; 6.32 inches at 19 versus 6 inches at 20 if the wall measures exactly 10 feet. As measured in the field at the elevations with 19 boards, the exposure ranged from 6.25 inches to 6.625 inches. The edges of the boards were not found to be parallel, exacerbating the ability to get an accurate exposure measurement. The current measurement of board thickness was 1/2 inch and the average lap was 1.5 inches. Uniform thickness of boards would result from the logs being sawn at a mill. Lack of uniformity would possibly indicate an earlier pit sawing process. The original thickness may have been greater, however drying and face erosion due to weathering may have caused a reduction in thickness. The most protected weatherboard should be used as a guide for replacement pieces and it will need to be at least partially loosened in order to be measured. The weatherboards had exposed nails. If any other nails were placed under the laps, these nails were not observable. The personnel engaged in previous weatherboard replacements would know whether all of the boards were face nailed. The observed nail heads were round, square, and ellipsoidal.

The interior surfaces of the weatherboards do provide a key to their likely age. The darkest boards appear to have been subject to long-term contact with smoke. Other boards are dark brown with darker areas appearing to be stains resulting from water leaks. These appear to be older replacements installed after the building was no longer used as a smokehouse. The white painted boards are those boards that were reversed, the exterior face being turned inwards. These boards were part of the NPS period repairs.

Typically, after the fire for the smoking was built in the center of the floor, the door was closed and the fire checked once or twice a day to be certain it had enough fuel to continue smoldering. Therefore, the entire interior filled with smoke, and while the lower wall boards may have received less smoke than the upper wall boards, the lower wall boards received enough smoke to be stained a near black / very dark brown coloration. Therefore, variations in the coloration of the interior face of the boards due to wall height would at best have been minor (the lowest boards slightly lighter) except for those boards installed after the building's use as a smokehouse.

Regardless of age of the individual board, each has had a bead planed into its lower 5/8-inch face to the edge, on the exterior face.

Conditions: Each board was assessed in the field for condition issues and examples of poor condition are shown in the following photos. The assessments for each board on each elevation are provided in the table following the photographs. There is moisture penetration and associated decay in the northwest corner of the building.

Photo 175 (JDF2234): New Smokehouse: Lower three weatherboards of the northwest corner board, rot spreads.

Photo 176 (JDF2237): New Smokehouse: Corner board rot.

Photo 177 (JDF2238): New Smokehouse: Condition: Edge split of weatherboard.

Table 18: Siding Condition Assessment of the New Smokehouse

Elevation	Type	Number	Condition (from top)
North	Lap: ½ inch thick Exposure: 6-1/4-6-5/8 inches Average: 6½ inches Lap = face numbed	19	1: end split 2: center split & nail pop, warped out 3: end split and center split 5: two end splits, edge partially missing 6: two end splits, edge partially missing 7: two end splits 8: two end splits and center split and rot 9: end split and missing edge 10: two end splits + missing edge + center split 11: end split + missing edge + rot 12: three end splits + center split 15: end split 16: end split 17: two end splits + rot 18: two end splits + rot 19: two end splits + rot

Continued on following page

Table 18 (cont.)

Elevation	Type	Number	Condition (from top)
East	"window" infill. 3 pieces for levels 7-14	19	1: missing edge (ME) 2: missing edge (ME) 6: end split 7: end split 8: two end splits, cupped 9: three end splits + rot 10: two end splits 11: two end splits 12: four end splits 13: four end splits 14: two end splits 15: two end splits + rot 16: center split 17: rot 18: rot 19: rot + missing edge material
South	8-18 split by door	20	2: end split 3: end split 4: face damage 5: end split + center split + missing edge 6: two end splits + center split + missing edge 7: end split 8: two end splits 9: two end splits 10: end split 12: two end splits 13: three end splits 14: end split + rot 15: end split + rot 16: two end splits + rot 17: rot 18: two end splits + rot 19: two end splits + rot
West		20	2: end split 7: end split 8: end split 9: end split + rot 10: end split + rot 11: missing edge 12: end split + missing edge 13: end split + missing edge + rot 14: end split + missing edge + rot 15: two center splits, rot, missing edge 16: two center splits, rot, missing edge 18: two end splits + rot 19: two end split + rot 20: rot

Door and Window

Wood Entry Door Description: The current wood entry door is a recreation of the historic door. In the historic photograph from the 1890s, the door can be seen to have diagonal planking on its interior face. While the recreated door has diagonal planking as well, the planks are running in the wrong direction. Instead of running from the upper outer corner toward the lower hinge, and supporting the door in compression, the planks are running from the top inner corner to bottom outer corner.

The current door is 70½ inches high, 31¼ inches wide, and 2 inches deep. The threshold is 1½ inches by 7½ inches wood sloped. The door fits well in its frame, which is 3¾ inches by 8 inches plus exterior trim of ¾ inches by 3 inches. The hardware comprises two 2-pin hinges and 1 metal hasp and padlock. The outside face: vertical, 1 x 4¾ inches wood boards with diagonal nailing pattern. The inside face is diagonal 1 x 4¾-inch wood boards.

The door hardware consists of pintle and gudgeon style hinges, often used for gates, and a hasp and padlock. These appear to be modern. The door hardware is in good condition.

Photo 178 (JDF2096): New Smokehouse: Door exterior.

Photo 179 (JDF2097): New Smokehouse: Interior face of door.

Photo 180 (Hogs_1999_160_260_266dpi.jpg): In this 1890s photo, Dr. Richard Eppes' son, Richard, received assistance from two employees as they prepare to place recently slaughtered hogs into the smokehouse. Note the direction of the historic door planks.

Wood Entry Door Condition: Good.

Windows: There are no windows present on the New Smokehouse. One is visible in photographs from the 1960s, placed in the east wall. It has since been removed to present an historically accurate representation of the smokehouse.

Floor Structure
None.

Floor
None.

Foundation
Description: Brick with mortar is at ground level. The depth is not documented. The wood timber sill plates sit directly on the brick.

Condition: The condition is good.

Interior Finishes
There are no interior finishes present in this building.

Utility Systems
There are no utility systems present in this building.

Built-In Features
There are no built-in features present in this building.

Materials Analyses
Paint Analysis—Summary of the Report in the Appendices Portion of this HSR
Ten samples were taken from the exterior of the New Smokehouse. The results are presented below. Typically, the number of layers of the samples was in the range of one to three. Sample #10 of the door jamb casing had four layers and only Sample #13 of the eave molding had a more expected number of layers with seven. The predominant colors were white, creamy white, and gray. The dark brown/black paint, thought to be quite early, was found deep in the groove of the bead of the southeast corner board. The surprise color was a bright red modern-era paint, second layer, for Sample #14, taken from the upper molding of the eave.

Table 19: New Smokehouse Summary of Paint Analysis

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Southeast corner board (rotted) flat	7	N8/59.1%R gray	N9.5/90.0%R white	10YR9/2	1
Southeast corner board bead	8	N1.75/2.5%R black vestiges	White	—	2

Continued on following page

Table 19 (cont.)

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Older looking board of lap siding, 8th from the bottom, face	9	N8/59.1%R gray	10YR9/2	N9.5/90%R white	3
Door jamb casing	10	N8/59.1%R gray (thin)	10YR9/2 Creamy Yellow / N8/59.1%R gray / 10YR9/2 Creamy Yellow		4
Underside of threshold	11	*	White	White	3
Top casing of door, architrave	12	*	White	White	3
Lower molding, south elevation	13	White / Cream / White	Putty gray / White	White / Light cream white	7
Upper molding, south elevation at underside of roof	14	White	Red	White	3
Upper molding, south elevation at underside of roof	15	White	Spots of cream	White	3
Soffit	16	White	Red (thin)	White	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

Character Defining Features

The four buildings are each purpose-built to perform specific functions in support of the operation of Appomattox Manor. With the exception of the Old Smokehouse with its present interior finishes, each building is an accurate representation of its functional requirements providing an integration of building form and function. The traveler in 1860 would recognize each building type by its exterior, immediately realizing the functions contained within. The traveler in 2017 who was familiar with the plantations of the Tidewater and beyond, would likewise recognize the function of each building by its exterior. The arrangement of the buildings on the site was common enough to have these travelers also recognize that this area was devoted to household support functions.

Functional Considerations

1. Square in plan view.
2. Pyramidal shaped roof with wood shingles with round butts.
3. Peak of roof finial, may be functional for covering the hole where a plug had been previously (see photo 181 below).
4. Smoke escape route, ventilation holes in the fascia.
5. Tight shell to contain smoke with lapped weatherboards, corner moldings, and joints covered by moldings.
6. No windows.
7. Stout entry door and locking hardware.
8. Earth floor upon which the fire was built.
9. Hanging pegs, nails, and hooks for suspending the hams from the roof structure.
10. Strong roof structure to handle the load of all the hams.

Photo 181 (5060): Plug from the peak of the roof of the New Smokehouse is now in the Park's museum collection (PETE Catalog 4131). As you can see, there is a history of nails from cut to wire on it.

Aesthetic Considerations

11. Bead planed in to the lower face at edge of the weatherboards, corner boards, and casings. Wood entry door architrave.
12. Molding profiles of fascia and soffit are classical ornamental moldings: *cyma recta* over *cyma reversa*.
13. Decorative aspect of the peak of roof finial.

Construction Considerations

14. Timber framed walls and roof structure, characteristic construction of the day of timber

framing with hewn beams. Walls are built with corner posts, studs, down braces, and top/bottom wall plate timbers, all connected with mortise and tenon joints with wood pegs. Roof structure is also constructed of hewn beams with similar connectors.

15. Brick foundation with lime mortar, upon which the sill plate is set.
16. Painted exterior and painted shingles

Ancillary Elements (none present)

After the hogs were butchered and before being hung up to smoke, the meat was prepared by salting. This process often employed a trough in which the meat was placed and the salt, with a small amount of saltpeter, was rubbed into the meat. While the trough was one vessel, reference in the literature also notes the use of barrels. These two portable vessels are part of the history of the smokehouse building as ancillary elements; not fixed to the building. Eppes diary also notes molasses curing and this process may typically have had its own vessel.

Remedial Treatments and Interventions

The treatments are detailed in Part Two of the report, "Treatments and Work Recommendations," in which the recommended treatments and interventions are presented, many in substantial detail where the complexity warrants deeper explanation. As the Kitchen-Laundry is both the largest building and has all of the materials and systems of the others, it is at that building where the detailed treatment recommendations are set out in a comprehensive manner. Where the same treatments are required for one of the smaller buildings there is a reference back to the treatment as set out for the Kitchen-Laundry. By example, lime whitewash is present in the Kitchen-Laundry interior and exterior. It is present in the interior of the Dairy as well. The comprehensive explanation of the treatment is presented for the Kitchen-Laundry and referenced thereto in the Dairy lime whitewash recommended treatment. Where a treatment is particular to just that building, such as tung oil wood floor finish, it is presented for just that building. Another example is a revised foundation for the Old Smokehouse; no other building has this recommended treatment.

Below are listed short descriptive titles of the recommended treatments provided for your consideration, for this building:

1. Repair wood shingles per treatment procedure set out at Kitchen-Laundry.
2. Replace and/or repair deteriorated weatherboards per detailed treatment set out at Kitchen-Laundry.
3. Repair sheathing on south and north roofs during next re-roof. Brace between the shell holes with angle iron to support the sheathing.
4. Investigate termite activity in the sill plate. If active, treat.
5. Repairs to northeast corner to mitigate moisture and associated decay in building.
6. Consolidate stud near northwest corner and one diagonal in west elevation near southwest corner.
7. Replace one missing stud in north wall.
8. Repair moldings; corner boards.
9. Remove door, rehang, plug holes.
10. Replace deteriorated weatherboards.

Future Research Needs

1. Additional paint analysis
2. Dendrochronology

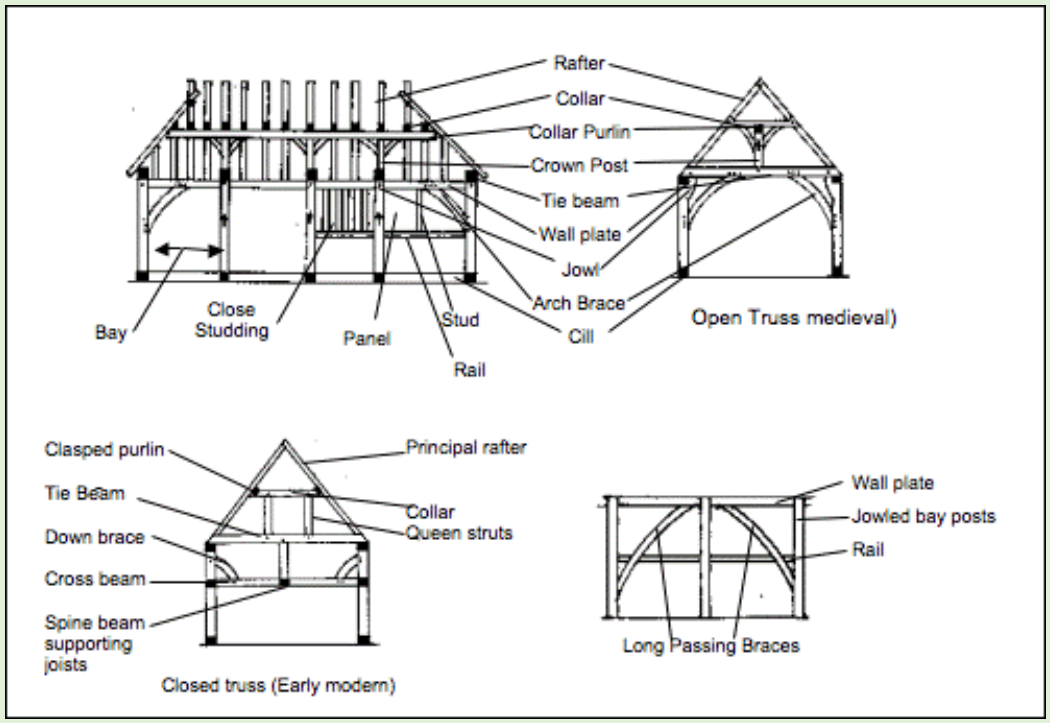
History of Timber Framing

"Because of time and labor limitations, the early settlers built one-room houses, which were either one or one-and-a-half stories high. There was an entry way, or porch, and a chimney stack at one end. By1675, modifications of this plan occurred. A second room was added on the other side of the chimney, creating space for a kitchen and a living room. The house now had a central source of heat. Then, by raising the roof and adding a "lean-to" along the back length of the house, a second story was created. The design, known as the saltbox design, allowed for three rooms on the first floor and an attic on the second. By 1700, householders were using the saltbox design as a plan, rather than just as 'a means of expansion,' for their cottages. Very soon the lean-to was abandoned in favor of the full two story house, in which the second floor attic was replaced by three rooms. We mentioned before that we consider the inherent flexibility for adding rooms and stories to be one of the important advantages of timber framing (one that the early settlers counted on). Even though few of us begin building with just one room today, the evolution of design in timber framing illustrates the many options we have for structural expansion as our space needs change.

"Hand-hewn timbers jointed together and secured with pegs remained the method of construction until the early decades of the nineteenth century. In the 1830s, as inexpensive machine-made nails and standardized sawn lumber became available, the balloon frame house came into being. The lighter frame and simplified labor requirements of balloon framing appeared at a time when both transportation and milling techniques were still primitive. The timber-frame method was soon replaced by the new, faster, and more economical process."

—Elliott, S., E. Wallas, and L. Foss. *The Timber Framing Book*, pp. 3 and 4.

Excerpts from *The Timber Framing Book*'s Illustrated Glossary of Architectural Terms



Timber Framing Illustration

Regarding "Key Dating Features for Timber-Framed Dwellings in Surrey," by Rod Wild and Andy Moir

> *[ABSTRACT]: The main component of the Surrey Dendrochronology Project is the accurate dating of 177 'dwellings', nearly all by tree-ring analysis. The dates are used to establish date ranges for 52 'key features', which cover many aspects of timber-framing from building type to details of carpentry. It is shown that changes of method and fashion were in many cases surprisingly rapid, almost abrupt in historical terms. Previous dating criteria for timber-framed dwellings in the county have been refined and new criteria introduced. Clusters of change from the 1440s and the 1540s are shown and some possible historical links suggested.*

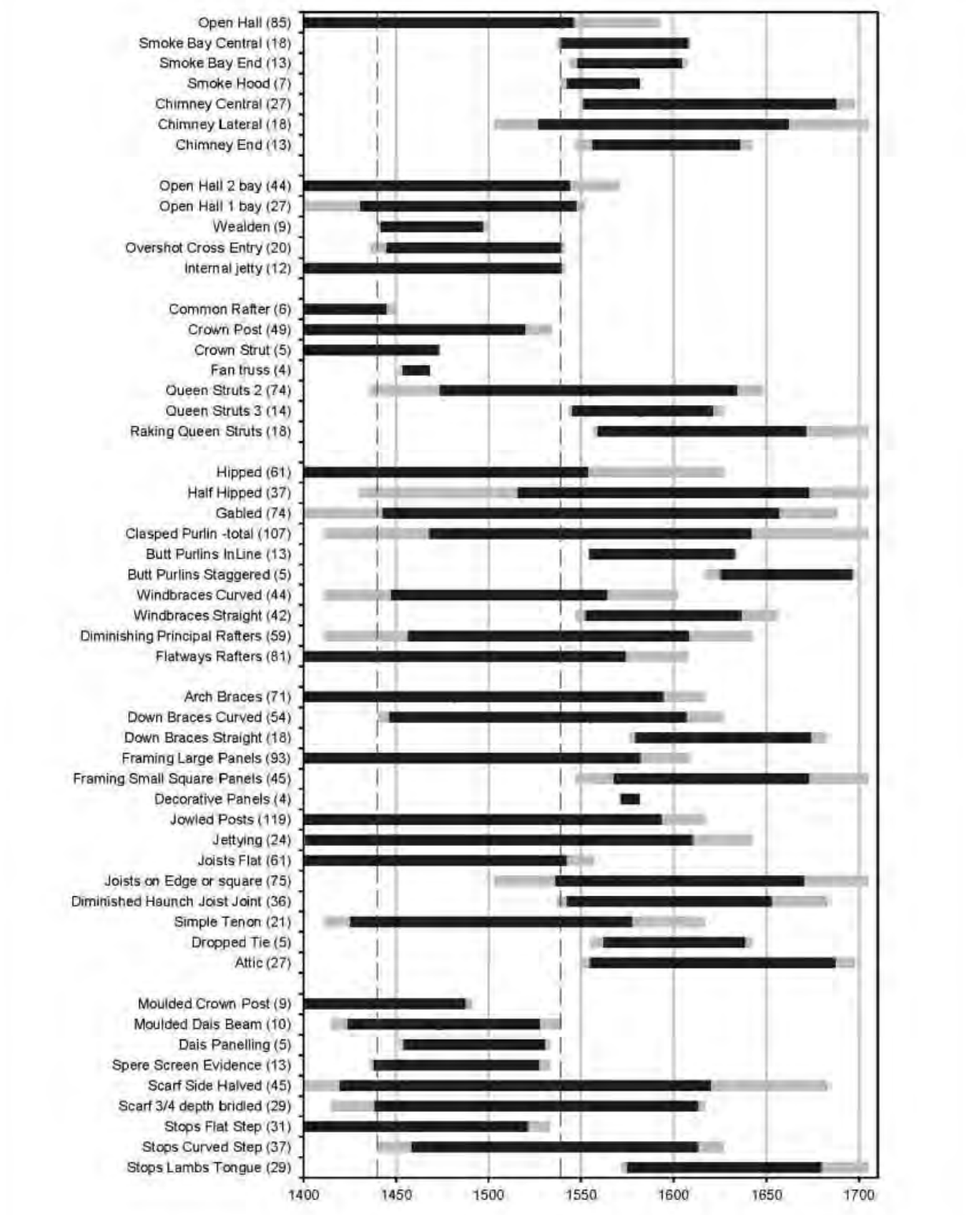
In this article, there are frequent references to practices being present in one area and not present less than a mile away in the next parish. On page 52, there is mention of a big gap in the practices of one area to another, see the quote below.

> *"The basic Surrey sequence for roof trusses is common rafter to crown post to queen strut to raking queen strut (Fig. 8). Six common-rafter roofs were dated by the project in the range 1254 to 1449. It had been thought to be a thirteenth- or fourteenth-century feature,[15] but the spread into the fifteenth is quite clear. This compares with experience in Kent, where it persisted until the sixteenth century in simple houses.[16] In Hampshire, it is only found in a few fourteenth-century houses.[17]"*

The other facet of the history, which was a surprise to the authors, is how fast a practice could change. Braces changed from curved to straight in an overlap of the practices of 10 to 20 years, joists went from flat laid to edge laid in less than 10 years, and so on.

One may assume that the timber framing techniques of the Colonists were those learned back in England by their carpenters. Therefore, it is reasonable to study the practices of the period in England to understand period changes. While some differences have been noted in the Surrey study between geographic regions of England, these differences are not as applicable to the 1600s as much as for earlier periods. The timber framing practices seen in the four buildings do indicate the evolved practices of England from the end of the time period indicated in the study, up until 1700. These practices are seen in roof framing to some degree and wall framing to a large degree. The size of the trees in the New World naturally altered some timber framing designs, as for example spans could use larger joists and not always require a mid-span summer beam. However, their English traditions ruled. The evolution in construction was as always driven by economics, with hewn and hand sawn timbers replaced by machine sawn as mills in the Tidewater Region came on line.

Other characteristics evaluated in the study of historic Surrey timber framed structures, such as chimney locations, do not hold the same similarities to England. Central chimney locations gained favor for the houses studied in Surrey, and at Appomattox this location was favored for the Manor but not for the Kitchen-Laundry building. Its end of building locations for its chimneys is related more to the cooking function than providing winter heat to the inhabitants. Knowing more about the parishes from which the Colonial carpenters originated might provide additional clues to those regional influences on their traditions of timber framing. Review of the passenger lists of arriving Colonists indicates a broad range of home locations for those passengers where such information was noted.



Summary date spans for the key features from 177 dwellings and additions to existing dwellings. The range shown is between the 4th and 96th percentiles, the total range of data is represented by the lighter shade. See Appendix for the groupings and additional information. The start of two apparent periods of change around 1440 and 1540 are highlighted by the dotted lines.

Part 1—Developmental History

Physical Description—Old Smokehouse

Old Smokehouse

The Old Smokehouse is a one-story wood structure with gabled roof with the axis running north south. The building is nearly equal sided with each elevation measuring between 12 feet, 3 inches and 12 feet, 4 inches in length. The roof is framed with modern dimension wood while the walls are constructed from timber framing, typically hewn beams, and mortise and tenon joints with wood peg fasteners. The exterior of the walls is covered by painted lapped weatherboards with a plain face. Likewise all of the corner boards and, door casing, window casing and rake covering boards are all of plain wood without any molded surface profile. The roof is covered with round butt cedar shingles with painted finish, with a projecting comb ridge. The join of roof to wall has a plain boxed eave. The foundation is a combination of brick sill at grade, and concrete blocks and wood stacks between the brick sill and wood beam plate/sill. The interior has a wood plank tongue and groove floor over newer dimension lumber wood floor structure. The interior face of the walls is covered by finish wood. There is one wood window on the south elevation that is a six-lite casement. The entry door is on the east elevation and is constructed of eight vertical boards on the exterior face and a double stack of cleats in "Z" configuration. The hardware is a rim lock on the interior face, a hasp and clasp and a pair of "T" strap hinges on the exterior face.

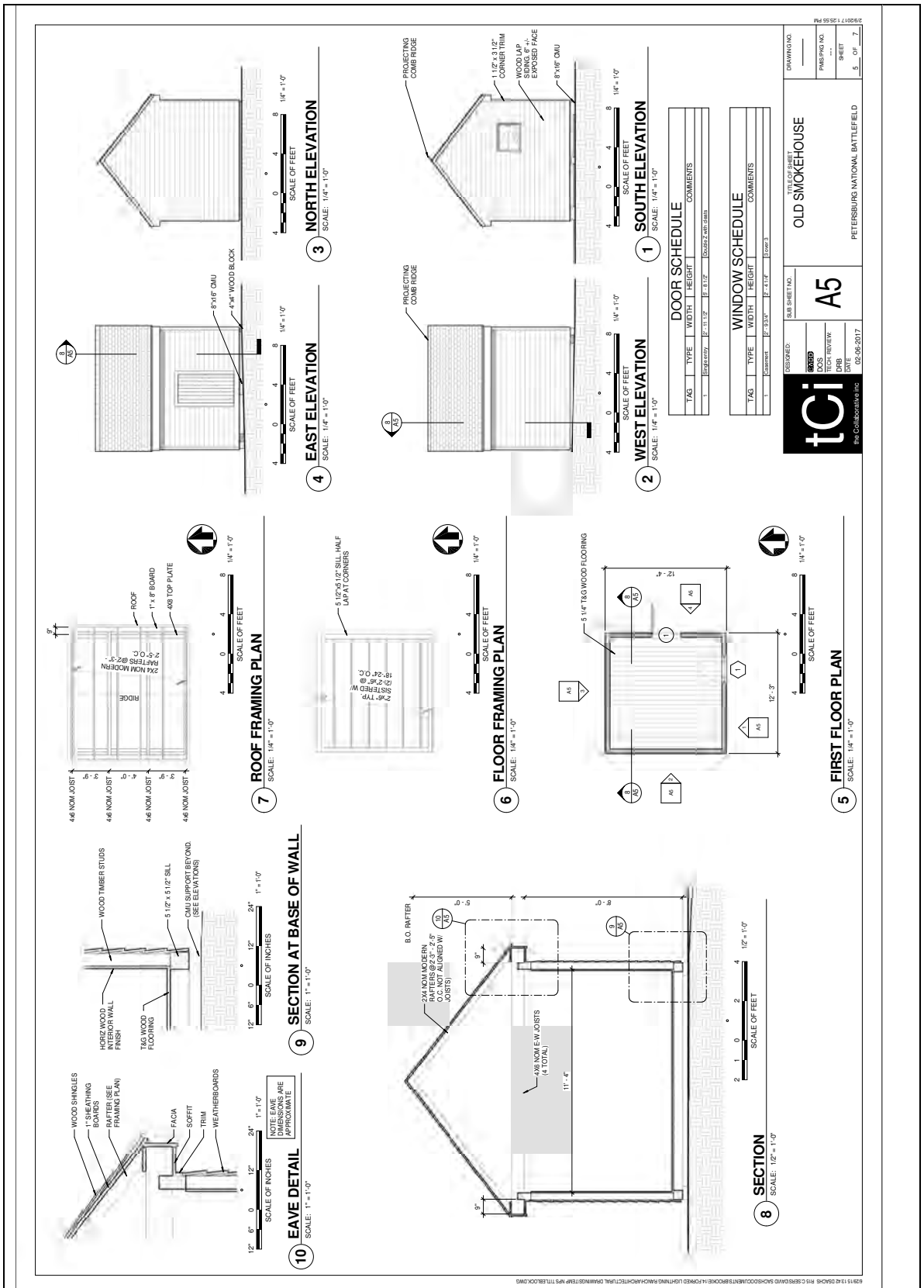


Figure 41: Sheet A6—New Smokehouse Plan, Elevations, Details, and Section

Photo 182 (JDF2085): Old Smokehouse: North elevation.

Photo 183 (JDF2086): Old Smokehouse: East elevation.

Photo 184 (JDF2087): Old Smokehouse: South elevation.

Photo 185 (JDF2088): Old Smokehouse: West elevation.

Photo 186 (JDF2200): Old Smokehouse: South interior elevation.

Photo 187 (JDF2201): Old Smokehouse: West interior elevation.

Photo 188 (JDF2202): Old Smokehouse: North interior elevation.

Photo 189 (JDF2203): Old Smokehouse: East interior elevation.

Photo 190 (JDF2204): Old Smokehouse: West roof structure.

Photo 191 (JDF2205): Old Smokehouse: East roof structure.

Photo 192 (JDF2206): Old Smokehouse: Roof structure looking straight up.

Photo 193 (JDF2207): Old Smokehouse: West floor.

Photo 194 (JDF2208): Old Smokehouse: East floor.

Record of Repairs and Alterations

A project completion report was prepared by Sandra "Sandy" A. Eickmeyer of work completed on the Old Smokehouse between January 1, 1995, and October 28, 1995. This project is believed to have been carried out principally by The City Point Unit of Petersburg National Battlefield maintenance staff. Accompanying the project report are drawings of each exterior elevation and each interior elevation detailing work completed. These are the only records of repair and alteration work as yet found. The repairs by individual elevation and whole building are as follows.

Old Smoke House City Point

Whole Building: Stabilization of brick foundation and level.
Front Eastside: Repair and replace 6x6 outer sill.
Pine Lumber: 4x6 framed corner post are det. and need to be repaired or replaced. Siding needs to be removed for work. Repair and replace deteriorated siding with in-kind materials. 10 boards need repair or placement.
Southside: Repair of outer sill. 8 boards need repair or replacement with in-kind materials. Window sash reglaze—Repair and repaint.
Westside: 4x4 framed corner post repair or replace. Remove siding for repairs. 5 boards need replacement or repairs.
Northside: Replace 6x6 sill. 7 boards need repair or replacement
Whole Building: Scrape lose [sic] paint on remaining siding. Apply one prime coat, two finish coats of paint to building exterior.

Sandy Eickmeyer provided the elevation drawings indicating the extent of work, which follow:

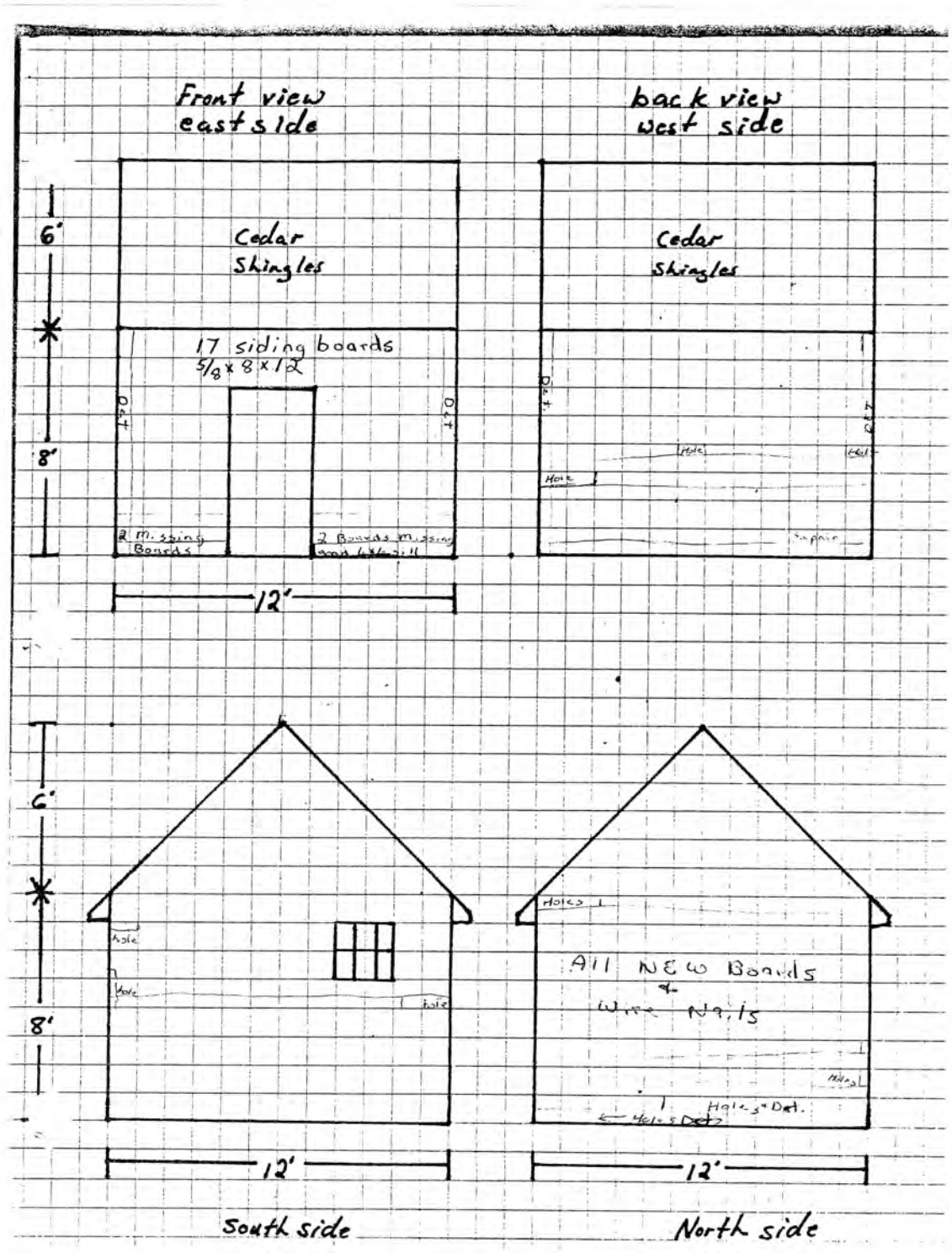


Figure 42: Elevation drawings indicating the extent of the 1995 work.

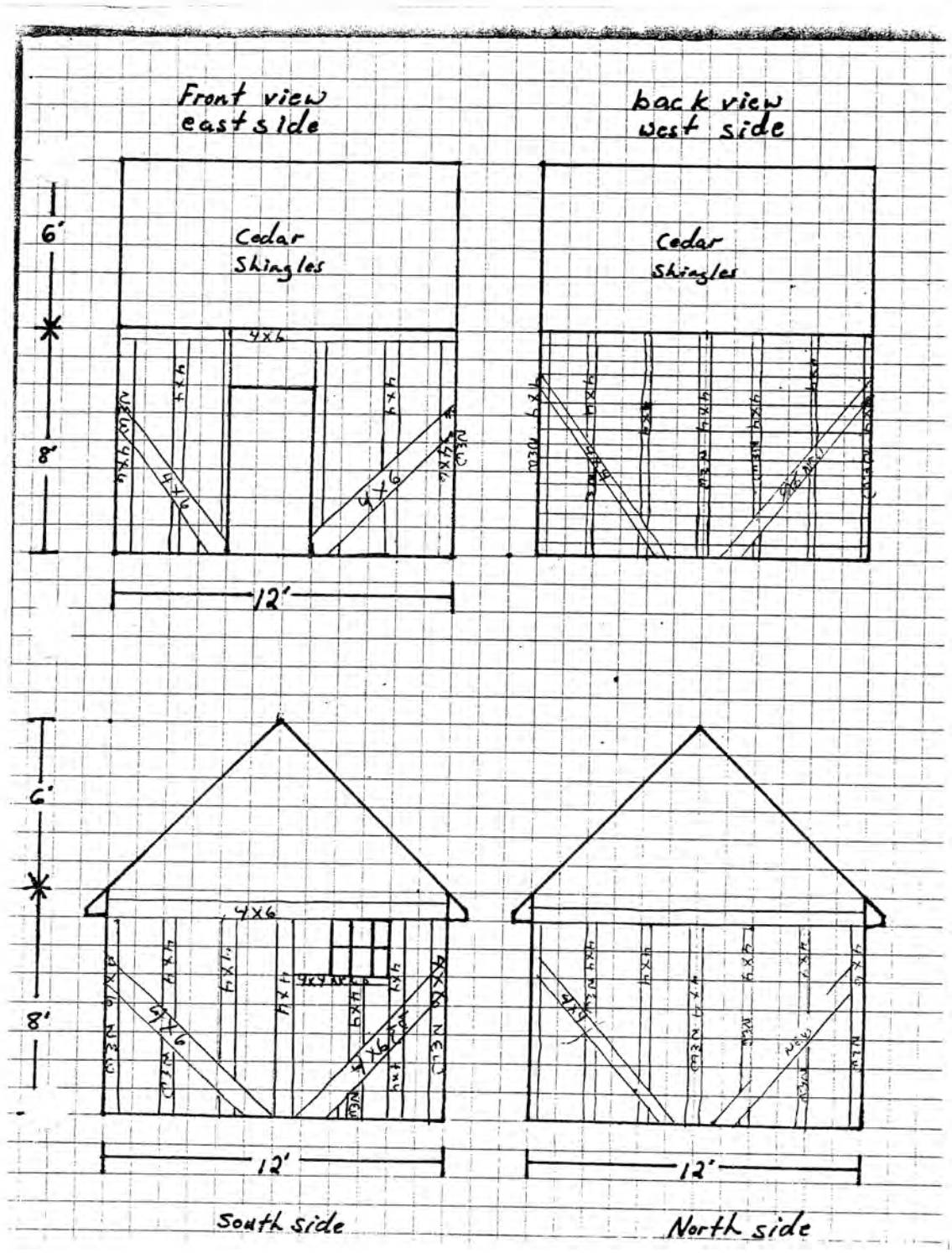


Figure 43: Elevation drawings indicating the extent of the 1995 work.

- "Foundation: Jacked building to level and supported corners using a combination of concrete blocks and treated wood stacks."

- "Wall structure: Repaired or replaced 4"x6" corner posts, all corners. New 4"x4" posts per the drawings as follows: three on north, none on east, two partials (below corner braces) on

south, and two on the west. New corner braces were installed on the north elevation NW corner, and west elevation SE corner. Sill repair and/or replacements were as follows: north, replace 6"x6" sill; east, repair and replace sill; south, repair outer sill; and west, no work."

- "Wall weatherboards: Siding of lapped weatherboards were replaced on the following elevations and quantities: north, 7; east, 10; south, 8; and west, 5. Some boards with good integrity were flipped with the previously exposed exterior face now on the interior, new boards were pine or cypress, all of the exterior boards remaining were scraped of loose paint, and overall one prime coat plus two finish coats of paint were applied."

- "Moldings: Simple moldings of nominal one-inch thickness cover the joint of gable ends weather boards to the underside of roof, the joint of soffit to wall, and corner boards. No work was specifically indicated for the moldings in the 1995 project scope."

- "Door: No repairs or alteration descriptions as yet found."

- "Window: Repairs made in 1995 were "reglaze, repair, and repaint." When it was first installed is as yet not known."

- "Roof structure: All new construction is evident. No documentation of work as yet found."

- "Roofing: No documentation found as yet of the most recent roofing. Likely to have been completed in the last thirty years."

- "Interior: At some point the interior walls have had installed a tongue and groove wood covering. In addition the flooring appears to be a newer installation, smokehouses tended to have earth floors, or brick covered earth. The floor structure is a combination of older timbers and modern dimensional lumber. No documentation has as yet been found for the flooring and floor structure installation."

Description and Condition of Elements
The materials of the Old Smokehouse are wood shingles, wood roof sheathing over wood rafters, wood weatherboards as siding, wood timbers as wall construction, wood interior wall covering, wood fascia/soffit, wood moldings, wood entry door, wood window, wood plank floor, wood floor structure, metal door hardware and window hardware, and a hybrid foundation of brick over which are wood stacks and concrete masonry units at the corners. The exterior is painted with paint.

Roofing
Description: The Old Smokehouse has a gabled roof form with the ridge running north south. It has a projecting comb ridge with the shingles extending up and over the ridgeline from the west slope. There are eaves on the east and west and none on the north and south. The wood shingles have a semi-scalloped lower edge, referred to as a "round butt" or "rounded butt" as well. The shingle thickness generally appears to match that of the New Smokehouse. There are 17 rows of 29.5 shingles each for a total of 501 shingles per slope. Each shingle has a 6-inch exposure, a 5-inch width (another 1/8 inch including the gap), and an 18-inch length. The exposure to overall length relationship results in a triple layer roof.

Condition: Assessment of conditions was evaluated for the same issues as the other roofs. The findings were: 2% had paint loss exceeding 25% of the exposed surface, 3% had splits mostly in the short top row adjacent to the east ridge, there were not any with edge loss, there were nine

shingles missing most of which were on the west slope close to the ridge, and 3% had cupping of significance, although mild cupping was surprisingly widespread. The cause for the loss of the missing shingles is attributed to design issues relative to fastening at the ridge. Because of the projecting comb ridge design, the last row on the east slope is composed of very short shingles, many of which have split. In a normal triple layer installation, the shingle is fastened by four nails; two driven into it when laid, and two more driven through it by the installation of the overlying shingle. Driving four fasteners into a short section of shingle may be the cause of the east slope splits. The west slope shingle losses are attributable to too few fasteners and the cantilever of the shingle over the ridge that allows winds to catch it on the back side working the fasteners loose.

In essence, the projecting comb ridge design is inherently flawed and a poor choice for a site with winds from variable directions.

Roof Structure
Description: The roof is framed with modern 2 x 4 inch rafters at 27 to 32 inches on center. Additional 4 x 6 inch joists span east-west and with a double notch joint over the plate and extend approximately 9 inch to support a raising (false) plate that provides bearing for the rafter ends. This detail provides an overhang of the walls on the east and west elevations.

Condition: The ridge of the roof is out of plumb nearly 4 inch to the north with respect to the top plate. The roof sheathing is not providing sufficient bracing for the roof and additional diagonals or braces are needed on the interior. The 2 x 4 inch (nominal) rafters are understrength by a factor of approximately 1.5 for combined dead and snow loads assuming typical Hem-Fir Construction grade lumber was used for the rafters.

There is evidence of powder post beetle activity on the north gable.

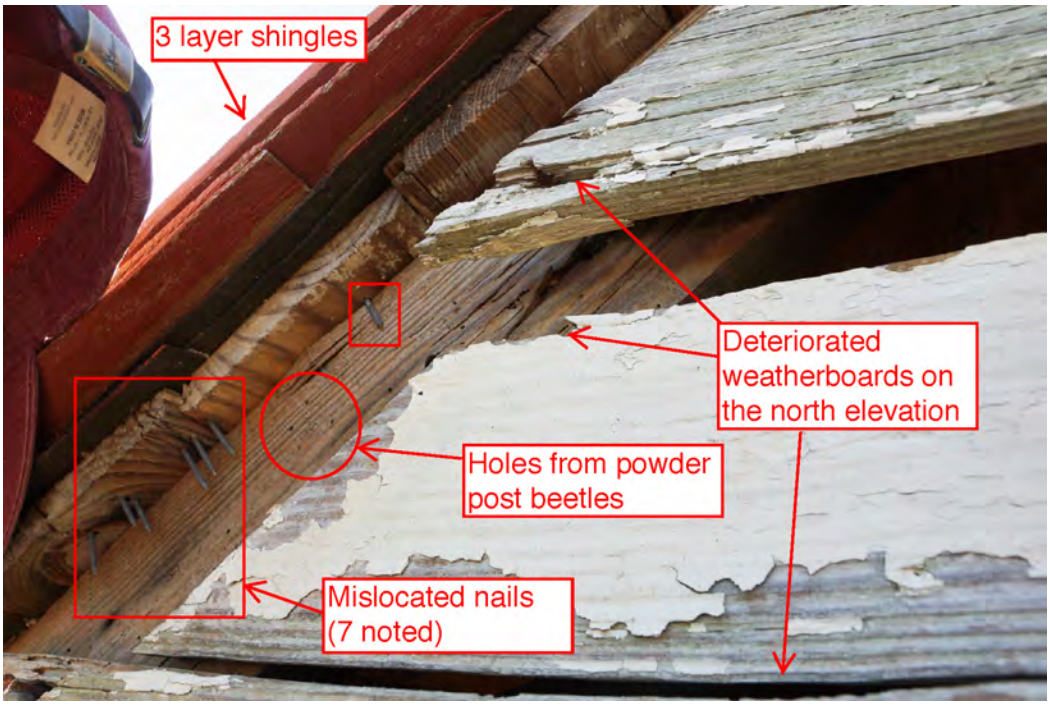


Photo 195 (JDF2281 Annotated): Old Smokehouse close up showing powder post beetles at north gable end, missing cover board, nail issues, and deteriorated boards.

Walls

Description: The interior surface of the walls is covered by wood planks, obscuring the timber frame. The timber-framed smokehouse has a perimeter 6 x 6 inch sill which appear to be half-lapped at the corners and possibly pegged; however, the joint is not visible at the top. The wall framing is not evident with the current interior sheathing. However, the following details of the wall framing are taken from NPS documentation, prepared by Sandra Eickmeyer, of the 1995 repairs. The 4 x 6 inch corner posts attach to the sill with a mortise in the sill and blind tenon on the post. Studs are 4 x 4 inch members at approximately 24 inch on center, blind tenoned into the sill below and 4 x 6 inch tie beam above. Down braces are typically 4 x 6 inch members—two per elevation and tenoned and pegged into the corner post and tenoned into the sill.

Photo 196 (JDF2212): Detail of removed corner post. Note mortises and pegs.

Photo 197 (JDF2211): Note deterioration at bottom of corner post, replaced in-kind in 1995.

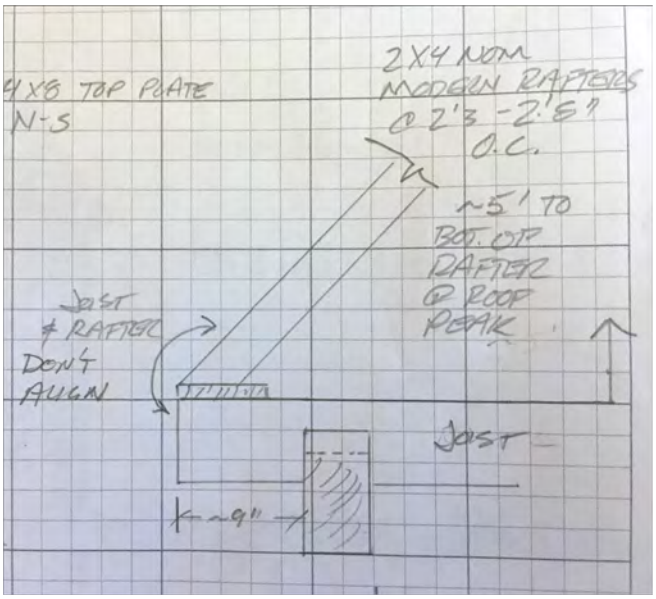


Figure 44: Section view above east wall of Old Smokehouse looking south showing the roof rafters, joists, top sill, and raising plate.

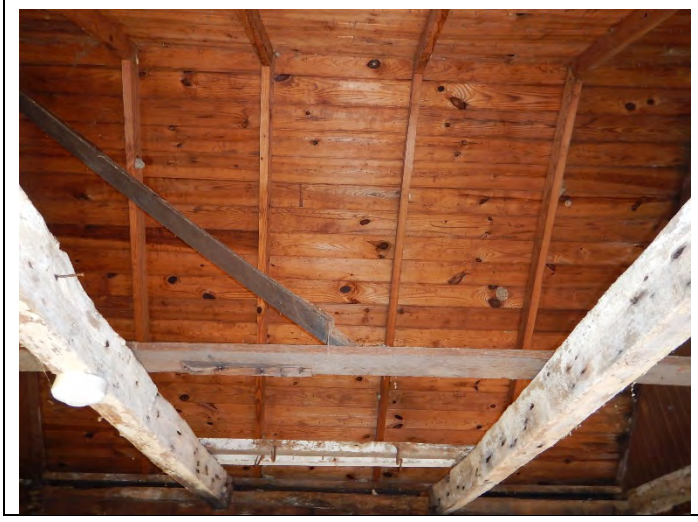


Photo 198: View of the roof rafters, roof sheathing, and joists from the interior of the smokehouse.

Condition:
The condition of the wall structural members could not be evaluated due to the interior sheathing. Presumably, the work done by NPS in 1995 (now over 20 years ago) replaced all moderately and severely deteriorated members. Given the significant number of deteriorated weatherboards, and the likely intrusion of water, the framing members should be comprehensively evaluated for condition issues during the recommended weatherboard replacement campaign.

Wood Fascia/Soffit/Moldings
Description: There is a plain wood soffit that extends from the wall face to a plain wood fascia. The joint of soffit to wall surface is covered by an equivalent 1x4 sized plain lumber. The slight projection of the roof sheathing and shingles at the gable ends has a similar sized cover board at the rakes extending from the ridge over the plain wood closure of the boxed eaves. Plain wood corner boards extend from the boxed eaves down to the bottom edge of the lowest weatherboard.

The entry door has the equivalent of 1x4 plain wood casings. The head casing is topped by a sloped wood flashing, sometimes referred to by its classical reference as an architrave. A window was added to the Old Smokehouse, functionally not in keeping with a smokehouse function. The date of the installation was likely sometime after the last use of the building as a smokehouse. It does not have any case moldings. Instead of casings it is defined by the projected edges of its frame.

Condition: There are some small end splits in the fascia boards. The north gable end is missing one covering board at the east rake. The bottoms of the corner boards have some damage such as minor material loss and end splits.

Photo 199 (DSC02085 cropped--rake board): The red arrow points to the area where a rake board should be placed.

Wood Weatherboards

Description: The boards are 7.125 inches in width, by 5/8 to 3/4 inches thick by the full length of the side of the building upon which it was applied. The lap appears to vary somewhat being in the 1.5 to 2 inch range. These weatherboards do not have the characteristic edge bead found for the other three buildings.

Condition:

The condition of the weatherboards was assessed for all four elevations and the results are set out in the table below. The majority of weatherboards are in poor condition; 48 of 86 (56%).

Photo 200 (JDF2239): Old Smokehouse: South elevation rot, sprung plank, edge losses.

Table 20: Siding Condition Assessment of the Old Smokehouse

Elevation	Number (from top)	Condition (from top)
North Lower 14 replacement boards 5-7/8 to 6-1/4-inch exposure, upper 13 are original; gable ends have no eave 27 boards	1	Poor: Split
	2	Good
	3	Poor: Dropped, split, Rot
	4	Poor: Edge checks
	5	Poor: 2 ES, ME
	6	Good
	7	Poor: Rot
	8	Poor: Rot
	9	Poor: Rot
	10	Poor: Edge checks
	11	Poor: Rot
	12	Poor: Rot
	13	Poor: Rot
	25	Poor: ES, ME
	26	Poor: ES, ME
	27	Poor: ES, ME
East 16 boards	1	Poor: ES
	2	Good
	3	Poor: Dropped, split, rot
	4	Poor: ES
	5	Poor: 2 ES
	6	Poor: ES
	7	Poor: CS
	8	Good
	9	North of door—Poor: ES
	10	Good
	11	Good
	12	Good
	13	South of door—Poor: rot
	14	South of door—Poor: rot
	15	South of door—Poor: dropped, rot
	16	Poor: ES, ME and missing 2 feet of north end

Continued on following page

Table 20 (cont.)

Elevation	Number (from top)	Condition (from top)
South	1	Poor: ES, ME
27 boards	2	Good
	3	Good
	4	Good
	5	Poor: ES, ME
	6	Poor: ES
	7	Poor: ES, ME
	8	Good
	9	Good
	10	Poor: rot
	11	Poor: ES, rot
	12	Poor: CS
	13	Good
	14	Poor: ME, rot
	15	Poor: rot
	16	Poor: rot
	17	Poor: ME
	18	Poor: CS, ME
	19	Poor: rot
	20	Poor: rot
	21	Poor: pulled out by warpage, rot
	22	Poor: ES
	23	Poor: dropped, rot
	24	Poor: rot
	25	Poor: ME, ES, rot
	26	Good
	27	Poor: ES
West	1	Good
16 boards	2	Good
	3	Good
	4	Good
	5	Good
	6	Good
	7	Good
	8	Good
	9	Good
	10	Good
	11	Good
	12	Poor: ME
	13	Good
	14	Good
	15	Poor: ME
	16	Poor: ME, rot

CONDITIONS KEY: CS= Center split, ES= end split, ME= missing edge material, Rot= rot
Note on Conditions: end splits means the condition varies from "significant," where there is separation, to fair condition where there is minimal separation. However, end splits will lead to rapid deterioration by rot so all weatherboards with end splits have been rated as poor.

Wood Entry Door and Hardware

Description: The single entry door is on the east elevation and is constructed of eight vertical boards on the exterior face. It measures 68-1/2 inches high, 5-1/2 inches wide, and 7/8 inch deep. It is operational. The vertical boards are tongue and groove, each measuring 3-1/4 to 4-7/8 inches in width with 2 inch face framing. The interior has cross bracing consisting of a double stack of cleats in "Z" configuration; the boards of the cross bracing are also 7/8 inch thick. There is no threshold or weatherstripping.

The door hardware consists of a rim lock mounted on the interior, without knobs and with an exterior key hole plate; and hasp and padlock and hinges mounted on the exterior. The hinges are strap style of "T" configuration and appear to be from the 20th century.

Condition: Overall, the condition is poor because of paint loss on the exterior and interior surfaces and six of the boards exhibit material loss at the lower butt ends ranging from 1/2" to 2" in height.

Photo 201 (JDF2098): Old Smokehouse: Door. Note hasp and padlock for exterior hardware.

Photo 202 (JDF2099): Old Smokehouse: Interior face of door. Note rimlock for interior hardware.

The rim lock lacks functional capability due to the removal of the knobs; therefore, the internal mechanism's condition could not be assessed given the knob removal. The hasp and clasp pieces do exhibit a loss of surface galvanizing and consequent rust. The strap portion of the lower hinge is missing its end section. The overall rating of the door hardware is fair.

Wood Window and Hardware

Description: The six-lite casement window, which is on the south elevation, measures 2 feet, 4-1/4 inches high, 2 feet 9-3/4 inches wide, and 1-1/8 inch deep. The sill is 3/4 inch by 3-1/2 inches, and the frame is 1 inch by 6-1/2. The bottom rail has been added on by an extension of 3/4 inch. Hinged to swing in, the east jamb has a pair of modern hinges with a galvanized finish. It is operational, but binds at the top. The closure hardware consists of a wood thumb latch. There is no weatherstripping.

Condition: The glazing is in good condition as is the interior paint; the exterior paint is in fair condition. The glazing putty and points are in poor condition. The window sash is in good condition. The window hardware is in good condition.

Photo 203 (JDF2100): Old Smokehouse: Window, exterior face.

Photo 204 (JDF2102): Old Smokehouse: Window, interior face.

Floor Structure
Description: The floor structure is constructed of newer dimension lumber, much of which is sistered to partially deteriorated floor joists.

Photo 205 (DW0730): Framing under floor. Note deteriorated structural member.

Photo 206 (DW0728): Photograph taken from the interior of the Old Smokehouse through existing hole in floor looking to the west of the floor structure. Note the tongue and groove edge of the flooring in the foreground, sistered floor joists—new dimension lumber joined to deteriorated older joists—new rim joist, and "foundation" of concrete masonry units and wood blocking.

Floor Structure Condition:
The restoration work done in 1995 replaced the north, east and south sill plates. It appears that the floor joists were strengthened by sistering at that time. There are several holes in the flooring including some that have been patched with plywood.

Foundation
Description:
There is uncertainty as to the original foundation of the Old Smokehouse. It may have been moved to this location as laid flat bricks extend north of the building. It is possible that it was simply timber on grade or that there was an at-grade or raised fired-clay masonry footing to support the sill. The current mix is of concrete masonry units, wood cribbing and fired-clay brick.

Photo 207 (JDF2240): Old Smokehouse, foundation under the west elevation.

Condition:
The existing foundation is considered temporary and should be replaced with an appropriate foundation system. Additional archeological investigation would likely provide critical guidance.

Interior Finishes
Flooring Description: The floor is covered by wood planks running north-south in a tongue-and-groove configuration. Wood flooring in a smokehouse is inconsistent with its use as a smokehouse as the fire used to generate the smoke was placed on the earth in the center of the room.

Flooring Condition: There are several holes in the flooring including some that have been patched with plywood. See photos 208 and 209 on the following page.

Photo 208 (JDF2208): West floor of Old Smokehouse.

Photo 209 (JDF2207): Old Smokehouse: East floor.

Walls Description: The interior face of the walls is covered by a mixture of finish wood, appearing to be of tongue and groove configuration with face detailing of beads (two per board), typical of beaded ceiling boards. Other boards are plain faced, typical of wood flooring. See photo 208 above.

Walls Condition:
The condition of the wall structural members could not be evaluated due to the interior sheathing. Presumably, the work done by NPS in 1995 (now over 20 years ago) replaced all moderately and severely deteriorated members.

Materials Analyses
Mortar:
Mortar sampled from what were believed to be remnant clay brick from a previous foundation for the Old Smokehouse was analyzed by acid digestion and sieve analysis to determine the binder to aggregate ratio and the gradation of the aggregate. The binder to aggregate ratio is approximately 1:2 with the aggregate containing a smaller percentage of the smallest aggregates (minus 200 and pan) when compared to the aggregates in the Kitchen-Laundry mortars. The aggregates for the Old Smokehouse appear to be from a different source than those used for the Kitchen-Laundry chimneys.

Infrared Imaging:
Infrared imaging was used to image the north elevation of the Old Smokehouse to visualize the wall framing. The wall framing is not evident with the current interior sheathing. As shown in Figure 45 (below), the infrared imaging is able to discern the framing behind the exterior and interior sheathing.

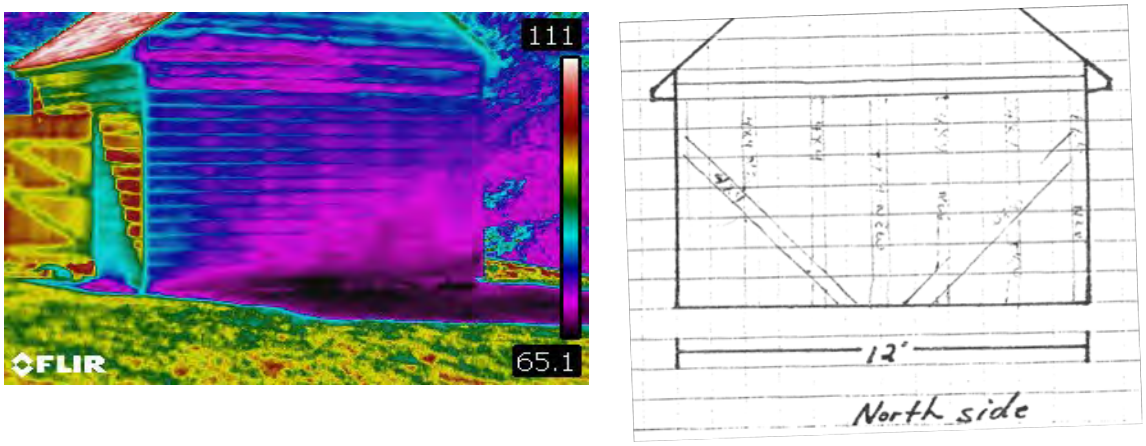


Figure 45: Infrared image of the north elevation of the Old Smokehouse correlates with the framing sketch made during the 1995 repairs.

Paint Analysis Summary:
Six samples were taken from the exterior of the Old Smokehouse. Two of the samples had nine layers, indicating the likelihood of these elements being original: #21 fascia and #22 north elevation weatherboards just below the gabled peak. The predominant early colors were white with one thin red layer, eighth up from the earliest, on the fascia.

Table 21: Summary of Paint Analysis—Old Smokehouse

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: South crossbeam	17	White Wash (lots of wood fiber)			1
Interior: north crossbeam	18	Creamy white	Creamy white	—	2
Exterior: trim at top of wall	19	White	White	White	3
Exterior: soffit	20	White	Silver gray white	White	Cream	Light cream white	5
Exterior: fascia	21	7 layers of white	Red (thin)	White	9
Exterior: north elevation siding, high up at gable peak	22	White	N978.7 %R gray	Cream	Gray	3 layers of White	Red (thin)	White	9

Wood: One wood sample provided by NPS from the Old Smokehouse siding was determined to be southern yellow pine (*Pinus* spp.). Please see the letter report in the appendix section of this report.

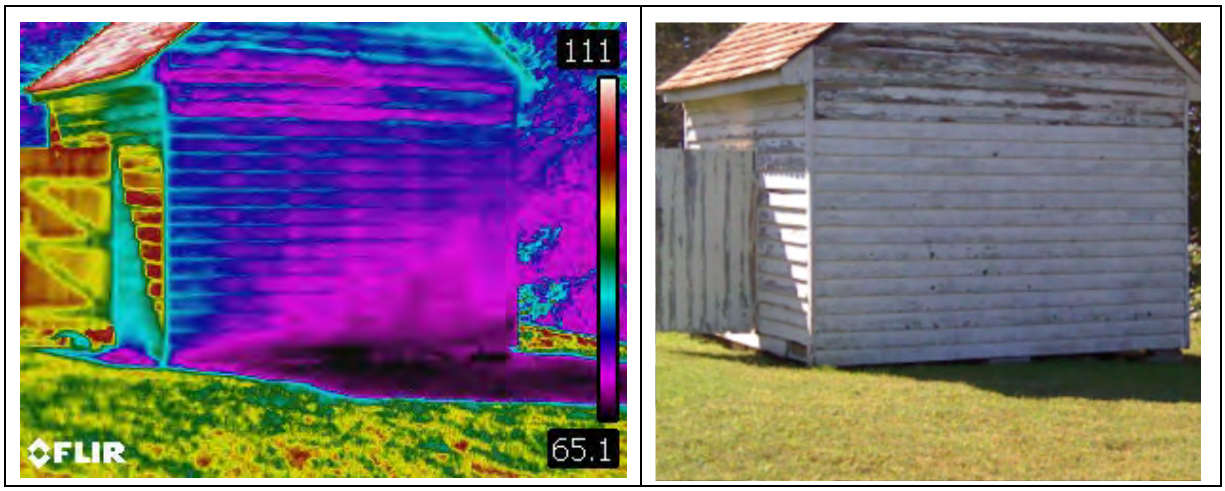


Figure 46: North elevation of the Old Smokehouse. Interior framing visible as cooler features. The framing layout agrees with the NPS documentation, prepared by Sandra Eickmeyer, of the repairs done in 1995.

Character Defining Features
The four buildings are each purpose-built to perform specific functions in support of the operation of Appomattox Manor. With the exception of the Old Smokehouse with its present interior finishes, each building is an accurate representation of its functional requirements providing an integration of building form and function. The traveler in 1816 would recognize each building type by its exterior, immediately realizing the functions contained within. The traveler in 2016 who was familiar with the plantations of the Tidewater and beyond, would likewise recognize the function of each building by its exterior. The arrangement of the buildings on the site was common enough to have these travelers also recognize that this area was devoted to household support functions.

Reference is made in the Eppes diary in the 1850s to the Old Smokehouse, for example as a reference to a place to store fish prior to smoking (although, it is not clear if the fish were smoked, salted or smoked AND salted). Alterations to this structure have removed its functional capability for smoking such as the addition of a window, a wood floor, and interior wood planking for the walls. Thus, while the building has the reference to a smokehouse in its name, it does not have this functional capability currently. The character defining features are related to its current storage function.

1. Gable form roof, north-south axis, painted wood shingles with round butts. Projecting comb ridge.
2. Plain lapped weatherboards with painted finish.
3. Simple moldings: rake moldings, corner boards, and casings.
4. Wood entry door, constructed of eight vertical boards with a double stack "Z" cleat in the interior face.
5. Wood window is configured as a six-light casement window.
6. Boxed eave.
7. Timber framed walls, characteristic construction of the day of timber framing with hewn beams. Walls are built with corner posts, studs, diagonals, and top/bottom wall plate timbers, all connected with mortise and tenon joints with wood pegs.
8. Interior wood floor, and wood planking on interior face of walls.

Remedial Treatments and Interventions
The treatments are detailed in Part Two of the report, "Treatments and Work Recommendations," in which the recommended treatments and interventions are presented, many in substantial detail where the complexity warrants deeper explanation. As the Kitchen-Laundry is both the largest building and has all of the materials and systems of the others, it is at that building where the detailed treatment recommendations are set out in a comprehensive manner. Where the same treatments are required for one of the smaller buildings there is a reference back to the treatment as set out for the Kitchen-Laundry. By example, lime whitewash is present in the Kitchen-Laundry interior and exterior, as well it is present in the interior of the Dairy. The comprehensive explanation of the treatment is presented for the Kitchen-Laundry and referenced thereto in the Dairy lime whitewash recommended treatment. Where a treatment is particular to just that building, such as tung oil wood floor finish, it is presented for just that building. Another example is a revised foundation for the Old Smokehouse; no other building has this recommended treatment.

Below are listed short descriptive titles of the recommended treatments provided for your consideration, for this building:

1. Repair sheathing on south and north roofs during next re-roof. Investigate termite activity in sills.
2. Repair and or replace deteriorated weatherboards, in particular, it is recommended to make repairs to the northeast corner so as to mitigate moisture and associated decay in building.
3. Wall structure repairs include the consolidation of one stud near the northwest corner and one diagonal in the west elevation near the southwest corner. Also, replace one missing stud in the north wall.

Future Research Needs

Archeological exploration should be done to guide dealing with the foundation.

Sawmills

The following is a series of relevant excerpts from this publication:
Mills in Eighteenth Century Virginia with Special Study of Mills near Williamsburg, by Mary A. Stephenson (July, 1947). Colonial Williamsburg Foundation Library Research Report Series – 0116. Williamsburg, Virginia: Colonial Williamsburg Foundation Library, 1999.

According to Sir William Keith, in *The History of the British Plantations in America*, Part I, p. 82 (London: 1738), the building of mills was considered as early as 1608, when Captain Newport arrived at Jamestown: "There were at this time one hundred and thirty Persons remaining in the Colony, when Captain *Newport* arrived with about seventy more, chiefly Artificers; and particularly some Polanders and Dutchmen, to make Pitch, Tar, Pot-Ash, Glass, &c. and to build Mills, and other Machines…." Page 2.

Types of Mills

1. Water-Mills:

Because seventeenth century records indicate the economic value of the mill in the life of the colony, a few early items are included in this report on eighteenth century mills. In the earlier century, much emphasis was put upon the grinding of grain. In 1621, Governor Wyatt received power **"**to take care of the Dutch sent to build saw-mills, and seat them at the Falls, that they may bring their timber by the current of the water: and to build water-mills, and block-houses in every plantation…." **(**Hening's *Statutes at Large*, I, p. 115) Earlier in the year (January 1621/22), Page 2.

In 1649, a writer noted that *"They have 4 Wind-mills, and 5 Water-mills to grind their Corn; besides many Horse-mills of several kinds, and Hand-mills for several uses: A Sawing mill for Boards is much wanted; one mill driven by water, will do as much as 20 Sawyers, &c." ("A Perfect Description of Virginia"*, in Peter Force's *Tracts and Other Papers*, Vol. II, Ch. VIII, p. 5) Page 4.

***

6. Sawmills

Very early in the seventeenth century, an interest was manifested in the building and operating of sawmills. It is presumed that the first sawmills were run by water power. Plans were made in July 1621 whereby it would be possible "to take care of ye Dutch Sent to build Saw Mills & Seat them at ye falls that they may bring their timber by Current of ye water to build Water mills…" *Virginia Colonial Records*, Book No. A.42, as cited in *Virginia Magazine of History and Biography*, XV, p.32.)[1]

[1]A gristmill was a mill used exclusively for grinding grain for local consumption. A merchant mill was a mill in which flour was ground and packed for sale. Gristmills were owned by many planters for convenience. Later, the merchant mill was operated as a means of income.

In about 1625 Purchas wrote regarding the American English plantations, especially those of Virginia and the Summer Islands: "There have beene also sent skillful men from Germany, for setting up of Saw-mills: Virginia yeelding to no place in the knowne World for Timbers of all sorts…" (Samuel Purchas, *Hakluytus Posthumus*, or *Purchas his Pilgrimes…*, Glasgow and New York: 1926 reprint, XIX, p. 247.)

Bruce (in his *Economic History of Virginia in the Seventeenth Century*, II, p. 491) states that in 1630 sawmills were being built at Jamestown and that land was granted to persons who undertook the erection of mills of this kind. In 1637, Hugh Bullock owned sawmills in Virginia (*Records of York County*, vol. 1633-1694, p. 30, Va. State Library).

William Byrd was keenly interested in sawmills. Letters written during the period between 1684-1688 give evidence of this fact.

Letters from William Byrd to Perry and Lane:

"Virga. ffeb'ry the 2d 1684
"…I have inclosed Sent for the iron worke of a Saw MIll, wch I desire may bee Sent by the first Ship, & that the Cranke may bee made exactly according to ye inclosed patterne. If it is cast (without flaws) it may doe best; the Racke & Nutt must fitt; I am told it may bee best & cheapest had out of Holland, but I thinke wrought iron is prohibited, therefore must leave it to you, onely earnestly desire that great care may bee taken (in ye Cranke especially) that the iron worke bee well & Exactly according to ye dimensions inclosed, for I hope my timber worke will be finished before ye End of 7 be next:…"

(*Virginia Magazine of History and Biography*, XXIV, p. 233.)

"Virg'a March ye 8th 1685
"…by Capt Ruds is Sent a patterne for 6 Mill Saws wch desire may bee Sent p first conveniency exactly according to paterne…"
(Ibid., XV, p. 50.)

Letter from William Byrd to _____:

"Virg'a June 6th 1685
"…I have Sent by Capt Tibbet a patterne of a Saw for a Saw mill & would desire you to Send mee a do of Saws according to that paterne, onley would have them 6 inches Longer…

(Ibid., XXIV, p. 357.)

Letter from William Byrd to _____:
"Virga Ult'o Jan'ry 1688
"…I desire therefore that hee would put mee up at Least a do'n Large rounde files for my Steel Mill Saws, & procure mee 6 Steel Saws, of ¼ Same dimensions of those formerly Sent…"

(Ibid., XXV, p. 359.)

Letter from William Byrd to "T. & Allen":

"…Please to Send mee these things underwritten…2 do of files for my Steel mill Saws…"

(Ibid., pp. 263-264.)

Hugh Jones in *The Present State of Virginia* (1724) spoke of "sawing mills": "They are not very easily persuaded to the Improvement of useful Inventions (except a few, such as Sawing Mills…" (See Chapter III.)

In 1751, John Blair in is diary made reference to his mill and millstone: “My mill stone broke, ye hoop bursting, had just writt ye day before to Mr. Lyde for a mill stone.” William and Mary Quarterly, First Series, VIII, p. 4.)

On May 27, 1762, James Gordon made the following entry in his diary: “Sent up the new mill-stones to our saw-mill.” (Ibid., XI,p. 230.) Here we have evidence that the mill was run by water power.

Near Richmond in Hanover County, in 1768, Elisha White had erected a large sawmill: “The subscriber, near NEW CASTLE in Hanover County, has erected a sawmill, and will sell the best plank on very reasonable terms. As it is Situated in a neighborhood abounding with most excellent pine, I can venture to engage to furnish any gentlemen, who favour me with their custom, not only with stuff cut in the best manner, but also of the best quality. I propose to sell cheap, and will on the most reasonable terms, deliver it in New Castle; and if any gentleman will contract for a large quantity, I will take it down the river. ELISHA WHITE.” (*Virginia Gazette*, Rind. ed., February 13 [18], 1768)

The advantages to the public of erecting a sawmill in connection with the foundry and furnace at Richmond are set out by John Ballendine to the Governor of Virginia in 1781:

“The saw Mill is the first object that ought to be considered for the improvement of those Wks to advantage, the situation being fixed & the Timber &c: ready to frame, am certain the expence in setting her to work, will not exceed £100, & as the Timber is so easily b'rot down by water, & for many years to be had in the neighborhood by Land, one half for sawing the other, supposing 2 saws constantly employ'd wou'd cut 2000 feet p: day, the half thereof is worth 5£ pr: thousand, say in the year amnts [in profits] to £1500” (Calendar of Virginia State Papers, I, p. 545.)

There is reference to Alexander Spotswood purchasing a saw-mill in Orange County, Virginia, in 1783 (*Virginia Magazine of History and Biography*, V, p. 389).

***

Summary:
Mills played a most important part in the economic life of the growing colony of Virginia. Very early (1608) the building of mills was considered. By 1624, gristmills had appeared on rivers and creeks. These mills were run by water or by wind. The Assembly of 1645 stressed the need for millers as well as the need for regulating and controlling the use to which the mills were being put. Provision was made by an Act of Assembly for land upon which mills could be erected. By the latter part of the seventeenth century Byrd, Blair, Beverley, Ludwell, Custis, Parke, and other prominent men of the Virginia colony were operating water gristmills and merchant mills (for gain) on their plantations.

There is strong evidence that a sawmill had been built at Jamestown about 1630. In the last part of the century sawmills had become more common in the tidewater section. Byrd operated sawmills from 1684-1688 near the “Falls.” The graphic on the next page shows evidence of using logs that have been sawn into planks at a sawmill, given the perpendicular lines at fairly regular spacing.

Sawmills Sidebar Photo 1 (JDF2136 cropped): Close-up view of wainscot beneath the north window of the kitchen's interior wall of the east elevation. Note regularity of saw marks, which are pointed out by the vertical lines below the image.

SAWMILLS SIDEBAR APPENDIX
Millstones, Hand-Mills, Millwrights, Grist-Mills, &c.

Saw-Mills in Counties of Virginia

1766, July 25, *Virginia Gazette*, Purdie & Dixon, eds.:
in Bath, N. C.

1768, February 11, Ibid., Rind. ed:
in Hanover County

1768, March 3, Ibid., Purdie & Dixon, eds.:
for sale near Suffolk

1769, January 1, Ibid., Purdie & Dixon, eds.:
in Lunenburg County

1769, April 27, Ibid., Rind, ed.:
on Pamunkey River

1769, December 14, Ibid., Purdie & Dixon, eds.;
in Caroline County

1770, October 11, Ibid., Rind, ed.:
for sale — no county

1770, November 8, Ibid., Purdie & Dixon, eds.:
for sale on Nanticocke River

1770, November 15, Ibid., Rind, ed.:
for rent in Culpeper County

1770, November 29, Ibid., Rind, ed.:
for rent at falls of Potomac

1771, April 25, Ibid., Purdie & Dixon eds.:
for sale in Surry County

1772, March 12, Ibid., Purdie & Dixon, eds.:
for sale in Caroline County

1772, August 20, Ibid., Purdie & Dixon, eds.:
in King George County

1772, October 1, Ibid., Purdie & Dixon, ads.:
for sale in Norfolk borough

1773, April 22, Ibid., Rind, ed.:
in Manchester

1773, December 9, Ibid., Purdie & Dixon, eds.:
manager of, adv. for

1774, April 7, Ibid., Purdie & Dixon, eds.:
in King William County

1774, June 9, Ibid., Purdie & Dixon, eds.:
in Surry County

1775, January 14, Ibid., Dixon & Hunter, eds.:
in Nansemond County

1775, January 14, Ibid., Dixon & Hunter, eds.:
in Isle of Wight County

1775, February 18, Ibid., Dixon & Hunter, eds.:
near Cabin Point

1776, November 15, Ibid., Purdie, ed.:
in Chesterfield County

1777, April 18, Ibid., Dixon & Hunter, eds.:
near Chickahominy River

1777, June 13, Ibid., Purdie, ed.:
in James City County

1777, October 24, Ibid., Purdie, ed.:
at Falls of Pamunkey River

1777, October 24, Ibid., Purdie, ed.:
for rent near Falls of James River

1777, December 5, Ibid., Dixon & Hunter, eds.:
saw-mill of Col. Johnson

1781, *Calendar of Virginia State Papers*, Vol. I, 509-510:
saw-mill in Albemarle County for rent

Saws

1711, June 28, *York County Records* — Book 14, Orders Wills, 1709-1716, pp. 100-101:
Inventory of Estate of Thomas Ballard decd,
"…3 x Cuttsaws 17/6"

1712, December 15, Ibid., p. 212:
Inventory of Daniel Taylor
"…One Whip Saw
Two short saws & Two Hand Saws"

1808, January 2, *York County Records* — Wills & Inventories, Book 23, p. 50:
Inventory and appraisement of Estate of Fleming Bates,
"…1 pr Hand-Mill stones"

1810, July 3, Ibid., p. 819:
Inventory and appraisement of Estate of William Goosley,
"…1 pair Horse Mill stone 20$
…3 Whip saws & 1 Cross cut 17$"

Part 2— Treatments and Work Recommendations

Part 2—Treatments and Work Recommendations

Introduction

Part 2 is directed toward two specific areas: the "Ultimate Treatment" of the four buildings, and the "Work Recommendations."

The Ultimate Treatment is presented first and includes the external documents guiding growth as developed by local jurisdiction, followed by a review of the internal park developed documents such as the General Management Plan relative to the four buildings. In this case, the four buildings are to be used for ongoing interpretation, similar to the current use. Extensive additional material has been provided on the sub-themes related to foodways with detailed background information provided.

The "Building-Specific Treatments and Work Recommendations" follow the Ultimate Treatment. These treatments are provided for the consideration of the National Park Service. They are arranged as building specific treatments. Some of the described treatments will only apply to that specific building, while other treatments may apply to all buildings or just a few. The Kitchen-Laundry building is the largest building and has the most number of elements and the most treatments in terms of number and the most detail for the recommended applicable treatments. Instead of repeating the same treatment details, where such treatment is appropriate for another building, it is back referenced to the detailed description, typically set out for the Kitchen-Laundry. However, for treatments only applicable to one building, the treatment specifics are there provided.

Ultimate Treatment: External Guidance

City Point Development Concept Plan (1986) and City Point: An Amendment to the Development Concept Plan (1992)

Completed in 1992, this public planning effort evaluated the resources at City Point and developed interpretive, facility development and personnel recommendations to guide future action. Most recommendations have been integrated into this plan. Specific development proposals have been modified to accommodate the broader planning perspective provided by this park-wide management planning effort, and to respond to subsequent research and archeological information uncovered since the DCP was completed.

City of Hopewell Comprehensive Land Use Plan, 2001

The City of Hopewell Planning Commission prepared a comprehensive land use plan adopted by the City Council in December 2001. This plan preserves cultural resources through the designation of an Historic District that is designed to "bring attention to the architectural excellence and historic importance of certain buildings, structures, and places and areas of the city". The Historic District currently only applies to the City Point community including the designated area of Petersburg National Battlefield. The district is administered as an overlay zone and regulations focus primarily on the external architectural appearance of buildings with the purpose of maintaining the historic appearance of the neighborhood.

As to Transportation, the Plan recommends exploring a shuttle bus between sites, river visitor experience, and a connecting multi-use trail system. The plan recommends bike racks at each site. Page 63. There is a call for "Rehabilitating the cultural landscape of Appomattox Manor, Hunter House, Bonaccord and Naidara" and "The cultural landscape at City Point is rehabilitated to reflect its significant period of 1864-1865 while respecting the diverse layers of history."

Ultimate Treatment: Internal Guidance
From an external standpoint, the Ultimate Treatment is to interpret the buildings in their use as functional support buildings to and for the Appomattox Manor. The following themes have been set out for the entire Petersburg National Battlefield site.

Petersburg National Battlefield's Interpretive Themes from General Management Plan (2005) and repeated in Petersburg National Battlefield's Foundation Document (2016)

> ***Theme One: A Young Nation in Transition:*** Through the local citizens, especially the Eppes family, and the lives of the enslaved population you can explore the many dimensions of the founding and development of a nation that was torn apart by political, economic and social differences and issues not yet fully resolved.
>
> ***Theme Four: Role of African Americans:*** During the Petersburg Campaign, African Americans finally took their place as full participants in the Union army and the Civil War, although not in society as a whole.
>
> ***Theme Five: Life During the War:*** Living under constant fire, the combatants and non-combatants at Petersburg represent a cross-section of old and young, white and black, enslaved and free, men and women, soldiers and civilians, each with different views on the causes, effects, and results of the war.

Foodways: The Function of Place/The Place of Function
Of particular importance to the interpretation of Appomattox Manor as part of the City Point Unit is Theme One. A subset of this theme is the interpretation of the foodway processes of the four buildings from preservation of meats to the extension of shelf life of fruits and vegetables, and moving on to food preparation. The people engaged in these food way processes performed a variety of functions, were of different backgrounds, and primarily represented enslaved and hired African-American women.

The Period of Interpretation may have an emphasis on the time of Union Troop occupation, the years 1864 and 1865, yet the functions performed in these four outbuildings began for the Eppes Family in the 1600s. The evolution in these functions over the various defined time periods is of importance. By example, one method of preserving foods was by "canning." Previous methods changed after the Mason jar was invented, and evolved further during the Industrial Revolution, until today with mass production of preserved foods in cans. On the other hand, the process and materials have changed little for smoking meats. In today's period, one can purchase small smokers for smoking one's own meats, but it would be rare to build a pyramidal roofed building of 12 feet by 12 feet dimensions to smoke for one's own consumption. Smoking evolved from a necessary function to sustain one's own family and labor force, to a time where it is a joyful hobby or one buys from a larger commercial supplier. Yet the method of smoking remains essentially the same.

It is fascinating to read the cultural diversity represented in the recipes contained in *The Virginia Housewife Or, Methodical Cook*, by Mary Randolph, first published in 1824. While many of the recipes would have been familiar to the people of England, there are also recipes from Italy and many of Spanish origin. Local vegetables and fruits were treated with great care, including vegetables believed to have been brought from Africa such as okra. Mary Randolph's cookbook's table of contents clearly indicates the emphasis of the period on preservation techniques such as pickling and preserves, the available meats and fish, and the spices and sweet additives put into a

great deal of the recipes. Her book is a window into the food culture of the day. By careful reading, one can also have a glimpse of the labor demand incurred, such as: "It must be put on at sunrise, to eat at 3 o'clock"; for boiled Indian meal pudding. Other dishes required fairly constant stirring.

While Mary Randolph is a great look into eating in colonial Virginia, the Eppes's enslaved cooks (and later paid cooks) would have mostly learned these skills from one generation to the next. However, we must acknowledge that Eppes's wives had their own cookbooks. The first is *The Complete Cook*, by J. M. Sanderson. This was owned by probably both Josephine D. Eppes (1826-1852) and her successor, Elizabeth W. (Horner) Eppes (1832-1905). The second is *Cookery as it Should Be*, owned by Elizabeth Eppes. Lastly, there is a handwritten cookbook owned by Elizabeth Eppes, which has been transcribed and included as Appendix 10.

While the buildings remained fairly static throughout the calendar year, the activities within and about were subject to periods of great activity: hog butchering in December, ham salting in January, loading the hams into the smokehouse in January, smoking in January to March, the shad run in April, on to the first vegetable harvest in the spring to the fruit and berry harvests of late summer and fall. Of course, other activities were constant such as cooking meals and doing the laundry.

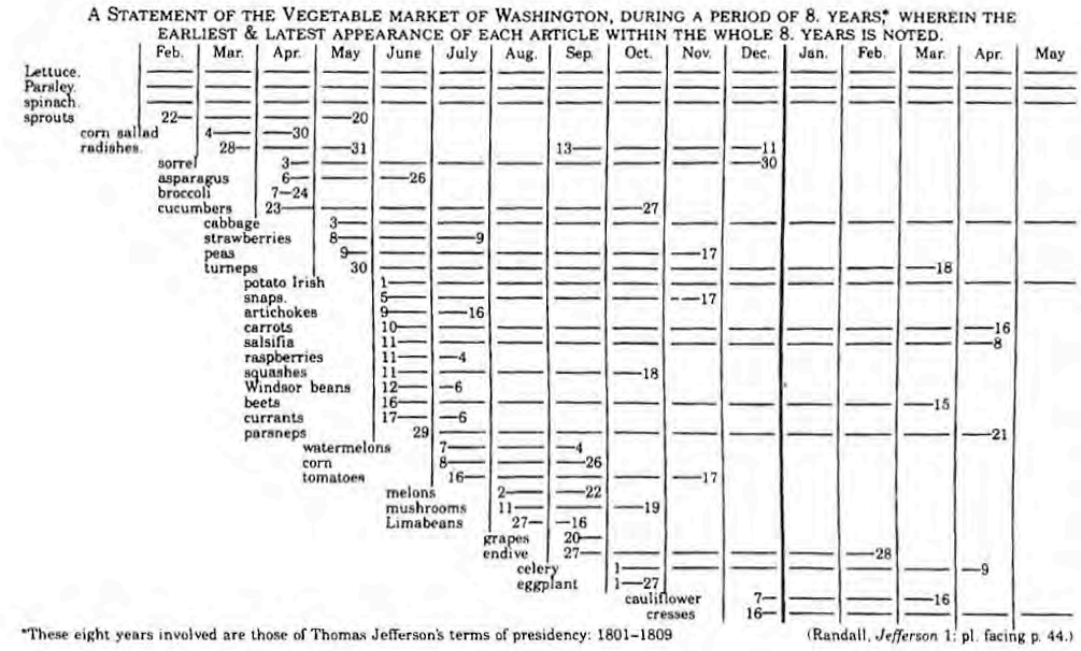


Figure 47: Chart from *Thomas Jefferson's Garden Book, 1766-1824*. Source: Randolph, with Historical Notes and Commentaries, 1984, p. 256.

Photo 210 (AppomattoxManor_1999_160_269.jpg): Photographic print, Servants at Appomattox Manor, City Point, VA. Late 19th C., 1999.160.269, Virginia Historical Society.

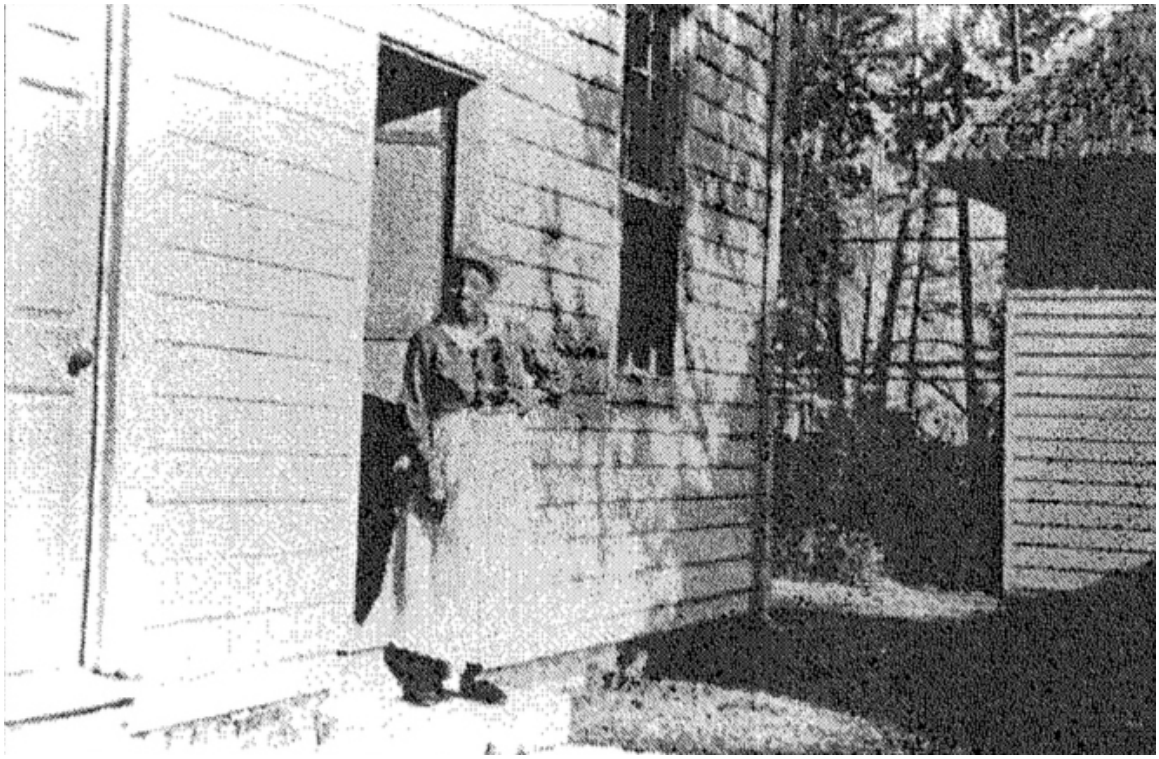


Photo 211: Photograph of Paulina Ruffin Eppes at kitchen door, c. 1936. Note windmill tower in the background. Source: Paulina Ruffin Eppes, Appomattox Manor, City Point, VA, 1999.160.287, Virginia Historical Society.

Interpretive Opportunities—Foodways

> *The journey of humble foods…from West Africa to New World plantation societies to our own place and time speaks to food's importance as a touchstone of the experience of human migration. Migrants the world over bring their dietary preferences and cooking practices with them. These traditions are rarely forsaken, even when food preferences cannot be reconstituted in full. Food gives material expression to the ways exiles commemorate the past and shape new identities amid alien cultures, diets, and language.[34] Food is vested with symbolic ties to homelands left or lost. The emphasis on meaningful foods and familiar forms of preparation enriches the memory dishes with which migrants connect past and present.*
>
> [34]Patricia Howard, "Women and the Plant World: An Exploration," in Patricia L. Howard, ed., *Women and Plants: Gender Relations in Biodiversity Management and Conservation* (London: Zed, 2003), 11.
>
> —Carney and Rosomoff, *In the Shadow of Slavery*, p. 185.

"Foreign" Cultures

Sources of inspiration for recipes included Spain, Italy, Africa, the Caribbean (Creole), England, and native peoples of the New World. The kitchen was where the blending of cultures was celebrated in new recipes, highlighting dishes of other cultures, bringing Old World recipes over the Atlantic to be continued in the New World, and incorporating New World produce as a regular ingredient in dishes. Technological change in cooking did not occur in any significant fashion in terms of cooking and preserving, methods, and materials. The people who did the cooking may have been servants in the Old World for those classes for whom funds allowed and in the New World in the Tidewater the cooking staff were generally enslaved people. The sources for the recipes were a combination of published cookbooks (which were few in number until the middle of the 19th century), family, and neighbors. No Internet and way fewer cookbooks would seem to mean less diversity in meals when compared to today. However, the number of recipes found in the few cookbooks of the first half of the 19th century is surprising. Less surprising is the significant number of meats, such as the available poultry, many of which were "wild game," from waterfowl to pheasants.

The intent of the Tidewater hostess was to be able to serve an English guest the same fare as found at a similar function in England. She might well have featured some regional specialties, given the local abundance, such as oysters; or home prepared, such as their own hams; or exotic, such as okra.

The foodway traditions of the kitchens of the Tidewater Plantations also included traditions from the home countries of the enslaved people, typically West African countries. However, the enslaved cook may have not simply grown up on this plantation, rather she may have lived in several places in the South with different cooking traditions. Therefore, the dishes issuing from the kitchen may well have reflected these other area's food traditions: Louisiana, Caribbean, or the "northern" states. There are also notable dishes bearing the direct influence of the Native American tribes. The role of native tribes in transferring knowledge to African heritage enslaved people was to demonstrate the techniques in the use of native plants and cooking methods, another source for fusion. (Carney and Rosomoff, *In the Shadow of Slavery*, pp. 121-122.)

Names of common dishes often changed obscuring the origins. By example, Brunswick stew is what it was named in the 1800s, but the contents were originally whatever was available added to an ongoing stewpot as attributed to Creek and Seminole tribal history (Richard Thornton,

peopleofonefire.com [1/23/17]). Today's base vegetable for Brunswick stew is the tomato. The tomato appears to have been introduced by the Spanish through their colonies to the southeastern tribes, including the Creek and Seminole tribes. The local tribes are reported to have taught enslaved people the methods to hunt and trap the local game. Into the stewpot went all that was caught. The stewpot figuratively and practically exemplifies the crossing of cultural "boundaries."

Other staple dishes, such as ash cakes, are present for cultures around the world, or in times and places where cookware may not be available, cooking in the ashes is practical. Cooking of ash cakes was the expedient technique for Revolutionary War soldiers. Typically the dried ingredients were carried easily, mixed with water and formed into thick pancakes and cooked in leaves in the ashes or directly in the ashes. Cooking meat directly on the fire's hot ashes is still practiced, a current technique in Argentina. The cooking method for hoe cakes has been attributed to the method of heating a hoe blade in the fields to make lunch, and has been further explained that the hoe is a reference in Old English to a flat metal skillet. Hoe cakes were cooked in the kitchen, at individual cook fires, and in the field for lunch. A common practice of individual plantations was to provide weekly rations to family units of their enslaved workers, and depending upon what constituted the rations, the cooking methods and recipes would necessarily vary. In addition, some plantations provided the family units with land for a small garden plot to supplement the rations. Thus cooking occurred for the plantation owners in the main kitchen, in individual family units, and in the fields.

In addition to the rations and the garden plots, there were times during the year when there was an abundance of foodstuff, all of which was unlikely to be able to be preserved. Examples were the shad and herring runs on the river, much of which might have been smoked (or salted and dried), yet a portion would likely have been consumed during the run. During the December hog slaughter, there were less desirable cuts that were often distributed to supplement the weekly rations.

The Example of Rice

Of the many agricultural products raised in the New World British Colonies, rice was singular in the knowledge of its cultivation by the imported Africans, particularly the women of West Africa. While rice became a leading export from the Carolinas, other areas such as Virginia attempted to grow the crop. The wetlands were selected for rice propagation and freshwater control systems were instituted. Evidence of the canals and control structures is seen as early as the 17th century in the Virginia plantation of Royal Governor Sir William Berkeley, "Green Spring."

> *Many scholars consider Green Spring an early form of the Southern plantation, which would come to represent the antebellum South, and a showcase for Berkeley's experiments to diversify Virginia's economy. Winemaking, silk, cotton and rice production and experiments with many different crops were conducted in the decades following the early settlers' arrival in 1619 at Jamestown; however, most of these experiments seem to have failed. Green Spring's experiments are noteworthy for the diversity of crops and manufacturing on one plantation, unusual for its time, and the large scale of the operations was unique. Agricultural production included rice, flax, hemp and tobacco, wine making and horticulture; manufactured goods included glass, pottery, walnut lumber and potash. Many of these goods were exported to England in large quantities as well as distributed locally.*
>
> —NPS, Draft General Management Plan Amendment & Draft Environmental Impact Statement, pp. 101-102.

Rice cultivation along the coast of West Africa had been observed by the Portuguese during their voyages of discovery beginning in the mid 1400s. The rice cultivation most readily observed was along the coast in cleared mangrove swamps, and in tidal estuaries where the fresh water sitting on top of the salt water was let into the fields and used to flood the fields at high tide and the water thus captured was retained by the control structures. Later explorers of the river valleys observed freshwater river-based irrigation. As irrigation as a system had been introduced to the Iberian Peninsula by the Moors, who in turn had migrated from Africa, one might expect the practices were African in origin. However, the later explorers from other European countries such as France attributed the irrigation practices as being introduced to West Africa by the Portuguese. Beyond not understanding the origin of the practices as being West African, further, the French did not understand crop rotation principles, and the introduction of cattle to feed off the crop residue with their manure fertilizing the field.

> *The French did not understand the rationale of tidal rice farming, which formed part of a complex land-use system involving cattle herding, fishing, and rice cultivation. This land-use strategy strengthened regional subsistence security through diversified food supplies in an ethnically diverse region. Europeans never considered that the cultivation of rice by river tides might form part of a clever land-use strategy for a drought-prone region.*
>
> *Nonetheless, the irrigated rice system along the coast suggested to the biased European perspective that Africans learned it though contact with the Portuguese. Arguments for a Portuguese origin for this most sophisticated of African rice systems failed to question the improbability of mariners, much less traders, teaching African farmers how to grow irrigated rice. Europeans simply could not imagine that the Africans themselves had experimented and adapted irrigation to their lands independently.*
>
> —Carney, J. A. *Black Rice*, p. 37.

The lack of understanding by the French and others of the agricultural practices employed by the populations of West Africa led them to grossly erroneous conclusions about the farmers, their knowledge of climate, soils, and their overall sophistication.

> *Even though the African method of shifting land use between rice and cattle supports a complex land rotation and diversified nutritional base, the underlying rationale of the system eluded Europeans until well into this century. They viewed the wetlands of the Inland Delta, for example, as perfectly suited for the cultivation of two irrigated rice crops. That such a system had failed to develop autochthonously in an eminently appropriate environment confirmed for European colonial officials the supposed technological limits of African society on the eve of the Atlantic slave trade. The land-use strategy developed by the region's farmers, herders, and fishers for coping with persistent drought served instead to bolster views of African cultural inferiority. In an era of scientific racism and colonialism, the denial of African accomplishment in rice systems provides a stunning example of how power relations mediate the production of history. As a result, researchers ignored African rice history until well into the twentieth century.*
>
> —Carney, J. A. *Black Rice*, p. 48.

This lack of understanding of the sophistication of rice production in West Africa, and of the native populations knowledge, persisted into the twentieth century as exemplified by a large-scale irrigation system developed by Europeans.

> *The Atlantic slave trade and its legacy of racism, combined with the inherent sense of Western superiority during colonialism, conditioned European perceptions of African rice systems. In the years between the two world wars, colonial irrigation engineers and botanists aimed to bridge the perceived technology gap by developing large-scale irrigation projects along Sahelian rivers. In promoting rice cultivation year-round, these European-initiated projects radically disrupted the traditional balance achieved in alternating land use between farming and grazing systems. Despite the repeated failure of these irrigation schemes, the blame was always placed upon the presumed inability of Africans to comprehend the sophisticated concepts embodied in technology transfer rather than on the ill-conceived plans of outsiders.*
>
> —Carney, J. A. *Black Rice*, p. 49.

The role of women in rice production was paramount. The women selected the types of rice to be planted and performed the planting. The Portuguese had noted 20 varieties being used in the 15th century. "…colonial officials in the early twentieth century recorded more than fifty distinct types of rice being grown, with another thirty-five varieties in the mangrove rice area." (Carney, J. A. *Black Rice*, p. 50)

The transfer of seeds from the Old World to the New World, and the reverse, has become known as the Columbian Exchange. Well in advance of the colonization of the New World by the British, the Portuguese had moved into the stepping stone islands of Cape Verde and on into South America. Rice cultivation was initiated in Brazil with African enslaved people who had come from the premier rice growing region of Senegal to Sierra Leone and whose skills in rice cultivation were well known to the Portuguese. Most slave ship captains were appreciative of rice as rations for their crew and the slaves, one of the cereals of choice for the voyage. Significant quantities were grown for this purpose in Africa for 350 years. Rice was a vital crop: in Africa, for the voyage, and in the New World.

The females from the rice growing areas of Africa were as valued as the men in the slave markets of the rice growing areas of North America. Their continued dominance in the planting phase was based on their knowledge of seed selection, soil fertility, climate, and planting cycles. Other tasks were shared with the men such as harvesting and post-harvest processing such as milling by mortar and pestle. However, winnowing by use of a fanning basket to separate the chaff tended to be done by the women.

The cooking of rice as practiced in the colonies did not follow the Asian method; instead, it followed the African method with the objective of complete grain separation. The technique included: medium to long grained rice, boiling rice for 10-15 minutes, draining off excess water, and removing the pot from the fire and left covered for at least an hour. One hallmark of rice cooked properly in this fashion was a hard brown cake around the edges. This is still the favored method of cooking rice in West Africa, and in places of such influence such as Cuba.

There were many other agricultural food and fiber crops transferred as part of The Columbian Exchange. Of all of these crops, the rice cultivation practices of West Africa were probably the most important, and least recognized by the Colonial Period plantation owners as being an integral part of the capabilities of many of the enslaved persons in producing crops.

Evolution in Food Production

The agricultural product of plantations was often a cash crop intended for export. Some portion of each plantation was producing food for the sustenance of the plantation's enslaved people and Owners, such as corn and wheat. The Appomattox Manor had its own family garden for the use of the Eppes family. The produce of small individual garden plots was intended for on-plantation consumption by the individual enslaved people's family unit planting and tending the crops. This was the location of experimentation and testing of crops not previously known to families such as the Eppes. However, it is important to understand the intense curiosity shown by planters such as the Eppes family, Thomas Jefferson, George Washington, and others. Bringing seeds back from their travels was common practice for planters. George Washington in his visit Barbados was likely to have brought back seeds to try. As plantation owners, they regarded themselves as planters and were intensely interested in new crops. They would have been equally interested in what was growing in the small individual plots, which soon after began to show up on their own dinner tables. (Carney and Rosomoff, *In the Shadow of Slavery*, p. 135.)

African Plants Established in the Plantation Era

FIGURE 7.1. African plants established in the plantation era.

CEREALS		
Millet	*Pennisetum glaucum*	B, Ca, H, Hi, J, L, La, Po, S, We
Sorghum	*Sorghum bicolor*	Ca, H, Ha, Hg, Hi, Hr, K, L, La, Ma, Pu, S
Rice	*Oryza* spp.	H, Hg, Hi, Ho, Hu, Mc, Pr, S, Sx, Wl, Wo
TUBERS		
Yam	*Dioscorea cayenensis*	Ca, H, Ha, Hg, Hi, Hr, O, OM, Pr, Pu, S, St, Wa
Plantain/banana	*Musa* spp.	H, Ha, Hg, Hm, Hr, K, Ku, Li, O, OM, Pi, Pr, Pu, S, St, Wa
Taro/eddo	*Colocasia esculenta*	H, He, Hr, K, Wa
LEGUMES		
Black-eyed pea/ cowpea/calavance	*Vigna unguiculata*	K, L, S, Sp, Wl
Pigeon pea/Congo pea/Angola pea/ *guandul*	*Cajanus cajan*	H, Hg, Hi, Hr, Pi, Pr, Pu, St, Sx
Bambara groundnut/ *Voandzeia*	*Vigna subterranea*	M, Pr
Lablab/bonavist/ hyacinth bean	*Lablab purpureus*	Hg, Hr, Je, K, L, Li, M, Pi
BEVERAGES		
Coffee	*Coffea* spp.	Hr, Pr, Pu, St
Tamarind	*Tamarindus indica*	H, Hi, Hm, Hr, Li, M, Pi, Pu, St
Roselle/hibiscus/ *bissap*	*Hibiscus sabdariffa*	H
Kola nut	*Cola* spp.	E, K, P, S, V, Wl

Historical observer(s) or modern scholar(s), location:

B = Jean Barbot, French Guiana
C = Lydia Cabrera, Cuba
Ca = Mark Catesby, the Carolinas
Cs = Luigi Castiglioni, Carolina
D = Jean Baptiste Debret, Brazil
E = Bryan Edwards, Jamaica
G = Lewis Gray, South Carolina
H = Frederick Hall, William Harrison, and Dorothy Winters Welker, Northeast Brazil
Ha = Jerome Handler, Barbados
He = Karen Hess, Virginia
Hg = Barry Higman, Caribbean
Hi = Arnold Highfield, Danish West Indies
Hm = Alexander von Humboldt, Colombia
Ho = F. C. Hoehne, Brazil
Hr = David Harris, outer Leeward Islands
Hu = J. Hurault, French Guiana
J = Han Jordaan, Curaçao
Je = Thomas Jefferson, Virginia
K = Clarissa Thérèse Kimber, Martinique
L = Jean-Baptiste Labat, Martinique and Guadelope
La = John Lawson, Carolina

Source: Carney and Rosomoff, *In the Shadow of Slavery*, p. 136.

OIL PLANTS AND FRUITS		
Sesame/benne	*Sesamum radiatum*	Hu, Je, M, P, Pi, S, W, Wl
Castor bean	*Ricinus communis*	C, Hr, K, M, Mc, S, V
Oil palm/*dendê*	*Elaeis guineensis*	H, S, V, Wl
Watermelon	*Citrullus lanatus*	Hi, Hr, Hu, P, Pi, St, Sx
Muskmelon	*Cucumis melo*	K, La, Wo
Ackee	*Blighia sapida*	E, P, Ru
VEGETABLES AND SPICES		
Okra	*Abelmoschus esculentus*	Cs, He, Hi, Hr, Hu, K, M, P, Pi, Pr, S, St, Sx
Vegetable amaranth/ African spinach/ *bledo/callalou;* jute mallow/ bush okra	*Amaranthus* spp.; *Corchorus olitorius; Vernonia* spp.	C, Hi, V, Wl
Melegueta pepper	*Aframomum melegueta*	H, He, Ho, K, M, V
Guinea pepper	*Xylopia aethiopica*	C, Ru
Guinea squash	*Solanum aethiopicum*	H, He, Ho, Hr, La, Pi
UTILITY		
Bottleneck gourd	*Lagenaria siceraria*	H, M, V
Kenaf	*Hibiscus cannabinus*	H
FODDER		
Guinea grass	*Panicum maximum*	C, D, Hr, K, P, S, Sx, Wo
Pará/Angola grass	*Panicum muticum*	D, Hr, K, R, Wa
Bermuda grass	*Cynodon dactylon*	G, K

Li = Richard Ligon, Barbados
M = Georg Marcgraf, Pernambuco, Brazil
Ma = Woodville Marshall, Windward Islands
Mc = James McClellan, Saint Domingue
O = Gonzalo Fernández de Oviedo, Spanish Caribbean
OM = John Oldmixon, Barbados
P = John Parry, Barbados and Jamaica
Pi = Willem Piso, Brazil
Po = Johannes Postma, Curaçao
Pr = Richard Price, Suriname
Pu = Lydia Pulsipher, Montserrat
R = Juan Tomás Roig, Cuba
Ru = A. M. G. Rutten, Curaçao
S = Hans Sloane, Jamaica
Sp = Randy Sparks, South Carolina
St = John Gabriel Stedman, Suriname
Sx = Johann Baptist von Spix and Carl Friedrich Philipp von Martius, Brazil
V = Robert Voeks, Bahia
Wa = David Watts, Barbados
W = Mary Tolford Wilson, South Carolina
We = Waldemar Westergaard, Danish West Indies
Wl = Maureen Warner-Lewis, Trinidad
Wo = Peter Wood, South Carolina

Source: Carney and Rosomoff, *In the Shadow of Slavery*, p. 136.

Distinctive Culinary Signatures

The plantation owners had a cultural food background rooted in the British Isles. This cultural boundary was expanded by inclusion of cuisines of various European countries, particularly France, Spain, and Italy. Found on the tables of plantation owners were many more foods brought to the New World from Africa, and techniques for cooking, all brought together to create a fusion cooking of lasting importance.

> *African ingredients and cooking practices gave the foodways of former plantation societies their distinctive signatures. Their metamorphosis to the diaspora cuisines of today was originally mediated by enslaved women who guided modest foods out of the subsistence plot and into the cooking pot. These foodways began, to borrow the words of the historian James McWilliams, as "cuisines of survival."[1] At the hearths of their dwellings and in the kitchens of plantation gentry, African women and their descendants created the fusion cuisines and memory dishes of the African presence in the Americas.*
>
> [1]James E. McWilliams, A Revolution in Eating: How the Quest for Food Shaped America (New York: Columbia University Press, 2005), 11-13.
>
> —Carney and Rosomoff, *In the Shadow of Slavery*, p. 177.

> *A signature ingredient of the foodways of Africa and the diaspora is greens…. Some greens apparently came to the Americas with enslaved Africans, notably mustard greens and collards…. Across the Atlantic in Jamaica, the African word* callalou *refers to spinach made from the leaves of the New World amaranth species.[16]*
>
> *In many plantation societies, the word* callalou *named not only the greens of the* Amaranth *genus but also the soups and stews that featured them…. Today* callalou *is recognized as one of the signature dishes of the African diaspora. These flavorful pepper pots of the circum-Caribbean bring together foods from different cultural traditions—African, Amerindian, and European—into a single dish, still known as* callalou *(or* callalou; caruru *in Brazil).[18] An important variant of this dish is the* gumbo*, in which okra substitutes for greens as the principal vegetable. Both* callalou *and* gumbo *are African words for African ingredients that lend the dishes their culinary definition. Each expresses the African preference for greens and the continuity of African cooking practices in the Americas.[19]*
>
> [16]National Research Council, *Lost Crops*, 2:37n5. In Brazil the amaranth spinach is known as *bredo*.
> [18]John T. Schneider, *Dictionary of African Borrowings in Brazilian Portuguese* (Hamburg: Helmut Buske Verlag, 1991), 109-10; F. G. Cassidy and R. B. Le Page, *Dictionary of Jamaican English* (Kingston, Jamaica: University of the West Indies Press, 2002), 89. In Haiti the term *callalou* refers to okra; in other parts of the Caribbean *callalou* is made with taro leaves. In Brazil *caruru-azedo* refers to African *Hibiscus sabdariffa*.
> [19]Harris, Iron Pots and Wooden Spoons; Cascudo, História da Alimentação.
>
> —Carney and Rosomoff, *In the Shadow of Slavery*, p. 179.

Interpretive Opportunities—Rice

The Portuguese brought rice to Brazil. The Spanish brought rice to Central and South America. Rice was cultivated in West Africa at the time of colonization of North America. The West African rice genus/species is *Oryza glaberrima*, different from the Asian rice genus/species. The earliest evidence of rice production in North America is in the last third of the 1600s. Whether African slaves brought in their native rice species or the other cultivated genus/species were grown is possibly not known, regardless the West African slaves were familiar with several techniques for growing rice.

The major zones of production are located along the Niger valley around Mopti in Mali and Birnin Kebbi in Nigeria, and in northern Guinea. Deepwater rice ecosystems can be defined as those where flooding achieves a depth of from 60 to 100 cm, and floating rice systems as those where flooding exceeds 100 cm. These production systems are among the least developed in West Africa, with very little use of fertilizer or mechanization and dominated by the use of *Oryza glaberrima* and tall traditional *O. sativa* cultivars. As a result, yields are among the lowest in the region, and highly variable across sites and years. Research to improve these systems has made little progress.

American Rice Inc amrice.com

Enterprising colonists were the first to cultivate rice in America. It began quite by accident when, in 1685, a storm-battered ship sailing from Madagascar limped into the Charles Towne harbor. To repay the kindness of the colonists for repairs to the ship, the ship's captain made a gift of a small quantity of "Golden Seed Rice" (named for its color) to a local planter.

The low-lying marshlands bordered by fresh tidal water rivers of the Carolinas and Georgia proved to be ideal for rice production. The soils were rich, reasonably flat and highly fertile. They also were so soft a man could hardly stand on them, with twice a day tides pushing fresh river waters onto the flood plains, nothing else could be grown there. By 1700, rice was established as a major crop for the colonists. That year 300 tons of American rice, referred to as "Carolina Gold Rice," was shipped to England. Colonists were producing more rice than there were ships to carry it.

Rice farming's extremely high hand-labor requirements are credited with having started the plantation era of the Southern States. Even with ox and mule-drawn equipment of those years, rice "farms" or plantations of only a few hundred acres required from 100 to 300 laborers to prepare the soil, plant, harvest and thresh their production-all by hand.

By 1726, the Port of Charleston was exporting about 4,500 metric tons of "Carolina Golden," which later became the standard of high-quality rice throughout the world. When America gained independence 50 years later, rice had become one of her major agricultural businesses. Then came the War Between the States and an end to the plantation era. This, together with the ravages of hurricanes and competition from other crops, moved rice westward. The sprawling plantations of the Gulf Coast, parceled out to soldiers returning from the war, became a new home to rice crops. Still, high labor costs kept the industry from expanding. Not until mechanized farming methods came into use would the Gulf Coast rice industry become viable.

Early History
https://en.wikipedia.org/wiki/Rice_production_in_the_United_States

Wooden mortar and pestle found in the rice loft on Briars Plantation, John's Island (Charleston County), South Carolina. It is believed to have been used in husking and/or polishing rice which was grown on the plantation. The age is unknown.

Winnowing barn at the Mansfield Rice Plantation, Georgetown, South Carolina.

Rice was introduced to the United States in the 17th century. It is mentioned to have been under cultivation in Virginia as far back as 1609, although it is reported that one bushel of rice had been sent to the colony later, in the summer of 1671, on the cargo vessel *William and Ralph*. In 1685, a bag of Madagascar rice known as "Gold Seede" was given to Dr. Henry Woodward. A tax law of 26 September 1691 had permitted payment of taxes by the colonists by way of rice and other commodities.[1] [2]

The colonies of South Carolina and Georgia prospered and amassed great wealth from rice planting, based on the slave labor obtained from the Senegambia area of West Africa and from coastal Sierra Leone. One batch of slaves was advertised as "a choice cargo of Windward and Gold Coast Negroes, who have been accustomed to the planting of rice". At the port of Charleston, through which 40% of all American slave imports passed, slaves from Africa brought the highest prices in recognition of their prior knowledge of rice culture, which was put to use on the many rice plantations around Georgetown, Charleston, and Savannah.[1]

Dikes are used to protect the rice paddy fields from the channels of saltwater which overflow during high tide. Karabane, Senegal, 2008; similar delta cultivation techniques were used in West Africa back to at least the 15th century[3]

Similar dyke, used to grow rice in the early United States, now abandoned and reclaimed by woodland[4]

Enslaved Africans cleared the land, dyked the marshes and built the irrigation system, skimming the freshwater layer off the high tide, flushing the fields, and adjusting the water level to the development stage of the rice. Rice was planted, hoed, and harvested with hand tools; plows and harvest wains could be pulled by mules or oxen wearing special shoes.[1] At first rice was milled by hand with wooden paddles, then winnowed in sweetgrass baskets (the making of which was another skill brought by slaves from Africa). The invention of the rice mill increased profitability of the crop, and the addition of water power for the mills in 1787 by American millwright Jonathan Lucas was another step forward.

Rice production was not merely unhealthy but lethal. One 18th-century writer wrote:[1]

> *If a work could be imagined peculiarly unwholesome and even fatal to health, it must be that of standing like the negroes, ankle and mid-leg deep in water which floats an ouzy mud, and exposed all the while to a burning sun which makes the air they breathe hotter than the human blood; these poor wretches are then in a furness of stinking putrid effluvia.*

Inadequate food, housing, and clothing, malaria, yellow fever, poisonous snakes, alligators, hard labour, and brutal treatment killed up to a third of Low Country slaves within a year. Not one child in ten lived to age sixteen. However, in the 1770s, a slave could produce rice worth more than six times his or her own market value in a year, so this high death rate was not uneconomical for their owners. Rice plantations could produce profits of up to 26 percent per year. Runaways, on the other hand, were a problem:[1]

> *I gave them a hundred lashes more than a dozen times; but they never quit running away, till I chained them together, with iron collars round their necks, and chained them to spades, and made them do nothing but dig ditches to drain the rice swamps. They could not run away then, unless they went together, and carried their chains and spades with them. I kept them in this way two years....*
>
> —one overseer's method of controlling slaves,
> reported by fugitive slave Charles Ball

Most plantations were run on the task system, where a slave was given one or more tasks, estimated at ten hours' hard work, each day. After they had finished the tasks to the overseer's satisfaction, they could spend the remainder of the day as they chose, often on growing their food, spinning, sewing their clothes, or building their houses (slaves were typically supplied with nails and five yards of cloth per year). The task system, and the unwillingness of free people to live in rice-growing areas, may have led to the greater survival of African culture among the Gullah.[1]

In the country's early years, rice production was limited to the South Atlantic and Gulf states. For almost the first 190 years of rice production in the US, the principal producers were South Carolina and Georgia. Limited amounts were grown in North Carolina, Florida, Alabama, Mississippi and Louisiana.[5]

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Rice and Slavery: A Fatal Gold Seede

Jean M. West

On New Year's Day, many Americans, especially those with southern origins, eat a dish combining black-eyed peas and rice called "Hoppin' John." It's supposed to bring good luck since people who "eat poor New Year's Day, eat rich the rest of the year." Most would be surprised to learn that rice is not a plant native to the New World. They would be even more surprised to learn that the dish has roots in tragedy rather than in luck. In Alexander Falconbridge's 1788 narrative, *An Account of the Slave Trade on the Coast of Africa*, he describes food served during the Middle Passage and reports, "The diet of the negroes, while on board, consists chiefly of horse-beans, boiled to the consistence of pulp; boiled yams and rice, and sometimes a small quantity of beef or pork." How did rice come to the New World, and why is its New World history intertwined with slavery?

Rice of the Old World

Rice is a tall annual grass that grows in a variety of conditions although it flourishes in wet, warm tropical climates. It is an ancient plant whose origins go back over 130 million years, hypothetically when South America, Africa, India, Australia, and India were joined in the southern hemisphere super-continent of Gondwanaland. When the continents broke up, a red rice of the species *Oryza glaberrima* evolved in Africa, while today's dominant crop species, *Oryza sativa*, evolved in Asia. People living along the Niger, Sine-Saloum, and Casamance Rivers began cultivating African wet rice around 2,000 to 3,000 years ago; archaeologists have discovered Asian rice grain imprints dating between 5,200 and 4,000 years ago in northern China, while Asian rice cultivation may have begun several thousand years earlier. It is believed that members of Alexander the Great's army brought the Asian variety of rice back from India, leading to its cultivation in the Mediterranean region, including Spain and Portugal.
Portuguese explorers reported African rice fields south of Cape Verde, probably along the Gambia River, as early as 1446. In the 1590s, André Alvares d'Almada reported that West African rice farmers, "construct dikes of earth for fear of the tide, but despite them the river breaks them frequently, flooding the rice fields. Once the rice has sprouted, they pull it out and transplant it...." West Africans learned to grow rice in the Niger River Delta and, from modern Senegal to Liberia, adapted different methods of production to different climatic conditions including tidal floodplains, inland wetlands, rain-fed Guinea uplands, and mangrove swamps along the Atlantic coast. Although different tribal groups divided rice cultivation work differently, women typically sowed the rice (covering the grains with clay before planting), milled rice using mortar and pestle, created coiled-grass fanner baskets to winnow rice as well as storage baskets for the cleaned rice, and cooked rice for their families. The Portuguese introduced Asian rice to Africa around the middle of the 16th century; by the height of the slave trade many Africans were familiar with the techniques of cultivating both the African and Asian species of rice.

Rice Comes to the New World

Early Spanish explorers introduced Asian rice to the Caribbean and South America; rice first arrived in Mexico in the 1520s at Veracruz, which was selected for its warm, wet, Gulf climate. Portuguese colonizers and their African slaves introduced Asian rice at about the same time to Brazil.
Tradition says that rice arrived in South Carolina around 1685 when sea captain John Thurber's ship was being repaired in Charleston. Thurber gave a sack of "Gold Seede" rice from Madagascar, a great rice-producing island off the east coast of Africa, either to Dr. Henry Woodward or Thomas Smith, who was a landgrave (governor of a major land grant). However, a bushel of rice had been sent to the colony on the supply ship *William and Ralph* as early as spring1672. By September 26, 1691, the General Assembly of South Carolina passed an act

permitting colonists to pay their taxes in rice, as well as other commodities. According to Edward Randolph, the collector of customs, planters exported 330 tons of rice from Charles Town (Charleston) to England and English Caribbean colonies in 1700; the governor complained that they had produced more rice than there were ships on which to export the grain. While some of the red-colored rice in early South Carolina was the African *oryza glaberrima* and may have arrived on slave ships, planters quickly adopted two varieties of the Asian *oryza sativa*, "Carolina White" and the prized, high-yield "Carolina Gold." Rice cultivation was centered in the Low Country of South Carolina, with the Georgetown District emerging as a major production zone. North Carolina's Lower Cape Fear Region (from the 1720s onward), northeastern Spanish Florida, and coastal Georgia (after the 1750 repeal of the Trustee's ban on slavery) also produced rice throughout the colonial and antebellum eras.

Table 1: South Carolina Colonial Rice Exports

1698	1700	1726	1730	1740	1763	1764	1770
5 tons	330 tons	5,000 tons	10,000 tons	25,000 tons	35,000 tons	40,000 tons	42,000 tons

Many of early settlers of the Carolinas (both the Cape Fear settlers of 1663 and the Ashley River emigrants of 1670) came from Barbados. These experienced sugar planters were offered land incentives to bring slaves; for example, contracts from 1664 guaranteed emigrants from Barbados a bonus of 20 acres for every male slave and ten acres for every female slave they brought to the new colony. However, the Carolinas were too cold for the cultivation of sugar, and the exports of lumber, cattle, and deerskins provided slim profits.

Slavery in the Rice Fields

The English settlers began to enslave the region's Native Americans in large numbers, selling them in the slave trade and using them as laborers. African slaves were imported from the earliest days, as well. In 1671, Sir John Yeamans arrived at the Ashley River settlement (the future Charleston) with 200 African slaves. According to South Carolina's 1708 census, there were 3,000 African slaves and 1,400 Native American slaves in a total population of 9,500. However, smallpox and yellow fever killed many Native Americans and it was impossible to get enough European indentured slaves to provide the colony with adequate labor. Indeed, Charleston merchant Samuel Eveleigh asserted in 1735, "I am positive that the Commodity can't be produced by white people. Because the work is too laborious, the heat very intent, and the whites can't work in the wett at that season as Negrs do to week rice." By the 1730s Carolinian slavery was predominantly African.

Table 2: Slave Population of South Carolina 1708-1860

Year	Number	Total	Percentage of Slaves Population Enslaved
1708	3,000	9,500	31.5 percent
1724	32,000	46,000	69.5 percent
1750	39,000	64,000	60.9 percent
1760	57,253	76,000	75 percent
1765	90,000	130,000	69.2 percent
1790	107,094	249,073	42 percent
1800	149,338	345,591	42.1 percent
1810	196,365	415,115	46.1 percent
1820	258,475	502,741	50.2 percent
1830	315,401	581,185	53.9 percent
1840	327,038	594,398	53.9 percent
1850	384,984	668,507	57.6 percent
1860	402,406	703,708	57.2 percent

From early on there was a close relationship between African slavery and rice cultivation. Planters buying slaves showed some preference for West Africans from the Gold Coast. In *An Account on Life in the Carolinas in 1750*, Johann Martin Bolzius claimed, "The best Negroes come from the Gold Coast in Africa, namely Gambia and Angolo." In the 1730s, roughly 12 percent of South Carolina's slaves were from the centers of rice-production (the Upper Guinea Coast, Senegambia, and the Windward Coast), but that number rose to 54 percent by mid-century, and 64 percent in the 1770s before receding in the 1780s; averaging 43 percent for the 18th century. Some slave brokers in coastal Africa apparently trained captives in African rice fields prior to selling them to slave traders bound for the Carolinas; the Charleston *Evening Gazette* of July 11, 1785, advertised "a choice cargo of Windward and Gold Coast Negroes, who have been accustomed to the planting of rice." These African slaves brought knowledge from their homelands of different modes of rice cultivation, soil and water management and milling, which they adapted to the rice plantations of the Southeast, such as using hollow cypress log "trunks" to control the flow of water from levees (embankments) into fields.

A Feat as Great as Building the Pyramids

Rice cultivation is dirty, hard, dangerous work. Contemporaries compared the work of converting 150,000 acres of virgin land into tidal plantations as an undertaking comparable to building the Pyramids or re-channeling the Euphrates River.

An acre of mud flats would be measured into a rectangular field. Slaves would clear the land, chopping down and burning or removing any trees. Oxen were the only draft animals that might be used to assist, but they had to wear a special boot or else they would sink in the muck. Using only picks and shovels, slaves excavated a five-by-five foot ditch through the clearing that would serve both as the canal that brought tidal waters to the field and its main drain. The slaves used the muddy soil they had excavated to form a levee as high as six feet tall around the field. Slaves constructed sluice gates (first of cypress plug trunks and later hanging floodgates) to drain the water from the field for sowing and flood it for cultivation. Typically the following season, the field would be divided into four ¼-acre sections. Slaves added quarter drains (secondary canals) and cleared stumps. With the extra weight of water-laden soil, the danger of snakes and alligators that had been stranded behind the levee, mosquitoes and hot summer temperatures, the slave's work was dangerous and exhausting.

The cultivation of the rice began in late spring, around April, with the seed being sown. Ploughs were dragged through the wet soil to create furrows about three inches deep spaced 18 inches apart. Then, the slaves planted the rice in rows called drills. Slaves' daily work included operating the sluice gates with the tides. They flooded the fields following their planting of the seeds to the time of sprouting. After three weeks, they weeded and flooded the plants to cover the top of the young plant, gradually draining it halfway down the stem after a few days. The fields were drained and weeded, and the ground around the plants "hilled up" (hoed). Around mid-June or early July, the plants were gradually flooded and remained underwater for two months. Slaves freshened the water in the fields to keep it from stagnating. Tidal water is where fresh, inland water meets the salt water of the ocean. Fresh water rises on top of salt water, so the rice fields would be sown below the level of the high tide. A slave would open a sluice gate to skim off the fresh water floating on the top of the tidal waters to irrigate the crop, shutting it off before the salt water could intrude and kill the plants. At low tide, the gates were reopened to drain the fresh water out. A slave would be expected to weed a 105 foot square plot (¼-acre) in one day. Charles Ball, a runaway slave reported:

> *Watering and weeding the rice is considered one of the most unhealthy occupations on a southern plantation, as the people are obliged to live for*

> *several weeks in the mud and water, subject to all the unwholesome vapours that arise from stagnant pools, under the rays of a summer sun, as well as the chilly autumnal dews of night.*

At harvest time, slaves with iron sickles reaped the rice stalks, bound them into sheaves (bundles), and stacked them in mule-drawn wagons. The slaves would unload the sheaves on a piece of hard ground or a barn's threshing floor and allow it to dry before threshing it with flails. (Treading the grain with mules was easier but resulted in more damage to the rice, so slave labor was used rather than animal labor.)

Rice must be processed to be the familiar white grain we see at the grocery store. The seed shell has to be removed, and then the brown coat of bran polished off the grain. Slaves used wooden mortars and pestles to mill the rice, separating the hulls from the grain with hand-sewn black rush winnowing baskets. An account from 1775 reported, "When winnowed it is ground, to free the rice from the husk; this is winnowed again, and put into a mortar large enough to hold half a bushel, in which it is beat with a pestle by negroes to free it from its thick skin; this is very laborious work." Following the pounding, the grain was sifted to remove the flour and dust produced in the process, and finally the rice was run through a market sieve, which separated the whole grains from the broken grains. Grains that were damaged in the process were called "little rice" and brought a lower price than whole grains. When the rice was clean, it would be placed in barrels that held roughly 600 pounds each. Rice mills appeared in the late 19thcentury, first operated by oxen, then by water (Jonathan Lucas, 1787), and finally tide-operated (1792). Although much of the work was back-breaking, unskilled labor, skilled slave artisans, such as carpenters, coopers, millwrights, and surveyors, contributed a great deal to the engineering, construction, and maintenance of the rice plantations.

Rather than the "gang system," where overseers or drivers directly supervised a group of workers, most rice plantations used the "task system," a specific amount of work that an average hard-working slave could complete in ten hours. When the slave completed the work to the driver's satisfaction, he or she could use the remaining hours of the day for their own purposes. Typically work began at dawn to avoid the worst heat of the day.

On rice plantations, a daily task might be the excavation of 24 linear feet of main drain excavation (the ditch dug five-by-five feet for each linear foot) or 133 feet of quarter-drain excavation (three feet by 18 inches). Sam Polite, a freedman, explained:

> *Every slave have task to do, sometime one task, sometime two, and sometime three. You have for work till task through. Have to cut cord of marsh grass maybe. Task of marsh been eight feet long and four feet high...If slave don't do task, they get licking with lash on naked back.*

Fugitive slave Charles Ball reported one overseer's method of controlling slaves:

> *I gave them a hundred lashes more than a dozen times; but they never quit running away, till I chained them together, with iron collars round their necks, and chained them to spades, and made them do nothing but dig ditches to drain the rice swamps. They could not run away then, unless they went together, and carried their chains and spades with them. I kept them in this way two years....*

Deadly Work

The mortality of slaves working in the rice fields was extremely high. One 18th-century writer declared:

If a work could be imagined peculiarly unwholesome and even fatal to health, it must be that of standing like the negroes, ankle and mid-leg deep in water which floats an ouzy mud, and exposed all the while to a burning sun which makes the air they breathe hotter than the human blood; these poor wretches are then in a furness of stinking putrid effluvia.

Up to a third of Low Country slaves died within a year of their arrival. Records from Somerset Place Plantation in North Carolina indicate that 80 Africans were brought to the site in June 1786 to transform the land into a rice plantation. By 1803, only 15 of the original 80 slaves were still alive. At Gowrie Plantation in South Carolina during an eight-year period between 1846 and 1854, 92 more slaves died than were born; 90 percent of the infants who survived birth died before they were 16 years old.

Part of the problem was poor health. The environment in which rice is cultivated is the perfect breeding ground for mosquitoes. Both malaria and yellow fever may have been introduced from Africa to the rice cultivation regions by the slave trade. Slaves suffering from malaria may have brought the disease to the New World, where it infected *Anopheles* mosquitoes. Yellow fever victims would not have survived the Middle Passage, but *Aedes (Stegiomyia) aegypti* mosquitoes could have bred in the slave ships' open-water barrels. A sickle cell genetic defect provided protection from malaria to some slaves, while yellow fever survivors had a lifelong immunity to the disease. Nonetheless, malaria and yellow fever claimed the lives of many slaves working the rice plantations. Zamba, an African king brought as a slave to South Carolina, reported, "Under the influence of a powerful sun, this practice naturally produces what is called marsh miasma, which engenders fevers of a dangerous nature: fatal, indeed to white men in most cases; and even negroes, in some seasons, suffer greatly from it."

Slaves' nutrition, clothing, and shelter typically were poor. A pint of boiled rice, a pint of cornmeal, and either a couple of pounds of butter or fat rendered from bacon were a slave's typical daily ration, supplemented by salt and molasses. Those slaves who completed task work might grow vegetable gardens with beans or yams or fish, if near the water, to improve their diet. Although high in carbohydrates, it was a low-protein, low-calorie diet for persons involved in heavy physical labor, and the resulting malnutrition contributed to slaves' early deaths. Slave quarters consisted of wooden frame buildings in which a family or a group of individuals lived. They were inexpensive to build, Johann Bolzius explained, because "One buys only a few nails for them." They were also flimsy and prone to fire. Most plantation owners provided their slaves with five yards of heavy, coarse cloth from which to make winter clothing each year and a pair of shoes. Slaves might spin their own summer clothing, although some provided linen pants or skirts, and a cap or kerchief for head cover. Some plantations had sick rooms or slave hospitals, but since doctors didn't know the cause of fevers and resorted to blood-letting and purging medicines, slaves may have fared as well (or as poorly) remaining in the slave quarters and taking home remedies.

As rice plantations expanded, the demand on slaves and their labor increased. Modern economists have noted that, unlike virtually every other slave-produced commodity, the output per slave in the rice industry grew from 2,250 pounds around 1750 to over 3,000 pounds by 1800. In human terms, this represented an enormous amount of physical hardship and arduous labor.

Gold Mines of Grain

The cultivation of rice required not only a large initial investment of labor, but also required money. In the late 18th century, it cost £2,500 to establish a 200-acre rice plantation. Most of the money was required for the purchase of slaves (an estimated cost of £1,800). In 1710, Thomas Nairne estimated that it was necessary to have 30 slaves to start a rice plantation; contemporaries calculated that a field hand should produce a ton (2,000 pounds) of rice each year working on two to three acres of old rice fields or five acres of new rice fields.

Based on average prices for rice between 1768 and 1772, the average slave generated five-six barrels of rice worth £15 ($975). Between 1722 and 1770, slave prices averaged around $150; from 1780-1809 they were substantially higher, averaging $305 per slave. By 1850, prices averaged $480 per slave. In the 1760s and 1770s, prices for women slaves grew more quickly than for men and sometimes exceeded them. Since African women (rather than men) milled rice on a daily basis and broke less grain than inexperienced male slaves, this may have been a case of price responding to demand for an important skill. A contemporary remarked, "Rice is raised so as to buy more Negroes, and Negroes are bought so as to get more rice."

Consequently, rice plantations could produce profits of up to 26 percent, prompting one Savannah River planter to describe his rice fields as "gold mines." For example a Charles Manigault invested $49,500 in Gowrie Plantation in 1833, and, by 1861, the plantation was worth $266,000.

Table 3: Rice Prices, 1772-1809*

Time Period	Rice Price (cent/lb)
1722-29	1.40
1730-39	1.64
1740-49	1.18
1750-59	1.56
1760-69	1.58
1770-79	1.87
1780-89	3.15
1790-99	2.73
1800-09	3.81

*Sources: Arthur Cole (1938, p. 152) and Peter Coclanis (1989, p. 107), as cited by Mancall, Rosenbloom, and Rice (1999)

The Legacy

The rice-fields of the Southeast, created at such a cost of human labor and life, were abandoned as the soil depleted and new rice-growing regions opened to the West as the nation expanded. Emancipation and the Civil War finished off the Low Country rice industry. The last stand of "Carolina Gold" rice in South Carolina was destroyed in 1911 by a hurricane. Today, "Carolina Gold" is cultivated in Texas, Arkansas, Louisiana, and, interestingly enough, Sierra Leone (where it was brought by former slaves or missionaries from America).

The largest percentage of slaves in the Southeast originated in Angola. Their descendants along the Atlantic coast on the Sea Islands are known as the Gullah people. The word "Gullah" is believed to have come from the old pronunciation of Angola, "N'Gulla." African customs and words from the region of modern Sierra Leone have survived in these previously isolated communities. Some historians credit the absenteeism of landowners during the malaria season (August-December) and the "task system," which enabled slaves to raise gardens and barter with each other, for the survival of so many African cultural remnants among the Gullah. Some Gullah words have migrated into standard American English, including "yam," "okra," and "tote."

Time, hurricanes, and the tide have filled the canals, eroded the levees, and leveled the slave huts of the rice plantations. Yet, the magnificent if tragic accomplishment of the slaves who labored in the fields is not diminished by their disappearance.

This essay was written by Jean M. West, a social studies education consultant in Port Orange, Florida.

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"Rice, Indigo, and Fever in Colonial South Carolina" by Jennifer Payne. **http://www.geocities.com/Athens/Aegean/7023/indigo.html**

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"Slave Prices and the Economy of the Lower South, 1722-1809" by Peter C. Mancall, Joshua L. Rosenbloom, and Thomas Weiss. **http://www.eh.net/Clio/Conferences/ASSA/Jan_00/rosenbloom.shtml**

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"Teaching with Historic Places: When Rice Was King" **http://www.cr.nps.gov/nr/twhp/wwwlps/lessons/3rice/3rice.htm**

Specific Treatments and Work Recommendations
Site
Grading
Slope Grading and Drainage: The conservation standard is to have the ground surface adjacent to all building elevations drain away from the building with a minimum slope of 5% for a minimum of 5 feet. This prescriptive standard may meet constraints of topographic gradient and distance to nearby obstructions: buildings, historic vegetation, and other site features. Whatever the constraining factors the objective remains the same, to keep water away from the building. Instead of general grading, there will be cases where a grass lined swale is required, and in more extreme cases a French-drain may be required.

Reseed with in-kind lawn seeds.

Of the four buildings, the Kitchen-Laundry building has both foundation walls and an area of measured reverse slope requiring treatment. The area is around the north chimney. The areas may be graded to the 5% by adding topsoil as the foundation is of sufficient height and draining to a shallow swale aligned diagonally from the inside corner flowing out. No excavation is required.

Site: Parking and Site Signage, Accessible Walkway, Building Access
With the assumption that the parking space signed for people with disabilities remains in the same current location near the garage, the parking area must meet the accessibility standards as must the walkway from there to the entry to the Manor house on its east elevation.

Accessibility Access Enhancements and Compliance
Main Parking Lot: Enhanced signage to be compliant by the installation of post mounted signs per UFAS.

Walkway from Main Lot to Supplemental Parking Lot: Provide midway turnaround by expanding width to 5 foot by 5 foot if the walkway is less than 4 feet wide.

Supplemental Parking Lot (at current garage): Provide hard surfaced parking area that is permeable and meeting UFAS. A current vendor with such a product is Klingstone Paths http://www.klingstonepaths.com/ada.htm (30 May 2017).

UFAS standards relative to size, markings, signage, curb ramp, and slopes (See Plan Exhibits below). If the park makes the determination that the building should be physically accessible, a ramp built over the surface of the ground is typical method employed. Such a ramp design alternative has been provided in the Plan Exhibits. In the alternative, if the park decides to provide the alternative of visual access, areas for viewing into the two first story rooms from each of the three doorways may be considered.

Ramps at Kitchen-Laundry: To allow for access to first story, the park should investigate alternative pavement systems that are permeable, such as cast concrete interlocking blocks laid on compacted gravel, large smooth surfaced pavers laid on compacted gravel, permeable concrete, and . Please note that the amount of square footage for such access is extremely small compared to the surrounding site; thus, what water becomes in contact with the smooth surface will drain to permeable ground.

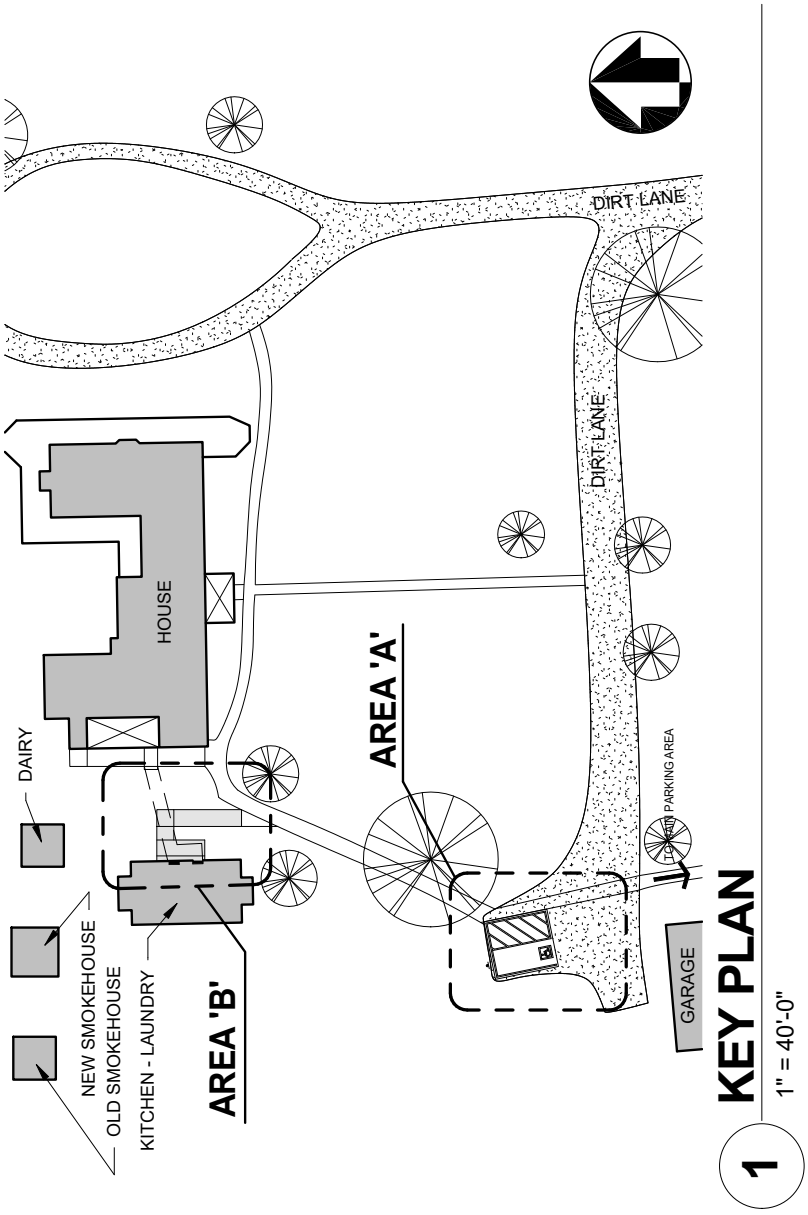
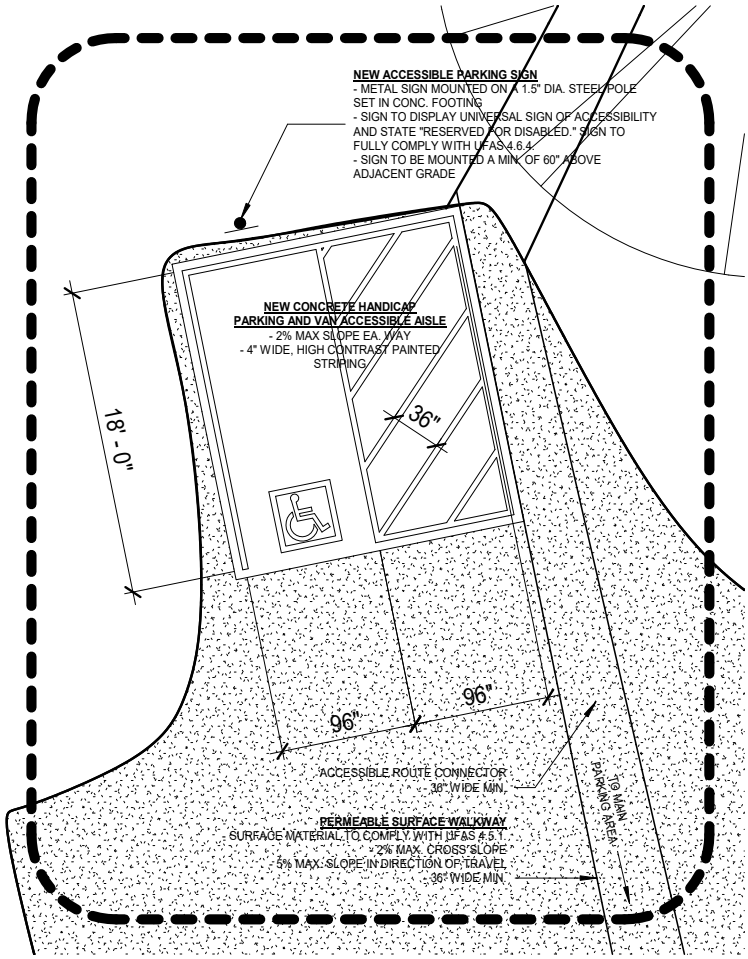


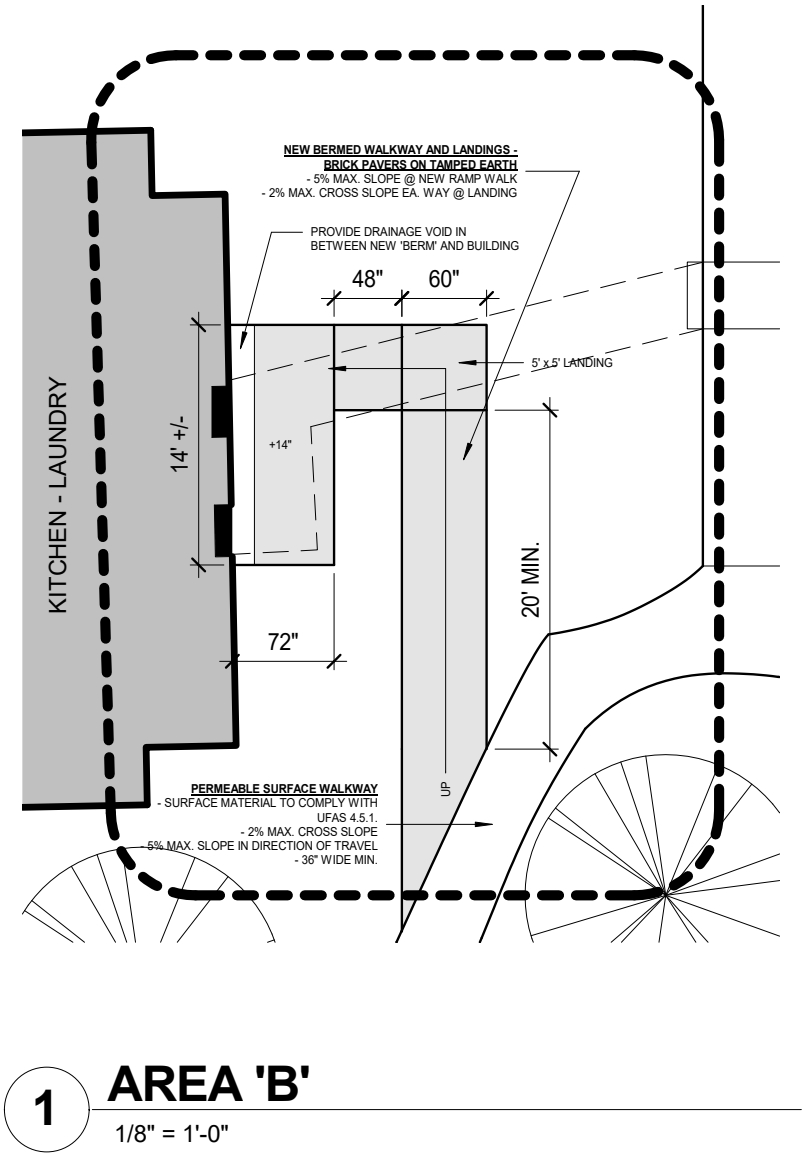
Figure 48: Appomattox Key Site Plan.



1 **AREA 'A'**

1/8" = 1'-0"

Figure 49: Appomattox Key Site Plan Detail of Area "A."



1 **AREA 'B'**

1/8" = 1'-0"

Figure 50: Appomattox Key Site Plan Detail of Area "B."

Kitchen-Laundry

The following treatments are recommended for consideration. The treatments were developed in consideration of multiple factors: The Secretary of the Interiors Standards, best practices in the preservation profession, and maintenance of character defining features. In one particular instance of the preservation of the interior plaster of the Kitchen-Laundry structure, the surface of the plaster has a wavy appearance reflective of an apparent historic owner's desire to use as little material as possible. The best practice would recommend a three-coat system with significant build up of material to allow a smooth in one plane surface. However, as the wavy appearance is a significant aspect of the plaster's character, the recommended intervention is to replicate such appearance in the execution of plaster repair. Where alternative treatments are to be considered, the treatments are characterized by the degree of intervention and the rationales for selection are provided.

Treatment of the Joint Between the Sloped Steeped Coursing of the North Chimney and the North Elevation Weatherboards

The underlying cause of the reverse slope of the stepped brick coursing slope toward the building is believed to be movement by settlement of the chimney, rather than an original construction fault. Consideration was given to underpinning the chimney with a concrete foundation and jacking the chimney to level the courses or further to provide proper drainage of the stepped courses away from the building. This treatment is deemed less favorable at this time, given the potential of collateral damage to the number of building elements interconnected to the chimney: second story fireplace and hearth, first floor fireplace and hearth, and to a lesser degree the floor structures of the first and second story and the wall structure of the north elevation. Underpinning should be reconsidered if settlement continues to occur as determined by a recommended monitoring program. If settlement has continued, underpinning can be installed without any significant jacking. Its purpose would be to arrest the settlement.

The primary contributing cause of the settlement is ground slope toward the north elevation resulting in ground saturation. This issue is addressed in "Site" related treatments.

The joint between the brick of both the north and south chimneys and the adjacent wood frame wall was flashed with copper in 1990. The flashing results in two joints. The first is between the top surface of the flashing and the weatherboards. The second is between the bottom of the flashing and the brick. Both joints were caulked (product not identified). Failure of the first joint is exhibited by deterioration of the adjacent weatherboards as seen by surface staining and rot, the water being taken up in the highly susceptible end grain of the weatherboards. Failure of the second joint allows water to enter the wall, with damage less observable than for the weatherboards, but likely to brick, mortar, framing, and plaster. The plaster adjacent to the chimney exhibits a smoother surface than the other areas of the north wall surface, consistent with having been previously repaired. Thermal imaging of this wall indicates a different heat signature in the area of prior plaster repair and the adjacent brick consistent with current moisture intrusion.

The lifespan of the caulking has been exceeded. Up until the development of modern caulking material joints subject to moisture intrusion were typically flashed. Modern caulking has been considered as a panacea as it is cheaper to install than flashing; however, it does need replacement on a regular basis and does not have the lifespan of flashing at 20 years versus 100 plus years for flashing. An historic preservation consideration is authenticity, modern caulking (butyl rubber, polysulfide, polyurethane, silicone, and so forth) is not an historic material, the caulked joint treatment is not historic, and caulking is usually visible. However, the caulking may be a good choice to protect the building as a whole and it is reversible. The flashing alternative, while an older and longer lasting treatment, may not be as reversible given that flashing of joints in masonry construction often make use of a reglet. A reglet was either cut into the brick or was

located to allow the mortar joint to receive the flashing piece. The challenge is to see if the flashing can be executed in a way that keeps water out of the joints in this quite complicated situation of horizontal and vertical runs.

Chimneys
The interior wythe of the fireboxes in the Kitchen-Laundry are in poor condition. Local rebuilding, with the limited replacement of some units, is recommended along with repointing of the eroded mortar joints. There are approximately 15 to 20 damaged units, which are primarily in the first three courses above the hearth in the back wall of the firebox, all of which should be closely inspected for possible replacement or reuse by exposing an opposing face. All mortar joints in the firebox and at the face of the fireplace should be repointed with a sand-lime mortar.

The south chimney has multiple areas where hard mortar, containing significant proportions of Portland cement, has previously been used to repoint mortar joints. It is recommended to remove this mortar and repoint with a compatible sand-lime mortar. Please see the discussion in the mortar analysis section for recommendations on appropriate replacement mortars.

As discussed above, the flashing between the vertical end wall of the Kitchen-Laundry and the stepped masonry chimney is allowing moisture into the wall assembly. Because of the complicated geometry, effective flashing details are not simple. Further, the horizontal runs of the steps tend to slope towards the building on the north chimney directing water towards this interface.

Photo 212 (JDF2217): Close-up view of the Kitchen-Laundry building's exterior, showing the joint between the brick of one of the chimneys and the adjacent wood frame wall. Note the presence of the rot on the weatherboard, which is a result of the failure of the copper flashing to prevent water from entering the wall.

It is recommended to rebuild the existing flashing at this interface, which includes weatherboard removal and replacement of some damaged weatherboards. Once this area has been deconstructed, it is recommended to clean the horizontal runs of the steps and apply a mortar wash sloped to provide a positive slope away from the building. Conventional copper, soldered inside corners should be shop fabricated for the interface between the wall and the horizontal runs. These can be field trimmed as needed. Outside copper corners should be shop bent and can be trimmed in the field for the exact rise and run of each step. Flashings elements should be lapped shingle fashion beginning from the lowest horizontal run. Flashing should be set in a butyl

sealant on the horizontal mortar wash and vertical faces to prevent moisture ingress under the flashing. Once all flashings have been set, a back plane of a stepped copper sheet should be lapped over all flashing tabs on the wall plane and all intersections sealed with sealant. Weatherboards can then be reinstalled maintaining a ¼ inch clearance to all flashing surfaces.

3D Sketchup

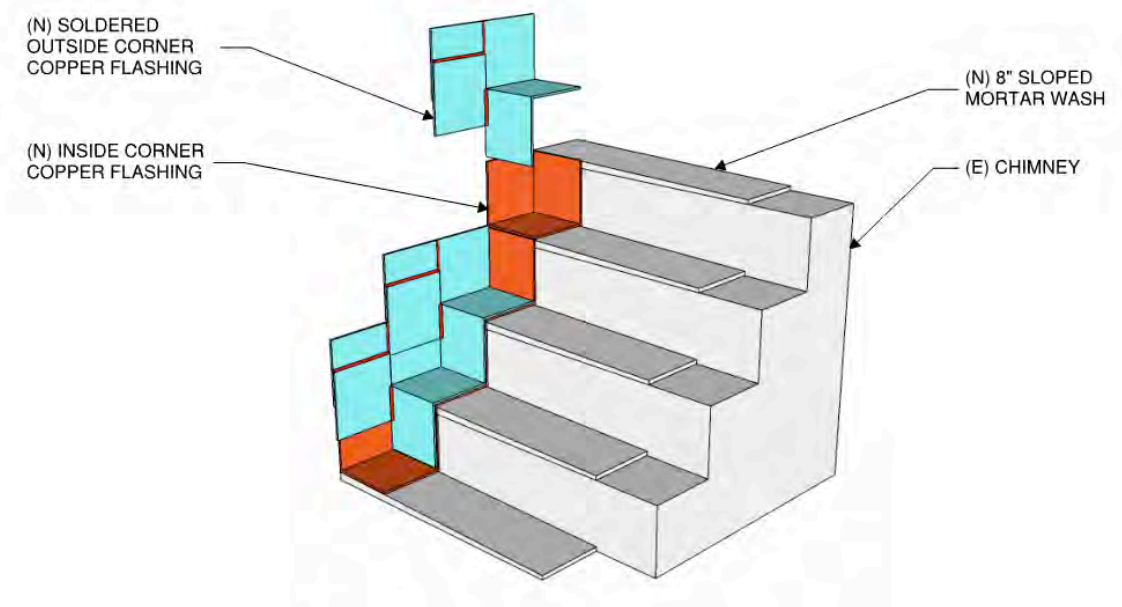


Figure 51: Conceptual flashing for chimney to wall interface using preformed copper flashing elements and mortar wash to correct negative slope.

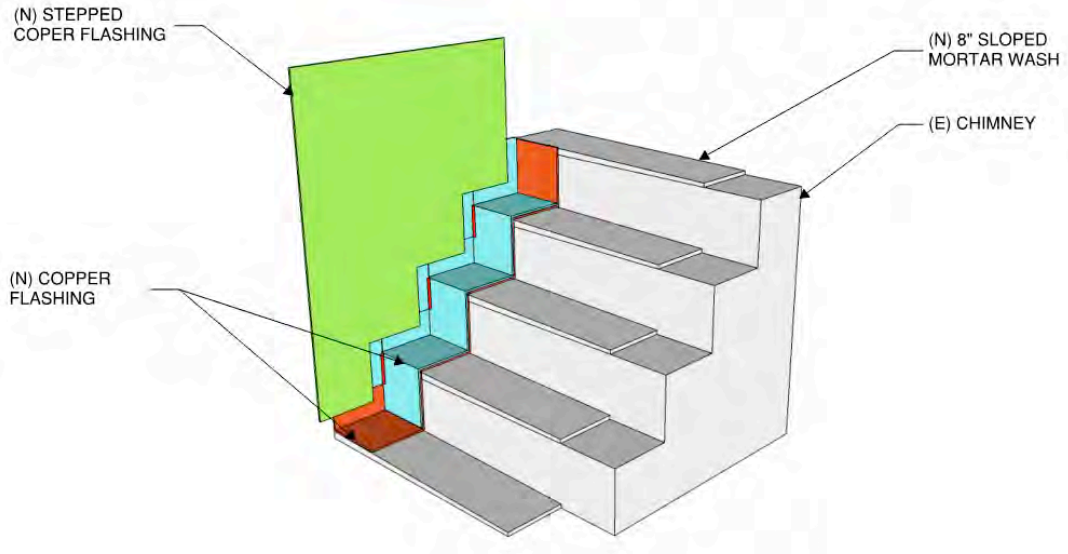


Figure 52: Copper backplane installed behind weatherboards to complete flashing.

Weatherboards

The conservation considerations in the treatment of the weatherboards are directly related to the primary acknowledgement of their purpose, to keep moisture from entering the interior causing rot in the structural members. Once rot commences it will spread to other members. Therefore rot in weatherboards can directly lead to rot in the structural timbers by direct contact. The observed areas of rot in the weatherboards were adjacent to the butt ends of a board, at splits, and at sap pockets. As previously described, it is also present adjacent to the chimney flashing of the Kitchen-Laundry.

There are multiple techniques to reduce the onset of rot in the weatherboards. To reduce or eliminate the number of butt joints is important, as the end grain of boards is the most vulnerable location for moisture uptake. By example, the Kitchen-Laundry east and west elevation are quite long and the entire length of the wall above the window and door openings has just two boards. While appropriate in fulfillment of the standard of retention of maximum historic fabric, the short (12 feet, plus or minus) elevations of the three small buildings in several locations exhibit short lengths of weatherboards due to partial replacement resulting in more butt joints than just of a single board and its join with the corner boards. Repairs to the weatherboards of the three smaller buildings should use full-length boards. The most original boards still in place are typically higher on the wall where eaves are providing some protection. The lower boards are the most likely to not be original and the most likely to be those with the most condition issues. Full-length board replacement is thus doubly warranted.

The two samples provided of weatherboards were identified by a wood scientist as being Southern yellow pine (see the wood portion of Appendix 8, which is titled "Building Materials Testing and Analyses, and Results.") The samples were not identified as to exposure elevation, or height on the wall. It is not certain whether the boards were originals or replacements and, if replacements, the date of their installation was not known. Two local tree species known to have been used for wood shingles and clapboards in the Tidewater were cypress and Atlantic white cedar. Both are rated as durable to very durable for rot resistance for mature trees. In comparison, southern yellow pine is rated low to moderate on average. For less rot resistant species, being highly selective, certain boards could be made into weatherboards with higher decay resistance if each was cut from highly resinous heartwood.

The recommended replacement species are Atlantic white cedar, cypress, or a somewhat less advantageous third choice of carefully selected Southern yellow pine. It would be of significant importance to have the species of a weatherboard known to be of early age identified, such as upper wall level boards on the New Smokehouse. The other method to increase rot resistance is to treat the boards with a preservative. The typical wood treatments are of a copper arsenate base, which has been of concern from a health perspective. Borates are another alternative. The oldest technique, and referenced at Williamsburg as "tar" is likely pine tar. This is a natural product, classically produced by extracting the liquid from the resinous heart of stumps by making a smoldering fire around a stump and covering the area with earth. The resin drips into a pan and has been available commercially as "Stockholm Tar." It has been in use, as an example, on the stone churches of Norway since the 1100s. Pine tar is the recommended treatment, and it is cut using both turpentine and linseed oil before applying.

As the butt joint issue of exposed end grain may be mitigated by reduction in the number of butt joints, reducing the uptake of water by the end grain, and keeping water from the butt joint and sealing the end grain. It is tempting to think that simply having tight joints would be the solution. However, at different levels of humidity in the air, boards change dimensions with length increasing and decreasing accordingly. Tight end joints cause buckling. Minimizing the gap to a

reasonable size is important and filling the gap with an appropriate caulking is equally important: secure, non-shrinking over time, somewhat elastic, and, if possible, period appropriate. Oakum is recommended for caulking.

Oakum has been used to fill joints since at least its first reference in the 15th century. It is manila or jute fibers impregnated to varying degrees with pine tar. To fill narrow gaps, the piece of oakum is unraveled to pick out the right size fibers and pushed into the gap. If the area has first been treated with pine tar, the assembly works as a whole. The exposed outer surface may be painted.

Where rot is present in the middle of a plank, a chisel may cut out the rotted area, and new wood glued in its place. The prevention is to use higher quality wood without sap pockets and to seal areas with knots with #10 shellac. End splits are present for many of the weatherboards. The causes of end splits are numerous, amongst which are: not using clear vertical grain wood, laid when above 19% moisture content, expansion and contraction due to moisture uptake, and fastener side pressure. Where end splits are small—less than 1/16th inch in width—paint can fill the gap. When the gaps are of medium width—up to 1/8th inch—the gap can be filled with modern caulking, and the area painted. Most of the larger than 1/8th inch slits tended to be quite long, extending beyond the 6 inches of the board's end. The two choices available are to glue the split shut or if there is rot, remove the defective and deteriorated plank and replace it with one of rot resistant species. An easy glue to use, waterproof as well, is Tite Bond Three. Clean out the split, apply glue, and press sides together using a block or blocks tack nailed up against the lower edge and into the adjacent weatherboard below. Wipe off excess; it is water soluble. This glue sets to a translucent amber color consistent with the appearance of natural wood.

Where splits are in the middle of a board, apply the same principles and materials as discussed above. Gluing back together is particularly difficult and the split may have to be treated like sap pocket rot, that is, cut out a Dutchmen of size covering the affected area, remove the poor wood, glue in the Dutchmen, repaint. Where splits are so large that rot has begun to affect the board and the timber to which it is affixed, replacement is warranted. Once again, it is recommended that consideration be given to replacement with those two species locally favored for weatherboards during the period of anticipated construction of the four buildings: Atlantic white cedar and cypress. City Point maintenance staff should have a ready supply of replacement weatherboards stockpiled and properly cured to allow for immediate replacement.

Moldings

Moldings are overall in good condition with a few exceptions, such as rot of the lower 6 inches of the corner boards of the New Smokehouse, a missing rake board of the north elevation of the Old Smokehouse, and significant rot of the surround and particularly the sill of the second story Kitchen-Laundry window, which is at the north elevation, east of the chimney. For the corner boards, where the expectation is that these are original (unless known by staff to have been replaced, such as for the Dairy), maximum retention of the historic material is fully warranted. In kind material and configuration is important, however the wood should be treated for rot prevention before installation. The joining of the new wood to the original should be done with an angled lap joint, configured to shed water; the upper piece laying over the lower replacement piece. Seal the end grain with pine tar. At the Old Smokehouse, the replacement rake board should match its mate. The Kitchen-Laundry window surround will require up close and detailed examination at the time of the repair to determine the extent of deterioration and whether the technique of Dutchmen can be used at the top and sides. The window sill clearly exhibits significant rot to the extent that, initially, comprehensive replacement should be anticipated. Caulking at all sides is required after repairs.

Photo 213 (JDF2235): Detail of condition of the lower 6 inches the New Smokehouse's southeast corner boards.

Photo 214 (JDF2237): Another example of corner board rot.

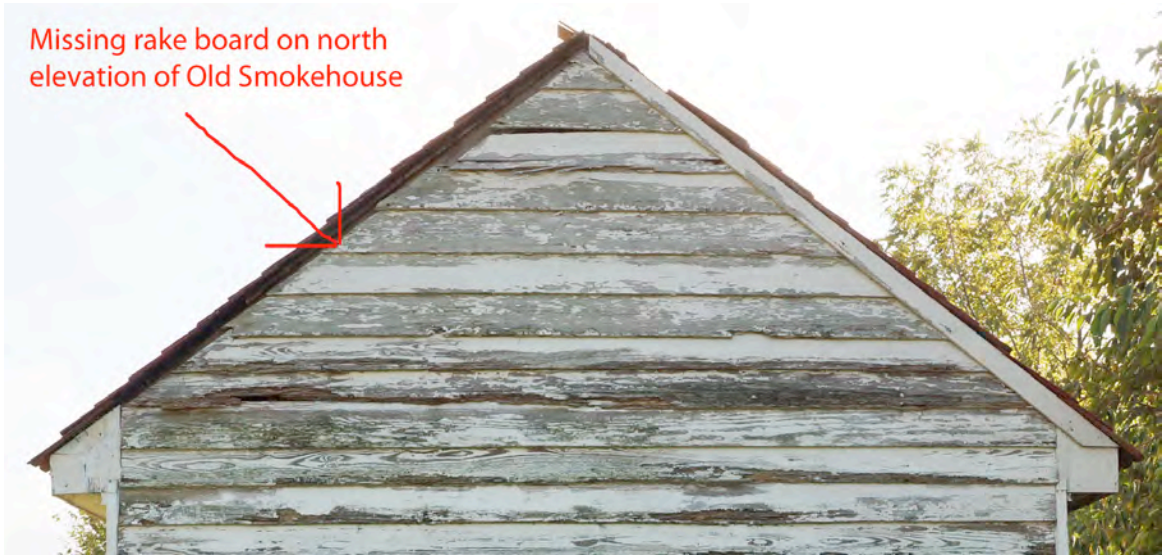


Photo 215 (JDF2085): Old Smokehouse: North elevation with missing rake board.

Photo 216 (JDF2215): Kitchen-Laundry: Deterioration of window frame and sill, northeast window.

Photo 217 (JDF2119): Kitchen-Laundry: Detail of northeast window, rotted sill, portion of rotten frame, as viewed from the interior.

Doors and Hardware
The Kitchen-Laundry building has the most exterior doors (3) and windows (6) of the four buildings. It also has three interior doors. The doors are addressed in the order of their numbering.

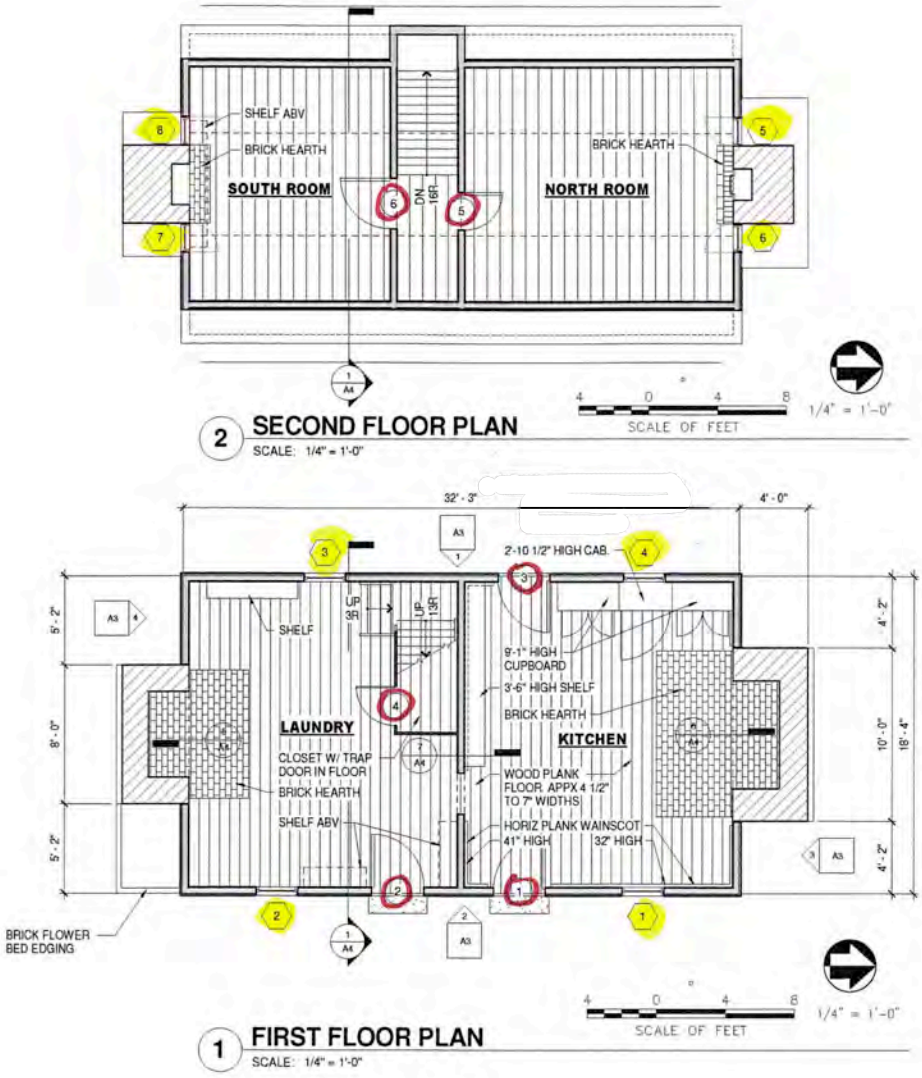


Figure 53: Kitchen-Laundry's First and Second Floor Plans.

Door #1, east elevation, north: Clearly the door was originally constructed of two very wide planks running the entire vertical height and then "something happened" from which the lower middle was broken out, a piece being lost from the edges of the joint of the planks. Was the door kicked out, perhaps by Union Soldiers? The repairs were made with beaded ceiling board, more of an expedient solution of the moment than an effort for a long-term finish solution. The Eppes family could well have fixed the door in a more finished mode, but they did not. Perhaps there is a story to be found about this door in the family archives. Therefore, while the door planks could be repaired by installing Dutchmen at the missing section, this alternative should only be done if the story of the lost material has been determined to be outside the period of significance or the story is felt to be without significance in the interpretation of the property.

The door is in fair condition. The lower section of the door is missing some material from the bottom edge of the planks. The area has two patches, unpainted, and placed in this location on the interior face (see photo JDF2133.) The recommended treatment is to replace the two patches with an edge to edge cleat sized for the location, of 3/4" material, with chamfered edges, and painted to match the door color as it appears on both the exterior (white) (see photo 2106a) and the interior (brown). To differentiate the material as being new, it is recommended that the interior paint be thinned down to almost a stain level of viscosity in order that the color will harmonize but be discernible as new by the apparent grain versus flatness of the original built up paint on the remainder of the door. Provide date of replacement by permanent marking on non-visible surface.

Photo 218 (JDF2133): Kitchen-Laundry Door #1: First story, east elevation, north door interior. Note patches.

Photo 219 (JDF2106a): Kitchen-Laundry Door #1: East elevation, north door exterior.

Photo 220 (DSC02106b) close-up of detail east elevation, north door showing piece of painted (with rust spots) sheet metal set on the surface below the middle cleat, lock side of the door.

Photo 221 (DSC02106c): Mid-view of detail east elevation, north door showing middle cleat and metal.

Photo 222 (DSC02106d): Close-up of detail east elevation, north door showing lower cleat, patch, and missing wood.

The exterior face of the door has a few character elements: both the middle and bottom cleat are missing some material, and there is a piece of painted (with rust spots) sheet metal set on the surface below the middle cleat, lock side of the door. These do add age character to the door. See photos DSC02106c and DSC02106d.

The door has a rim lock with porcelain knobs, white on the outside and Bennington style brown on the interior. The lock set is operable. There is a pair of strap hinges, possibly stamped metal, and the lower hinge appears broken. More research can be undertaken once the metal is exposed, which is recommended. The overall condition of the hardware is fair.

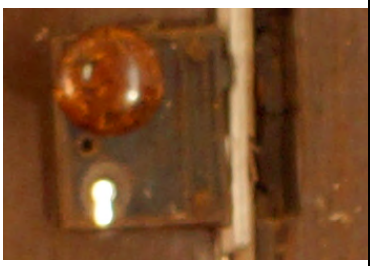


Figure 54: Left image is Door #1 Hardware: white porcelain knob the exterior. Center image is Door #1 Hardware: Bennington style brown knob on the interior. Right image is Door #1 Hardware—one of the two strap hinges.

The door and its surrounding jambs have signs of rust at each nail head. At these areas, clean the paint off the nail head to examine condition. The recommended treatment is to spot paint the nail heads with metal primer before painting the door and its surrounds. The lower hinge treatment

determination required removal of the hinge to determine the specifics of its condition and repairs: was new material welded to the strap, or is the original on "H-L" hinge missing half.
Door #2, east elevation, south: Overall, the condition of this door is fair. The door is a six-panel door in the classic configuration: two small horizontal panels over four vertical panels in two sections. The panels are similar to a typical modern door; the panels have chamfered edges set into rabbets of the rails and stiles. The rails and stiles have an integrally molded edge. The hinge side stile appears to have a small extension to thereby create a slightly wider door, 25% wider stile than the lock side stile (see photo 223). The bottom of the hinge side stile has lost material to approximately the height of the bottom rail's top edge, creating a weakness in the door's structure, as there is no connection between the stile and rail (see photo 224). The interior face has a pair of "HL" hinges, the lower of which does provide metal reinforcement of the corner. The hinges are partially rusted.

Photo 223 (DSC02107 cropped): South door on the Kitchen-Laundry's east elevation.

Photo 224 (DSC02107cropped): Close up of east elevation's south door showing missing wood. The bottom of the hinge side stile has lost material to approximately the height of the bottom rail's top edge, creating a weakness in the door's structure, as there is no wood-to-wood connection between the stile and rail.

Photo 225 (JDF2134): Close up of the interior of the east elevation's south door's HL hinge. Note it provides metal reinforcement of the door's corner. Both hinges on this door are partially rusted.

The interior face of the door exhibits flat panels, with no chamfer. In addition to the pair of "HL" hinges there is a wood cross bar and a rim lock. The cross bar drops down into a wrought iron open topped bracket driven into the north doorway frame, and a wrought iron closed bracket set into the south doorway frame. The rim lock has Bennington style brown colored doorknobs of which the exterior knob is missing about 40%.

The overall condition of the hardware is poor.

The recommended treatment for the door is to install a Dutchman at the deteriorated lower corner. The size of the piece will be determined after removal of deteriorated wood. This repair will need to be coordinated with the conservation of the hinges. Remove the hinges, mark location by removable tag, take paint samples from each for analysis, and determine if there was any original finish. Coatings and rust can be removed using a hot caustic stripping process with waterjetting. Complete the conservation by applying either a replication of the historic finish or, if none was found, a black oxide. That finish can be achieved with a selenium-based product such as those manufactured by Birchwood Casey and this can then be sealed with wax or a clear coating. Apply "… a prepared mixture of microcrystalline waxes, mineral spirits, and BTA … sparingly with short bristled natural brushes."[1]

[1]NPS Preservation Tech Notes, Metals Number 1, p. 4.

Historically, after the last quenching a preservative treatment was applied of linseed oil and bees wax, applied hot. This may be tried instead of the black oxide or applied over the black oxide finish.

The fasteners for the hinges are a possible clue to their age; however, fasteners do get changed out over time. Two fasteners appear to be present, screws and clenched nails. Dating screws can be difficult, hand-cut screws were the first period, followed by machine-made screws in Great Britain commencing in the late 18th century. There was even more widespread screw manufacturing in the United States in the 1840s.

Any rim lock can be reconstructed due to the simplicity of the parts. Most typically the spring is what wears out and requires replacements. The Bennington style knob that is broken can be replaced as such knobs are actively traded by antique knob collectors. The knob still has enough remaining material to continue to be used.

Door #3, west elevation: The condition of this door is good. There is some missing material at the edges of two of the vertical boards at their lower ends. However, the missing material is minimal in extent. These boards should be monitored for further loss.

Photo 226 (JDF2112): Kitchen-Laundry Door #3: West elevation door exterior.

Photo 227 (JDF2135): Kitchen-Laundry Door #3: West elevation's door's interior face.

The door hardware consists of a pair of "HL" hinges, a rim lock, and a pressed metal pull handle mounted on the exterior face. The exterior knob of the rim lock is missing, although in the single historic photograph the knob shows up as being quite light in coloration; likely white. The interior knob is white porcelain. Also on the interior there is a metal slide bolt. The "catch" for this bolt appears to be from another rim lock; however, there are no attachment holes left from a previous rim lock at the location beside the catch. Due in part to the loss of the knob the hardware condition is fair. Conservation of the hardware is recommended and should follow the recommended treatments described for door #2 above.

Door #4, under stair closet: There are no significant condition issues with the door and its overall condition is good. The hardware consists of a pair of "T" strap hinges and a hasp with padlock. Rust is the single significant condition issue of the hardware; thus, the overall condition of the hardware is fair. Treatments recommendations should follow those previously provided for hardware.

Photo 228 (JDF2142): Kitchen-Laundry Door #4: South room, north elevation, closet door.

Door #5, second story, north: This six-panel door matches door #2 in configuration. It is in good condition, except for the finish. The recommended treatment to be considered is restoration of the finish.

Photo 229 (JDF2123): Second Story Kitchen-Laundry Door #5: North room door, north face.

Photo 230 (JDF2126): Second Story Kitchen-Laundry Door #5: North room door, south face.

The door hardware consists of a rim lock with Bennington style brown doorknobs and a pair of "HL" hinges with substantial surface rust. The hardware is in fair condition. The recommended hinge treatment is the same as for door #2.

Door #6, second story, south: This six-panel door matches door #2 in configuration, except it is mounted upside down. There are numerous holes in the door at the area of the middle rail's intersection with the lock stile below the existing location of the rim lock. The holes may at least in part be attributed to an earlier lockset location. The door has a sheet metal patch wrapped around the bottom of the lockset stile. The door has an overall condition of fair. The metal patch was not removed to determine the condition of the wood underneath. The recommended treatments would be for the use of a Dutchman at this location if the wood is deteriorated or missing.

Photo 231 (JDF2127): Second Story Kitchen-Laundry Door #6: South face of south room door.

Photo 232 (JDF2129): Second Story Kitchen-Laundry Door #6: North face of south room door.

The door hardware consists of a rim lock with Bennington style brown knobs, a pair of "HL" hinges, and a wrought iron closed bracket mounted on the south frame of the south face. The hinges exhibit a significant amount of surface rust. The overall condition of the hardware is fair. The recommended treatment of the hinges is the same as for door #2.

Windows and Hardware

Window #1, east elevation, north: This nine over nine double-hung wood window has fairly wide sash dividers in comparison to the companion window on the west elevation. However, like its companion window, the combined height of the upper and lower sashes is greater than the height of the window opening resulting in an overlap of the sashes. The window has no meeting rail. Each pane of this window has a vertical orientation with the height greater by 25% than the width. Its companion window of the west elevation differs in having a six-over-six configuration with the panes oriented horizontally. All of the other first story windows are nine over nine and have narrow sash dividers. The window is in good condition.

Photo 233 (JDF2105): Kitchen-Laundry: East elevation, north window.

Photo 234 (JDF2136): Kitchen-Laundry: East elevation, north window.

The window does not have any hardware. The likely method by which a sash would have been held in the open position was by one or more sticks of differing lengths set between the bottom rail of the sash and the window sill.

Window #2, east elevation, south: This nine over nine double-hung wood window has narrow sash dividers and is racked in its frame. It has a meeting rail, although quite small in cross section. The window is in good condition.

Photo 235 (JDF2108): Kitchen-Laundry: East elevation, south window.

Photo 236 (JDF2137): Kitchen-Laundry: East elevation, south window.

The window does not have any hardware.

Window #3, west elevation, south: This is the companion window to #2 and is configured the same as #2. However, the meeting rail of #3 is bigger in cross-section than that of #2. It is in good condition.

Photo 237 (JDF2111): Kitchen-Laundry: West elevation, south window.

Photo 238 (JDF2138): Kitchen-Laundry: West elevation, south window.

The window does not have any hardware.

Window #4, west elevation, north: This is the sole window of the building that is a six-over-six double-hung. It has the overlapping sash configuration of #1 and is racked in its frame. It has narrow sash dividers. It is in good condition.

Photo 239 (JDF2113): Kitchen-Laundry: West elevation, north window.

Photo 240 (JDF2139): Kitchen-Laundry: West elevation, north window.

The window does not have any hardware.

Window #5, second story, northwest: This is the first of four similarly configured windows of the second story. Each is set beside the fireplace chimney, tucked in below the gambrel shaped ceiling. Each swings inward as a casement window hung on a pair of metal hinges from the frame side furthest from the chimney and closed by a thumb latch. The sash configuration is two over two with narrow sash dividers. Each pane is taller than it is wider by 25%. Of note, the interior surface of this window's sash exhibits a darkened varnish coating. The window is missing some glazing putty on its lower left pane, as observed from the exterior. Its condition is thus rated fair. The recommended treatment is to replace the glazing putty.

Photo 241 (JDF2114): Kitchen-Laundry: Northwest window exterior.

Photo 242 (JDF2116): Kitchen-Laundry: Interior of northwest window.

The window hardware consists of a pair of butt hinges, probably 20th century, and a sash lock thumb turn type of wood, possibly earlier. The hardware is in good condition.

Window #6, second story, northeast: This window matches the other three in configuration as a two-over-two casement. The lower left interior corner shows separation at the joint. A gap is present under the window, to be remediated when the sill is repaired. It is missing glazing putty at the bottom edge of both lower panes. The paint job done on this window has left a good deal of paint on the glass, well beyond the dividers. The interior surfaces are painted. The window condition is fair. The recommended treatment is to reconnect the loose joint, remove the overpaint, replace the glazing putty, and then repaint.

Photo 243 (JDF2117): Kitchen-Laundry: Northeast window, exterior.

Photo 244 (JDF2118): Kitchen-Laundry: Northeast window, interior.

The window hardware consists of the typical pair of modern-era metal butt hinges in this case in brass finish, modern screws, and a carved wood thumb sash lock. The window hardware condition is good.

Window #7, second story, southeast: This window is a two-over-two wood casement, with painted interior surface. It has abundant paint on the glass. It is in good condition. The recommended treatment is to remove the overpaint from the glass.

Photo 245 (JDF2120): Kitchen-Laundry: Southeast window, exterior.

Photo 246 (JDF2121): Kitchen-Laundry: Southeast window, interior.

The window hardware consists of a wood thumb turn sash lock and one complete but rusted upper metal hinge and one broken rusted lower hinge. The overall condition rating of the hardware is fair. Replace the lower hinge to match the upper. Refinish upper hinge per recommended treatment for Door #2 hardware. Clean window glass, including all paint overruns.

Window #8, second story southwest: This two-over-two wood casement window has a painted interior surface. The lower rail of the sash has second tier loss of summer wood in the grain although it is well protected by a comprehensive paint coating. An upper light of glass is cracked. It is in good condition.

Photo 247 (JDF2122): Kitchen-Laundry: Southwest window, exterior.

Photo 248 (JDF02165 blowup): Kitchen-Laundry: Southwest window, interior.

The window hardware consists of a pair of metal butt hinges and a wood thumb turn sash lock. It is in good condition although the finish on the hinges has been compromised. Consider hinge re-finishing and clean the overpaint from the glass. Repair upper light, which is broken, with new glass to match; i.e., if cylinder glass, use cylinder glass for replacement (commercially available).

Doors/Hardware and Windows/Hardware—Dairy, New Smokehouse, and Old Smokehouse
Dairy
Door: The single entry door, located on the south elevation, is constructed of vertical wood boards with three horizontal wood cleats on the interior surface. The bottoms of the vertical boards exhibit water stains extending up as high as the bottom edge of the lowest horizontal cleat, evidence of direct water contact at the sill level. The door is painted on its exterior surfaces only. No other condition concerns were seen. The overall condition of the door is good. The recommended treatment is to seal the bottom edge of the boards with pine tar mixture.

Photo 249 (JDF2095): Dairy door.

The door's hardware includes a rim lock and a pair of hinges. The rim lock has Bennington style brown knobs. The hinges are strap hinges in a "T" configuration. The hinges appear to be of 20th century steel without any markings of having been forged. The surfaces have rust, with just a small amount of paint on the upper hinge. Rust as a condition issue may be addressed as set forth for the hinges of door #2 of the Kitchen-Laundry. The overall condition rating of the door hardware is fair.

New Smokehouse

Door Treatment

As noted earlier, the direction of the diagonal boards of this replica are to rehang the door with the proper orientation, plug the fastener holes for the hardware, and strip the interior face of paint. After stripping, the door's interior surface can be treated with a linseed oil/turpentine/pine tar mix. (See the following photographs.)

Photo 250 (JDF2097): New Smokehouse: Interior face of door.

The door hardware consists of modern-era pintle, and possibly earlier gudgeon hinges. The pintles have a galvanized metal finish and the gudgeons have a painted finish with some rust spots.

Photo 251 (Hogs_1999_160_260@266dpi.jpg): In this 1890s photo, Dr. Richard Eppes's son, Richard, received assistance from two employees as they prepare to place recently slaughtered hogs into the New Smokehouse. This photo also shows the historic orientation of the planks of the interior face of the entry door.

Old Smokehouse

Door

The recommended treatment is to remove any deteriorated wood, install Dutchmen, and seal the end grain surface with pine tar mixture. The entire building requires extensive repairs to the exterior after which re-painting will be required, including the entry door.

Photo 252 (JDF2098): Old Smokehouse door exterior.

Photo 253 (JDF2099): Old Smokehouse: Interior face of door.

Door Hardware

The recommended treatments for future consideration include: rim lock, reworking of the mechanism for operation and add knobs matching the other locks of the outbuildings (Bennington style brown); and strap hinges, replace the broken lower hinge.

Window
There is a six-over-six casement window located in the south elevation. It likely was added at some time when the smokehouse function transitioned to storage. The glazing putty is largely missing at the lower three window panes. The condition of this window is fair. The treatment

Photo 254 (JDF2100): Old Smokehouse: Window exterior.

Photo 255 (JDF2102): Old Smokehouse: Window interior.

recommended is replacement of the glazing putty. Painting the window should occur with the recommended painting project to be completed after all exterior treatments are complete.

Roof Structure: Old Smokehouse
Due to the roof structure not acting as a diaphragm, it has been displaced northward. Add diagonal members to the exposed lower face of the rafters.

Molding
At the Old Smokehouse, the rake board that is missing should be installed to match its mate.

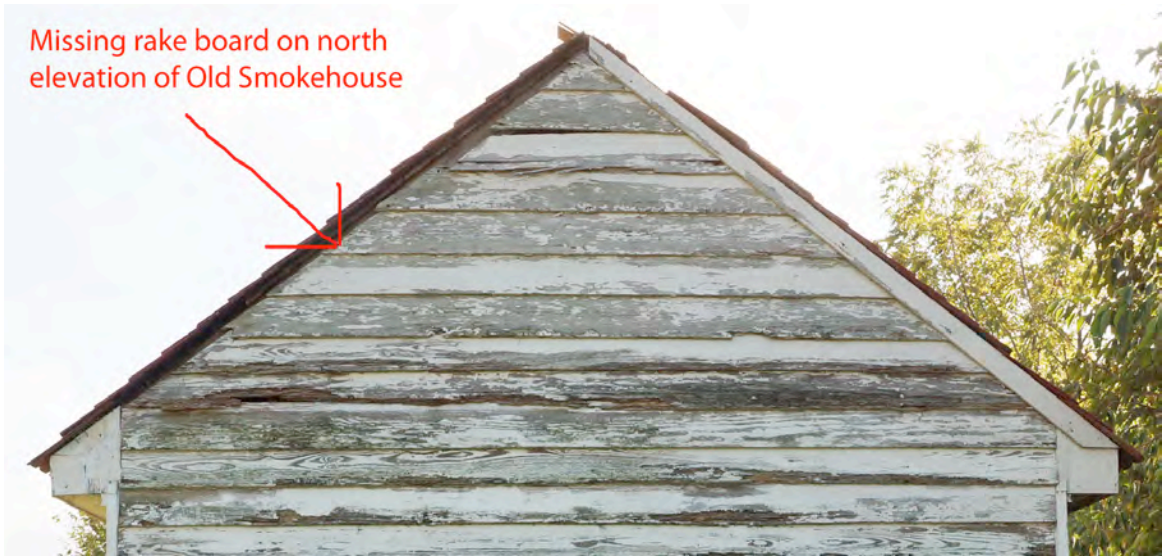


Photo 256 (JDF2085: Old Smokehouse): North elevation with missing rake board.

Plaster Walls and Ceilings: Kitchen-Laundry

Treatments for plaster vary to a degree based upon the extent and type of the condition to be treated: "divots," cracks, loose attachment, and missing plaster. A critical criterion is the visual aspect of the plaster surfaces in the Kitchen-Laundry's first and second story spaces. While typically plaster is placed over the lath in three layers with a total thickness of 3/4" to 1", these spaces appear to generally have two plaster layers and the total thickness is quite variable, but thin, in the range of 1/4" to 1/2" in total thickness. Due to the thinness of the plaster, the underlying lath "photos" through, making the surface appear with small waves. The thinness of the historic plaster means it is difficult to hide added fasteners, such as for ceiling reattachment, without them appearing as out-of-place lumps, and repaired areas, instead of being finished flat, must reflect the adjacent wavy surface appearance, a much more difficult proposition. These two difficulties are of greatest concern for two of the repair types, reattachment of loose plaster and replacement of missing plaster. Of far less concern are the repair of cracks and filling of divots given the small area of each at the surface.

In all four repair types, given the concern for authenticity, the plaster material used should match the historic: binder type, fiber reinforcement (if present), and aggregate gradation per layer. One materials analysis test was completed for a piece of loose plaster from the second story. The analysis results are indicated below. The sample is identified as Sample 6 in the Mortar and Plaster Analysis Report, Appendix 8.

- Binder type: lime
- Fiber present: none
- Aggregate: A well-graded, fine (90% passing a #16 sieve) aggregate with off-white color. Particles are angular to sub-angular.
- Formula for Replacement Mix: Two (2) parts washed aggregate in conformance with ASTM C897, *Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plaster* to one (1) part Type S hydrated lime (all by volume).

Crack Repair: Clean out crack of any dirt and debris, moisten edges with water, install finish coat of plaster (finer sand) and finish the surface to match adjacent areas.

Divot: Clean surface thoroughly with potable water insuring whitewash removal, install finish coat of plaster (finer sand), and finish the surface to match adjacent areas.

Areas of Detachment: Typically, the detached area is reattached by the installation of screws with large open mesh washers specifically made for this purpose. The two locations of detachment are lath to framing and plaster to lath. The special plaster screws/washers can be used if care is taken to replicate the surface treatment. The other methods to reattach lath to framing members are gluing from above by reaching through an open area, or removing a floorboard from above for ceilings, or aligning nails with the lath in the loose areas and installing stainless steel nails before patching the resultant small divots. Detachment of plaster from the lath occurs by a break at the "key"; the plaster pushed up through the gap in the lath, typically mushroom shaped in cross section.

There are techniques for repairing cracks in the keys. However, the technical approach requires extensive access above a ceiling to reconnect the plaster keys and few people have experience in the technique. More commonly, the loose plaster is removed, the lath connections to the framing members either re-established or reinforced by installing stainless steel ring shank nails, and the area patched as for missing plaster.

Missing Plaster: Clean all lath of plaster remnants and dirt. Reinforce attachment of lath with stainless steel ring shank nails. If lath is missing, install lath to match adjacent. Moisten lath with water. Install historic plaster mix per the analysis in as many layers and formulas as original. The finish coat's surface appearance should continue adjacent areas of original pattern and surface character. Plaster repairs should only be undertaken when temperature conditions are appropriate; 40-plus degrees.

Wood Floors

Kitchen-Laundry

The wood floor of the first story was installed by National Park Service maintenance crew as part of the 1989-1990 campaign. The floor was finished with tung oil. The tung oil treatment is no longer apparent. It should be renewed, preferably matching the techniques previously used. See some guidance for tung oil application on the following page.

	Photo 257 (JDF2146): Kitchen-Laundry: South room, east half of floor.
	Photo 258 (JDF2147): Kitchen-Laundry: South room, west half of floor.

Some boards along the west elevation adjacent to the wall appear to have lost in part their connectivity with the underlying floor joists. Re-nail to match the original installation.

Some guidance for tung oil application is:

1. Wash floor with water, then sand.
2. Dilute 100% pure tung oil 1:1 with turpentine for first coat.
3. Wipe on until uniformly absorbed.
4. Let dry, remove by wiping any "wet oil" appearing areas.
5. Sand.
6. Apply additional coats with less dilution until desired finish is achieved.
7. It will take about seven days to fully cure.

Old Smokehouse

Repair holes in the floor by installation of new floorboards in this area to match existing, insuring there is proper support and landing upon the floor joists below. If not, install sisters to the floor joists, and/or cross braces as required.

	Photo 259 (JDF2207): Old Smokehouse: East floor. Note racks for materials storage and hole in floor at lower left of photo.
	Photo 260 (JDF2208): Old Smokehouse: West floor. Hole in the floor is visible in the foreground.

Future Research Needs

At some point, it may be desirable to remove the interior sheathing to return the smokehouse to a more original appearance. If this course of action is pursued, at that time, the structural members of the wall should be evaluated and any necessary repairs completed. Likewise, inspection should occur with the campaign replacing deteriorated weatherboards.

Archaeological research should be undertaken to determine the original foundation type and a determination if the foundation was for this building. Based on the results, a more permanent foundation for the Old Smokehouse might be constructed similar to the New Smokehouse or, at minimum, the existing concrete blocks replaced by stone supports. We recommend removing the floor boards, inspecting the floor joists and their attachments to the sills on the east and west. Repair the joists and connections as necessary. The floor boards should be reinstalled and the numerous holes in the current floor should be repaired with appropriate in-kind materials.

A professional exterminator should be consulted to verify if the observed powderpost beetle signs are the result of current or previous activity, and take appropriate actions as needed.

Paint: All Buildings

The application of paint to previously painted surfaces and replacement elements is a regular final step of all of the preservation treatments recommended. Maintenance of the paint coating is a primary maintenance activity of the National Park Service personnel. Regular inspections on an annual basis of the painted surfaces for paint blisters and loss should occur. Spot painting of these areas is recommended. Comprehensive repainting of exterior surfaces should occur on a seven-year cycle.

While the general means and methods are well known to the staff, location-specific circumstances may be best served by specifications particular for both the wood species and for the paint. For example, the Atlantic white cedar shingles may be ordered already coated with two coats of stain that is able to penetrate and bond with the oils of that specific species. Likewise, if the weatherboards are of a species, such as cypress, the same care is required in selecting the paint which has the best record of bonding to this resinous wood.

The general means and methods are: clean off old paint on existing by scraping loose paint and sanding the entire surface. If there are areas with oily stains, special spot cleaning for the particular type of stain is recommended. The surface should be clean and dry. Apply 10-pound shellac to any exposed knots and sap pockets. Prime bare spots, followed by two applications of paint by natural bristle brush. Paint color selection to match historic color.

Whitewash: Kitchen-Laundry and Dairy

Using the same general means and methods for paint should result in a fairly clean plaster surface where such has been whitewashed. Whitewash can be renewed over existing where the latter is well adhered. Where wood has been whitewashed, the rougher the surface of the wood, the more likely will be the adherence. The Dairy interior's wood is rough and the whitewash has good adherence. The smooth doors of the second story of the Kitchen-Laundry do not have as good an adherence. The City Point Unit maintenance leader has her own formula for whitewash, which has been favored. There are many formulas and whatever works soon becomes favored.

Lime wash on the Exterior Brick Chimneys

The chimneys currently exhibit a lime wash coating which is partial in its coverage due to aging. The recommended treatment is the restoration of the lime wash finish coat.

There are several factors in the selection of an appropriate recipe for lime wash to be used on exterior brick. These are: breathability, water resistance, and longevity. In the effort to provide water resistance qualities various additives have been used in the past and currently. A primary group of water resistance additives are animal fats. However, some people believe the fats are a

support medium for fungal growth. Animal fats used may range from lard to buttermilk. There is potential of the animal fats reducing somewhat the vapor permeability. Surface renewal time periods for lime wash will differ based upon substrate type and condition, mix, application skills and techniques, and area weather. In general, renewal time intervals recommendations described in the literature are one year, two years, and five years. The five-year period is the expectation for lime washes containing animal fats.

The National Center for Preservation Technology and Training (NCPTT) has performed numerous tests on 12 different mixes to determine suitability for various substrates. The full report, prepared by Sarah Jackson dated May 20, 2008, "Durability of Traditional and Modified Limewashes" includes results evaluation relative to abrasion resistance, adhesion, and differences in propagation of salt and sugar crystals (both additives to many of the mixes). Of note, the alternative recipes tested lime and lime putty, and three different lime sources. A review of the results will likely prove beneficial to the City Point Unit maintenance staff should the lime wash repairs and restoration continue to be their responsibility. NCPTT has ample information in print form, and in videos, on the application of limewash. An abbreviated description of the process is:

Surface Preparation

1. Remove vegetative and fungal growth with a biocide.
2. Remove all loose material with a stiff bristle brush.
3. Wash down the surfaces.
4. Brush again.
5. Wash down again leaving the surface just saturated surface dry (SSD)

Temperature Constraint

6. Be sure the temperature is in the required range at application and for several weeks beyond of 70 degrees Fahrenheit, plus or minus ten degrees.

The Recipe

7. There are many recipes with many additives as alternatives, including none. Some recipes will recommend apply the mix "hot"; that is, after the water has been added to the lime, and any additives blended into the mix; the chemical reaction includes heat.

Application

8. Having prepared the lime wash apply with a "lime wash brush" which is a typically wide brush, with short stiff bristles, of assistance in working the mix into surface declivities. Apply seven or more thin layers keeping a wet edge and keeping the mix fresh per the limits recommended. Please note that commercial mixes do exist. The use of lime wash is still fairly common in Scotland and their videos on mixing and application may be particularly helpful.

Systems—Lightning Protection: Kitchen-Laundry

As the location of most of the lightning protection system on the Kitchen-Laundry is high enough to challenge the opportunity for close examination, the treatments recommended are related to condition issues observable up close. The conductors at the ground level are braided wire and have been reduced in number of intact strands apparently through contact with mowing operations. To protect these conductors at the northwest and southwest corners of the Kitchen-Laundry building it is recommended that a rot resistant wood stake be driven into the ground outside of their current locations creating a bollard to protect the cable from mowing operations.

Photo 261 (JDF2110): Kitchen-Laundry: lightning protection at south elevation, above southwest window.

Photo 262 (JDF2232): Kitchen-Laundry lightning protection, braided cable conductor, coming down the wall at the southwest corner.

Photo 263 (JDF2233): Kitchen-Laundry: condition of lightning protection at the ground level. Note loss of about 30% of the wires of the braided cable.

Summary of Future Research

Comprehensive Paint Sampling Program

Table 22: Comprehensive Pain Sampling Program

Comprehensive Paint Sampling Program			K-L	D	NS	OS
	Three samples per element					
Exterior	Corner boards		3	3	3	3
	Casings		6	3	3	3
	Weatherboards (under the soffit, protected)		6	3	3	3
	Soffit		6	3	3	3
	Fascia		3	3	3	3
	Upper classical molding			3	3	
	Lower classical molding			3	3	
	Doors		9	3		3
	Windows		18			3
		Sash				
		Frame				
		Sill				
Interior	Appurtenances Interior					
		Wainscot (2 types)	6			
		Cupboards	3			
		Shelves	6			
	Walls					
		Closet walls	3			
	Baseboards					
		1st story	6			
		2nd story	3			
	Doors (interior face, 1st story)		12	3		3
	Windows (interior face, 1st story)		18			3
SUBTOTALS			108	27	21	27
Total =	183					
Deduction for samples from 2016 HSR of 40 = 143 samples needed.						

Dendrochronology

When a building has detailed information on construction dates, the sources are often public records such as deeds and tax records, communications between owners and contractors, dated design drawings, and historic photographs with verifiable dates. The four buildings have none of these sources to develop a verifiable construction date. The best method for wood framed structures, especially with larger timber frame members, is by dendrochronology, which is determining the date by studying tree ring data. The sequence of the width of tree rings in a specific species in a given area of similar growth provides a "fingerprint." By comparison of the sample with the sequence from other trees of known date of harvest, the date of harvest of the sample can be accurately determined. Date of harvest does not necessarily equate to construction date as the tree after harvest may have been set aside for some time before being used in construction or the piece of timber may have been re-used (salvaged) from another earlier structure. Sampling multiple timbers from the same building will usually provide a fairly uniform cut down and allow outliers, such as a re-used timber, to stand out.

The sample is taken by a boring device at locations chosen that include the outermost part of the tree. A corner of a timber which exhibits a condition defined as "wane" is a prime sample

location. The area with wane often has either bark remainders or evidence of bark impressions in the wood. The simple sketch below indicates a spot with wane, and types of samples able to provide the information critical to analysis.

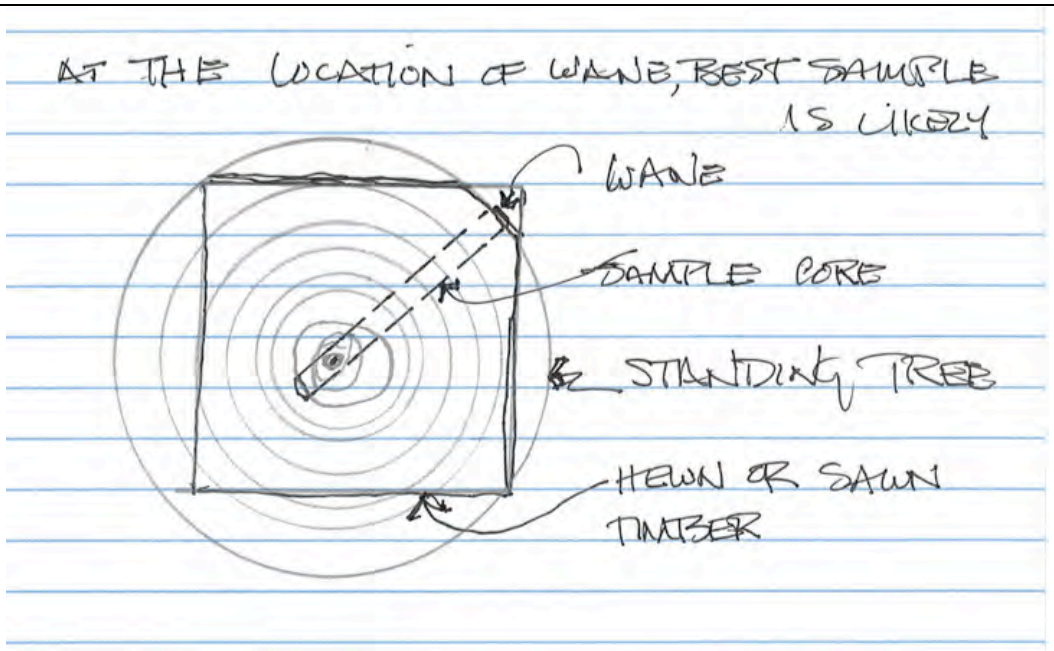


Figure 55: Illustration of how dendrochronology is done.

Even a portion of the sample core toward and including the outer ring will allow the dendrochronologist to determine the date, if there are enough rings. A concern is whether the holes left from taking the cores are visible. Dendrochronologist Michael Worthington states in his proposal for the four outbuildings:

> *"As for the holes in the timbers, we always plug our cores (unless the client requests us not to do this). The holes themselves are quite small, 15 mm in diameter, and we plug them with wooden dowels stained to match the timbers. We try as much as possible to make it so that no one knows we have been there--sometimes it can be hard to even see where we've taken a sample."*

Oxford Tree Ring Laboratory was requested to provide a proposal, which is provided below with a detailed scope, dated February 23, 2017.

PROPOSAL

I. Scope of Services

The dendrochronological study will target the timbers used in the primary construction phase of the old smokehouse, new smokehouse, kitchen/laundry, and dairy and will include a thorough assessment of the surviving timbers in each building; the taking of samples as required; all relevant laboratory analysis; and the production of a detailed written report outlining the goals, methods, and results of the investigation. A digital version of the report will be provided to the client, with an additional hard copy to be provided upon request.

A detailed list of services and rates for the laboratory are attached hereto ("Scope of Services").

II. Compensation/Terms

Oxford Tree-Ring Laboratory proposes to provide the services outlined herein for a cost of $2500 for the first building, then $2000 per each additional building (a 20% discount) plus any expended costs for travel and accommodation. This quote assumes the efficient execution of the work proposed herein with no lengthy delays.

First building..... $2500 plus travel and accommodation
Second ..... + $2000 (a 20% discount)
Third building..... + $2000 (a 20% discount)
Fourth building ..... + $2000 (a 20% discount)
Total if all buildings sampled $8500

If, after initial assessment, all of the timbers are found to be unsuitable for sampling, a fee of $500 will be charged to cover time and travel.

If the timbers are judged to be suitable for sampling, an invoice will be submitted for half of the total fee ($4250) plus expenses upon completion of sampling. A second invoice will be submitted for the remaining half of the fee ($4250) upon production of the draft report. Payment of each invoice shall be due within thirty (30) days of receipt of the invoice. Overdue payments will be assessed interest at a rate of 3% every 30 days and Oxford Tree-Ring Laboratory reserves the right to collect any and all fees associated with the collection of past due payment.

III. Independent Contractor Status

You understand that you are engaging Oxford Tree-Ring Laboratory as an independent contractor. This agreement is not intended to create any partnership, joint venture, co-ownership, agency, or employment relationship between us. Unless Oxford Tree-Ring Laboratory specifically agrees to it, in writing, you will not act as an agent or make commitments on behalf of Oxford Tree-Ring Laboratory.

IV. Copyright Conditions

The client will have the right to use the results for his or her own purposes, and results will be published on the laboratory's website at www.dendrochronology.com. The authors will retain copyright of the written report and reserve the right to use the scientific data for their own purposes. Acceptance of the terms of this schedule will imply acceptance of the copyright conditions.

V. Sampling

In selecting the precise point of sampling, the primary consideration will be to determine which part of the complete sapwood was most sound and least affected by historic beetle attack. Wherever possible, points of sampling will be selected so as to be in the least visible location, but occasionally little choice is available. In these instances, core holes will be plugged with white wood doweling and stained to match the surrounding surface to minimize visual impact. The structural integrity of the timbers is considered to ensure that no sample will be extracted from an overstressed area such as a joint.

Archaeology
There are several completed archeological reports that were reviewed in detail and provided a significant amount of highly valuable data relative to now-hidden site features including the original home. However, there are large sections of the site likely to also provide important information about the site's occupation during different periods, such as before the Eppes family settled in the mid 1600s, the pre-Manor House structures, Civil War period use, and post-Civil War occupation. Site use for the kitchen yard, the foundation remnants under the existing location of the Old Smokehouse, location of the ham salting area, pollen and seed evaluation of the Eppes's garden plot, and similar areas of study will fill information gaps in the site's history and use. Another highly specific area of interest is whether the Eppes family made its own lime for mortar from burning oyster shells, if bricks were truly fired on the property or were purchased, and similar aspects of construction materials and daily life.

Additional Mortar Analysis
Mortar fragments were found under the Kitchen-Laundry as part of the 1989-1990 project that deepened the crawl space. Petrographic analysis of the samples from the north half of the building and comparison in results to the south half. It would be of interest to also evaluate the samples taken from the excavation home constructed prior to the Manor.

Monitoring
The north 5 to 10 feet of the second story of the Kitchen-Laundry exhibits floor slopes with a low point evidenced most particularly in the baseboards, and plaster cracking at the walls and ceilings. On the exterior, the stepped coursing of the chimney is sloping toward the building. This condition is perhaps indicative of settlement of the chimney; leaning into the building causing the slight buckling of the second story floor. The challenge is how to monitor the potential movement in a least cost manner, hopefully using park staff.

There are two alternate recommended approaches to monitoring any potential movement of the chimneys. In either case, it is recommended to repeat these measurements annually.

The low-tech approach would utilize a self-leveling laser level with a 90-degree prism that produces both plumb and level reference beams. Chimney plumb can be monitored by placing the laser level on a flat surface adjacent to the chimney and measuring the offset to the plumb laser beam at two reference points—one near the base and one high on the chimney. The difference (by subtraction) between these two measurements will be a constant, if there is no change in plumb. If this measurement is periodically repeated, with the same reference points, any rotational movement will become evident. Subsidence of the chimney can be monitored by placing the laser level on a reference position (e.g., one of the horizontal steps) on the chimney and noting where the level beam of the laser level meets the perpendicular Manor wall. Again, repeating this measurement periodically, with the same setup, will indicate any vertical movement of the chimney.

Alternately, NPS can elect to have a surveyor establish reference points on the chimneys, with respect to a known reference point, and annually resurvey these points.

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Appendices

1-Summary of Secretary of the Interior's Standards and Guidelines
2-Site Plan
3-Architectural Drawings
4-Building Materials Testing and Analyses, and Results:
- **Mortar and Plaster**
- **IR**
- **Paint**
- **Wood**

5-Richard Eppes Diary Entries 1851-1860: Outbuildings References
6-Cookbook of Elizabeth Welsh Eppes
7-Foodways by E. Dabney
8-Field Notes
9-Digital Photographs

1. Summary of the Secretary of the Interior's Standards and Guidelines

Appendix 1
The Secretary of the Interior's Standards for Rehabilitation

The Standards (Department of Interior regulations, 36 CFR 67) pertain to historic buildings of all materials, construction types, sizes, and occupancy and encompass the exterior and the interior, related landscape features and the building's site and environment as well as attached, adjacent, or related new construction. The Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility.

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired

2. Site Plan

OLD SMOKEHOUSE

NEW SMOKEHOUSE

DAIRY

CONTEXTUAL
AREA OF STUDY

PRIMARY AREA
OF STUDY

KITCHEN -
LAUNDRY

HOUSE

EDGE OF VEGETATION

DIRT LANE

DIRT LANE

GARAGE

20' 10' 0 20' 40'

SCALE OF FEET

1" = 20'-0"

NOTE: SITE PLAN IS BASED ON TOPOGRAPHIC SURVEY, (NPS DRAWING NO. UNKNOWN), PRODUCED BY LEGAT, ELROD AND ASSOCIATES, INC., DATED AUG 1980

2

SITE PLAN - AREA OF STUDY

SCALE: 1" = 20'-0"

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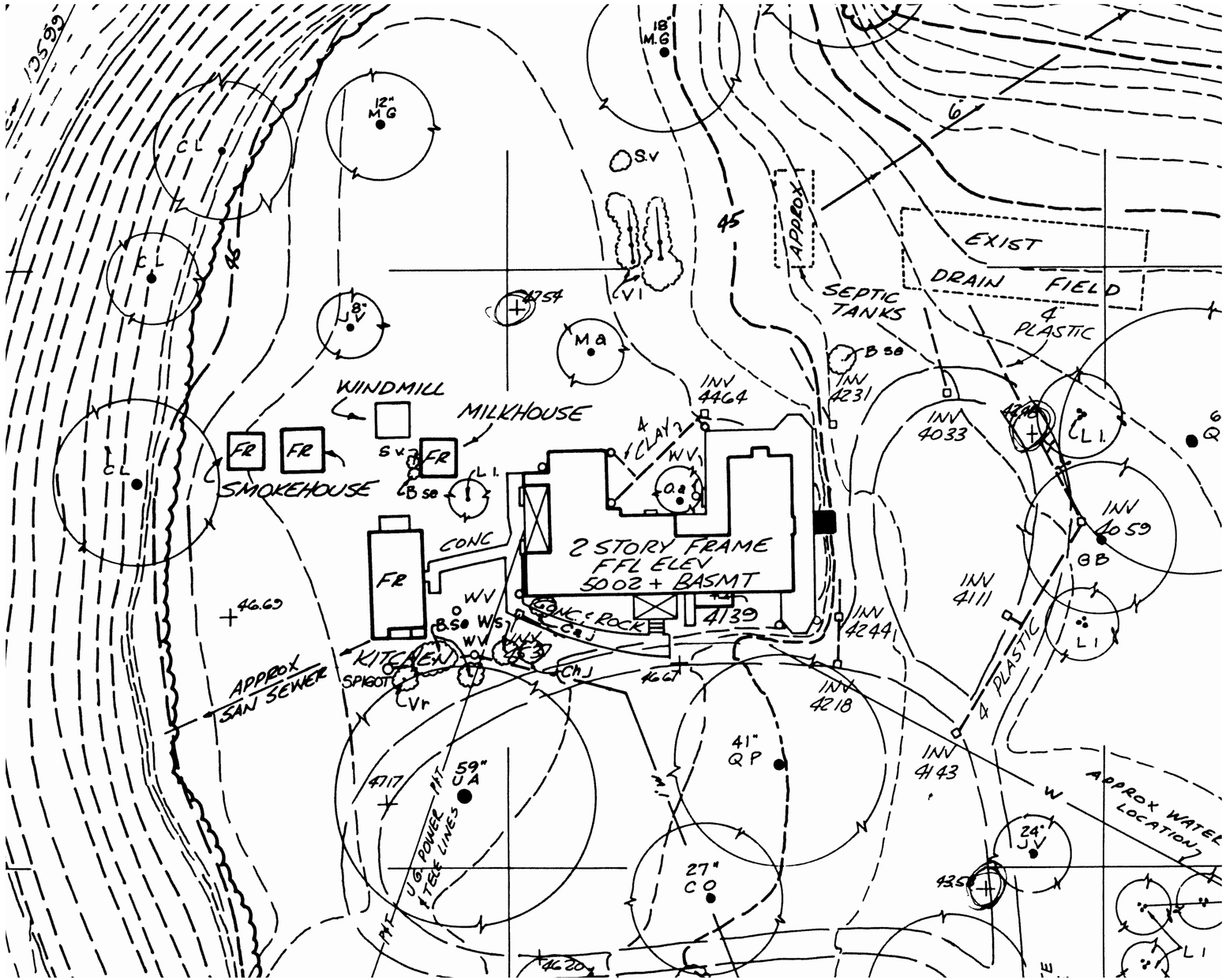
3. Existing Site and Building Drawings

APPOMATTOX MANOR OUTBUILDINGS
PETERSBURG NATIONAL BATTLEFIELD

PETERSBURG, VIRGINIA



2 SITE PLAN - AREA OF STUDY

SCALE: 1" = 20'-0"

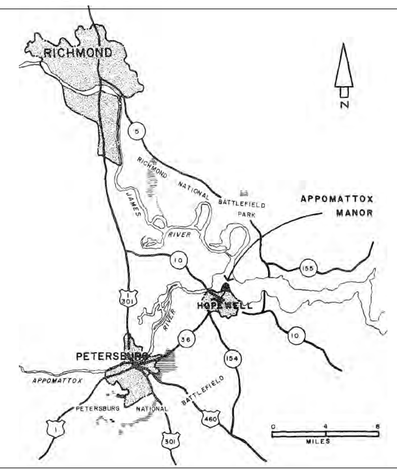
20' 10' 0 20' 40'

SCALE OF FEET

1" = 20'-0"

1 SITE PLAN - ENTIRE PARK

VICINITY MAP



SITE PLAN LEGEND

FENCE LINE ----------

BUILDING

ROAD, GRAVEL

PROJECT TEAM

the COLLABORATIVE inc
2080 Pearl Street, Boulder, CO 80302
303-442-3601, collab@thecollaborativeinc.net

PROJECT INDEX

SHEET NO.	DESCRIPTION
A1	COVER SHEET / SITE PLANS
A2	KITCHEN BUILDING
A3	KITCHEN BUILDING
A4	OLD SMOKEHOUSE
A5	NEW SMOKEHOUSE
A6	DAIRY

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NATIONAL PARK SERVICE
Department of the Interior

AS BUILT DRAWINGS

UNITED STATES
DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE
MID ATLANTIC REGIONAL OFFICE

TITLE OF DRAWING
BUILDINGS
LOCATION WITHIN PARK
APPOMATTOX MANOR
NAME OF PARK
PETERSBURG NATIONAL BATTLEFIELD

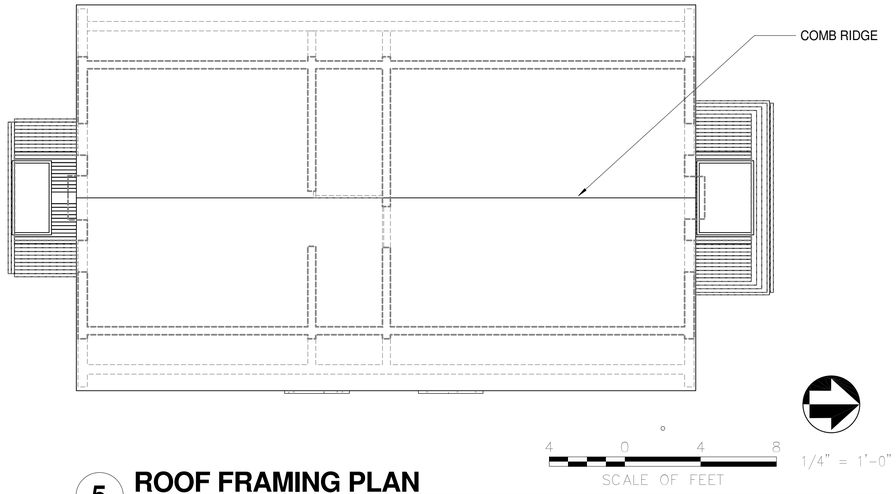
REGION	CITY	STATE
MID-ATLANTIC	PETERSBURG	VIRGINIA

DRAWING NO. A1

PMIS / PKG NO. 188194A

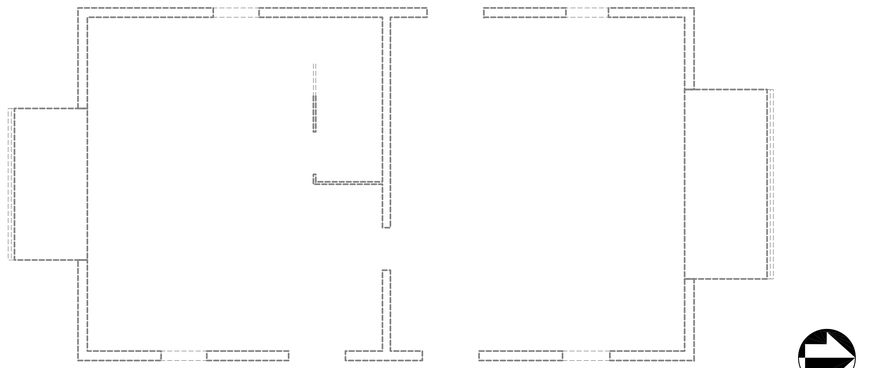
SHEET 1 OF 6

11/1/2016 9:29:15 AM



4 0 4 8
SCALE OF FEET
1/4" = 1'-0"

5 ROOF FRAMING PLAN
SCALE: 1/4" = 1'-0"



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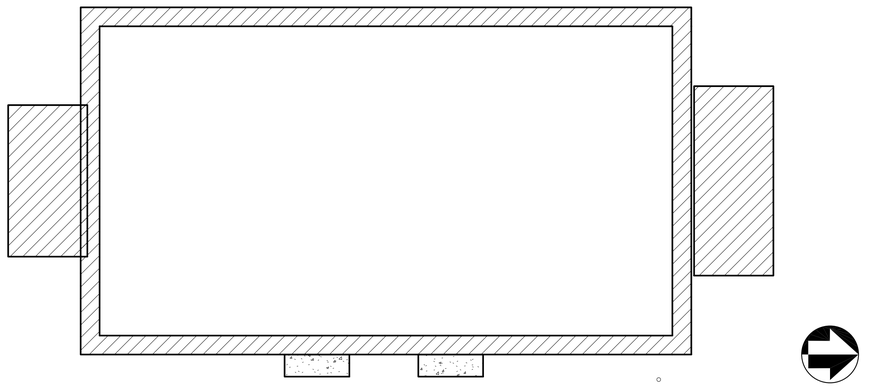
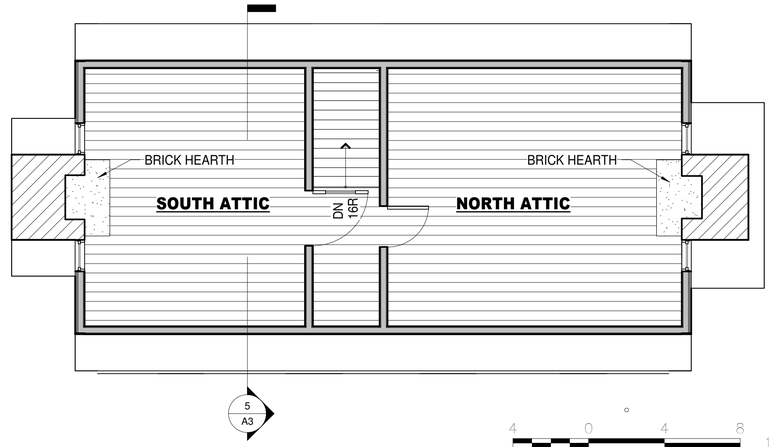
SCALE OF FEET
1/4" = 1'-0"

4 SECOND FLOOR FRAMING
SCALE: 1/4" = 1'-0"



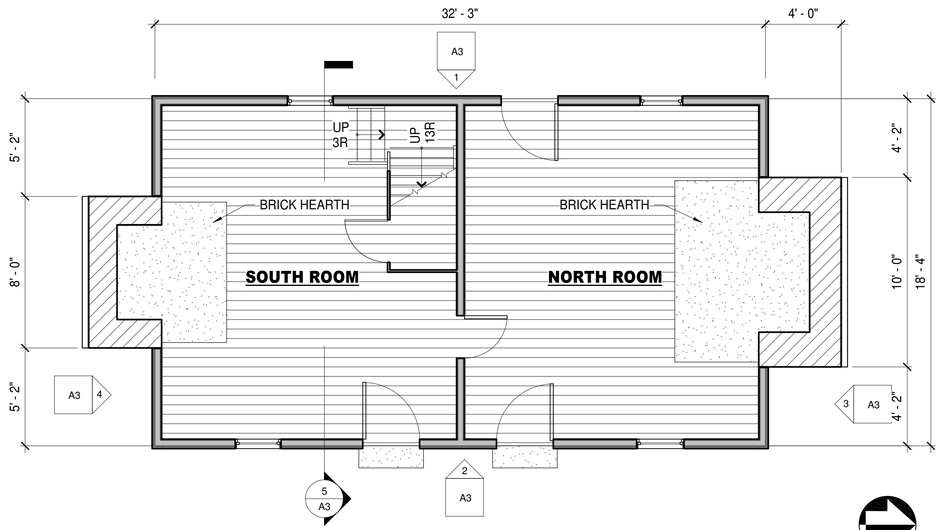
4 0 4 8
SCALE OF FEET
1/4" = 1'-0"

3 FDN / FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"



4 0 4 8
SCALE OF FEET
1/4" = 1'-0"

2 SECOND FLOOR PLAN
SCALE: 1/4" = 1'-0"



4 0 4 8
SCALE OF FEET
1/4" = 1'-0"

1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

DOOR SCHEDULE

TAG	TYPE	WIDTH	HEIGHT	COMMENTS
T7	Single Door	3' - 0"	6' - 3"	
T8	Single entry	3' - 0"	6' - 2"	
T9	Single entry	3' - 0"	6' - 2"	
T12	Single Door	2' - 3"	6' - 0"	
T18	Single	2' - 2"	6' - 0"	
T19	Single entry	2' - 11"	6' - 0"	
T24	Single cabinet	2' - 3"	6' - 7"	

WINDOW SCHEDULE

TAG	TYPE	WIDTH	HEIGHT	COMMENTS
CC	Fixed	1' - 8"	2' - 2"	
DD	Fixed	1' - 8"	2' - 2"	
EE	Fixed	1' - 8"	2' - 2"	
FF	Fixed	1' - 8"	2' - 2"	
R	Single Hung	2' - 6"	5' - 3"	
U	Single Hung	2' - 5"	5' - 3"	
W	Single Hung	2' - 3"	5' - 3"	
X	Single Hung	2' - 5"	5' - 3"	

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DESIGNED: DADD
DOS
TECH. REVIEW: DRB
DATE 10-31-2016

SUB SHEET NO. A2

TITLE OF SHEET
KITCHEN BUILDING

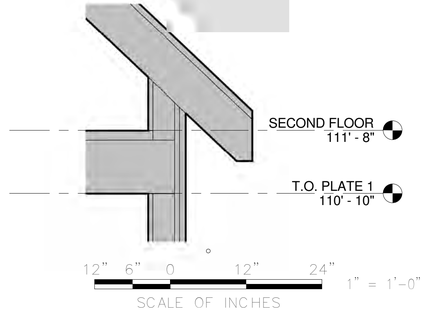
PETERSBURG NATIONAL BATTLEFIELD

DRAWING NO.

PMIS/PKG NO. 188194A

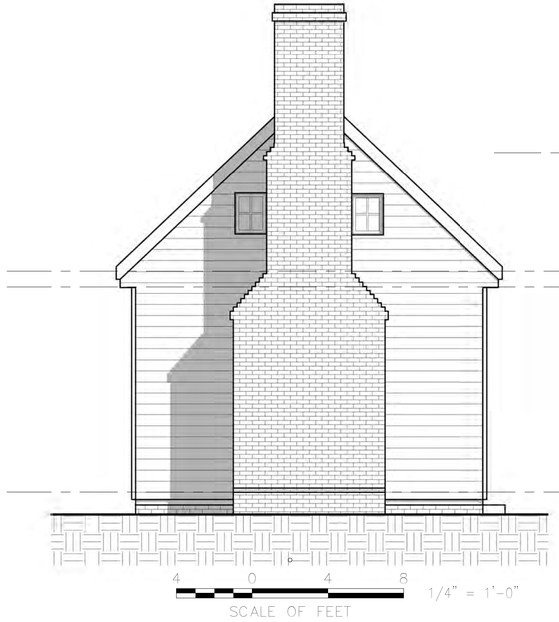
SHEET 2 OF 6

6/29/15 13:42 DSACHS R15 C:\SERS\DAVID SACHS\DOCUMENTS\BROOKE\14.FORKED LIGHTNING RANCH\ARCHITECTURAL DRAWINGS\TEMP NPS TITLEBLOCK.DWG
10/31/2016 9:35:38 AM



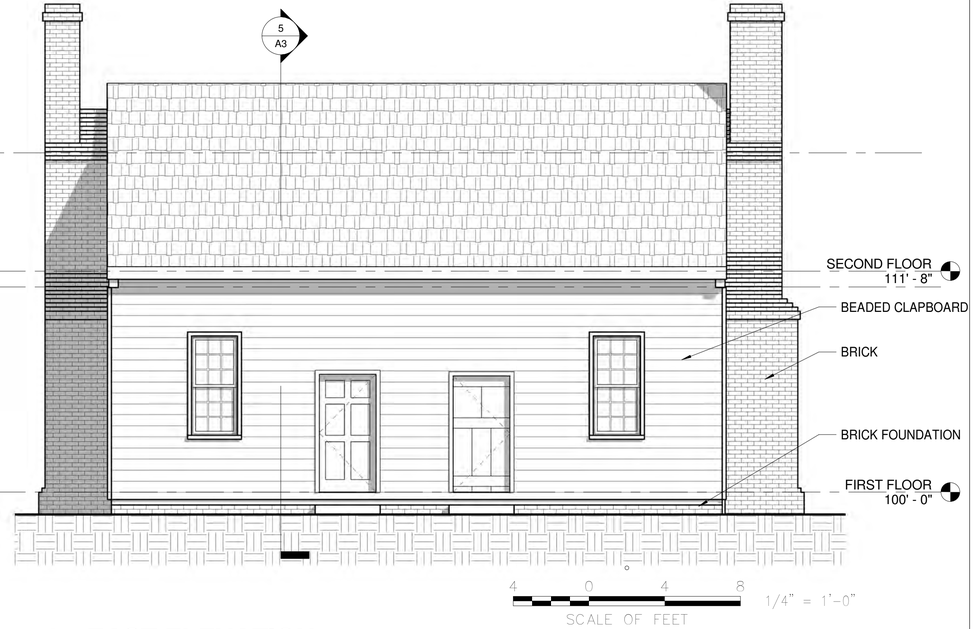
6 EAVE DETAIL

SCALE: 1" = 1'-0"



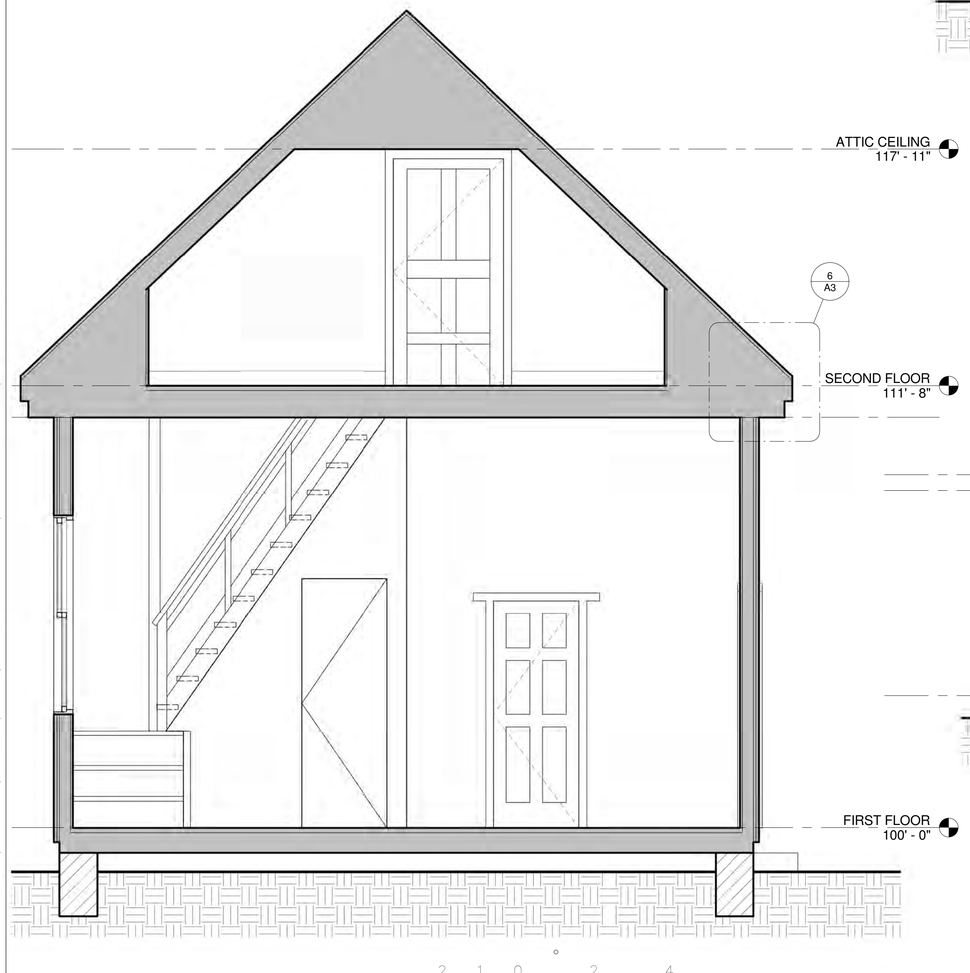
4 SOUTH ELEVATION

SCALE: 1/4" = 1'-0"



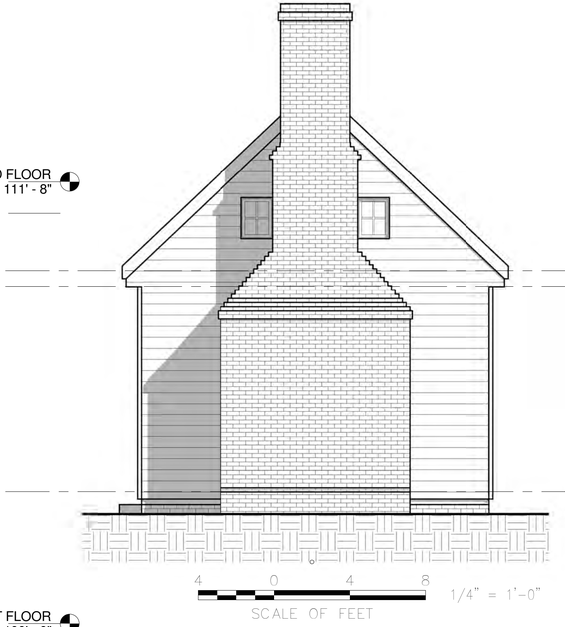
2 EAST ELEVATION

SCALE: 1/4" = 1'-0"



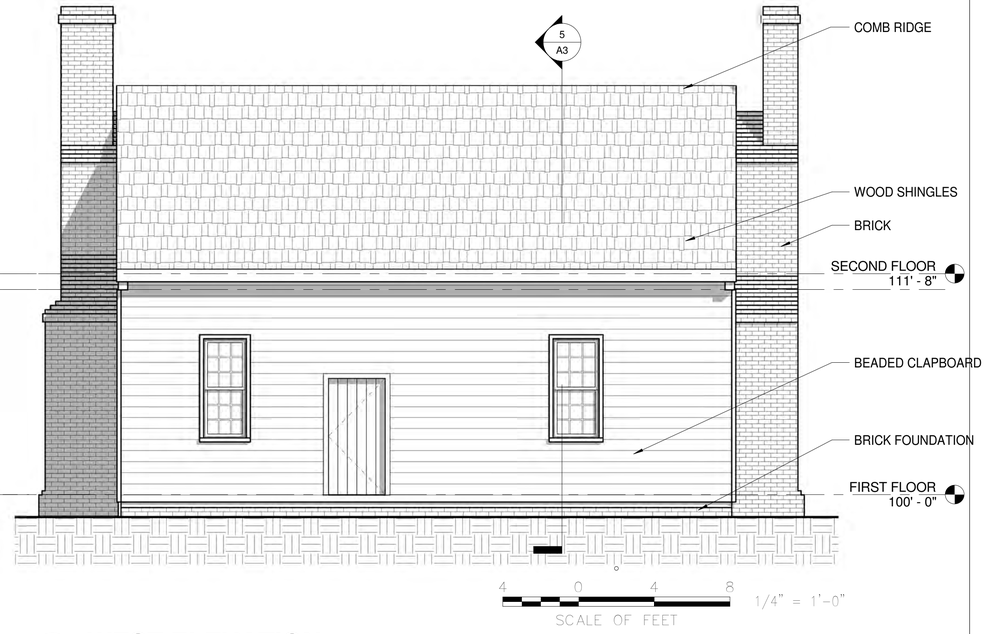
5 SECTION

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



3 NORTH ELEVATION

SCALE: 1/4" = 1'-0"



1 WEST ELEVATION

SCALE: 1/4" = 1'-0"

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DESIGNED:
CADD
DOS
TECH. REVIEW:
DRB
DATE
10-31-2016

SUB SHEET NO.
A3

TITLE OF SHEET
KITCHEN BUILDING

PETERSBURG NATIONAL BATTLEFIELD

DRAWING NO.

PMIS/PKG NO.
188194A

SHEET
3 OF 6

6/29/15 13:42 DSACHS R15 C:\SERS\DAVID SACHS\DOCUMENTS\BROOKE\14-FORKED LIGHTNING RANCH\ARCHITECTURAL DRAWINGS\TEMP NPS TITLEBLOCK.DWG

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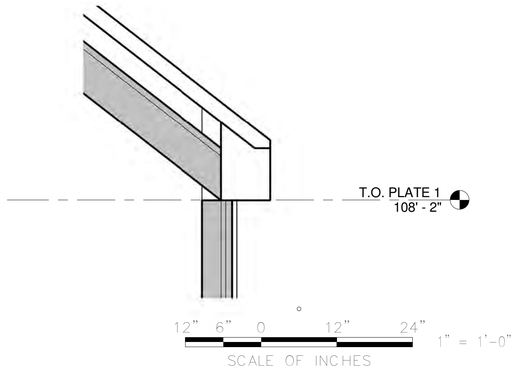
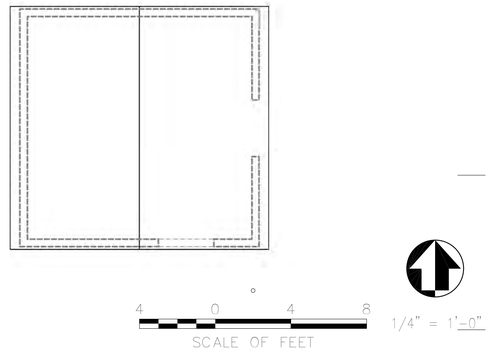
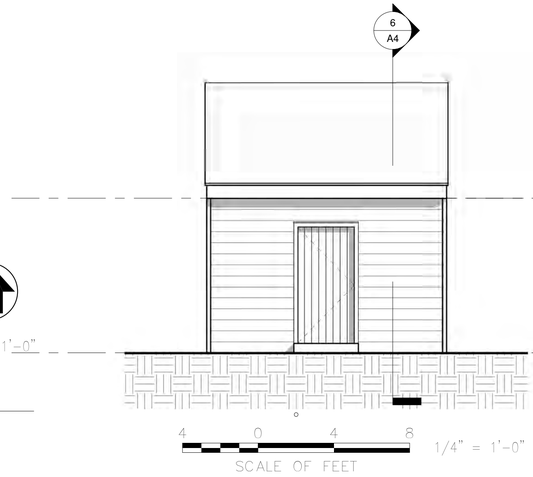


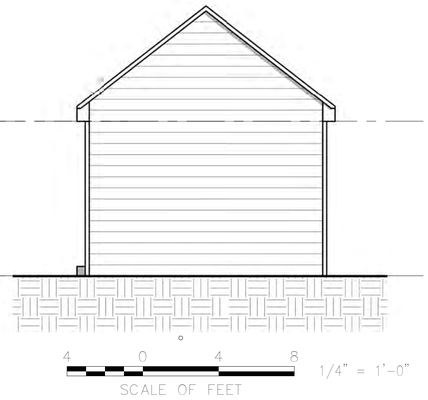
7 EAVE DETAIL
SCALE: 1" = 1'-0"



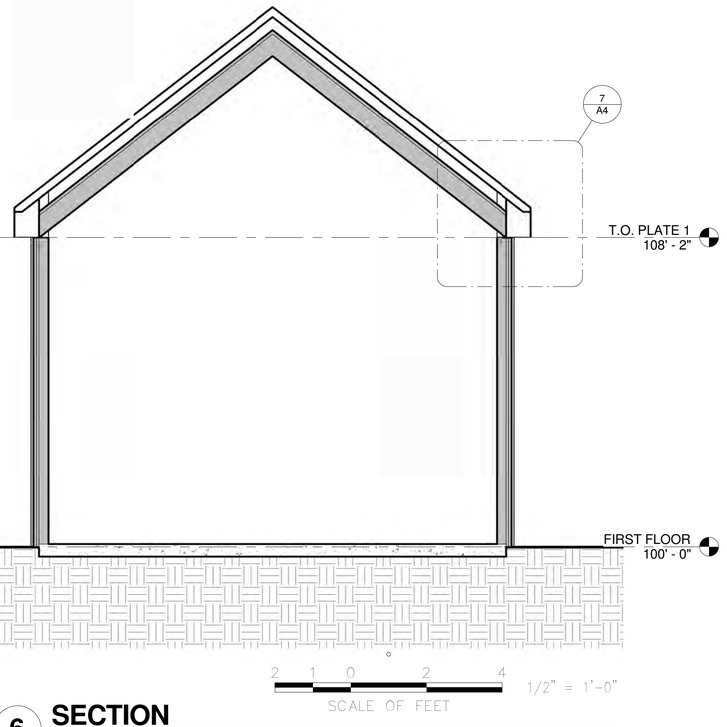
8 ROOF FRAMING PLAN
SCALE: 1/4" = 1'-0"



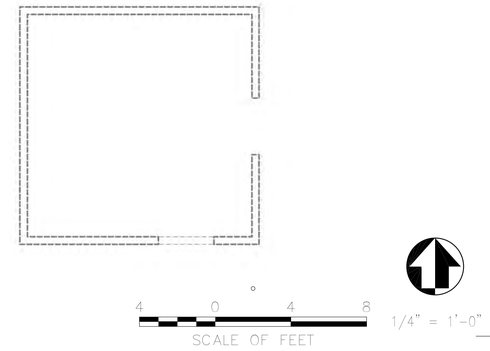
5 EAST ELEVATION
SCALE: 1/4" = 1'-0"



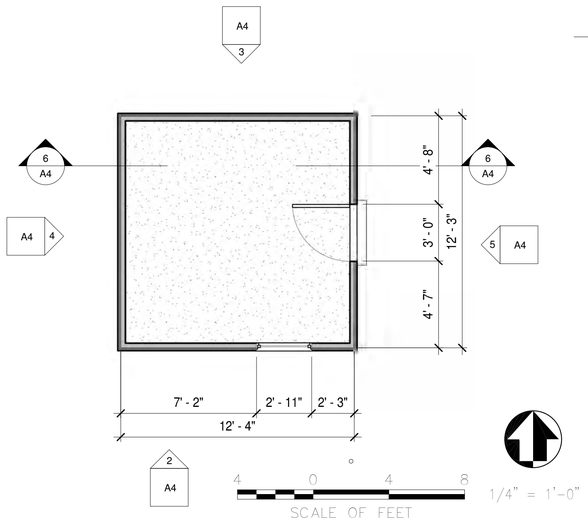
3 NORTH ELEVATION
SCALE: 1/4" = 1'-0"



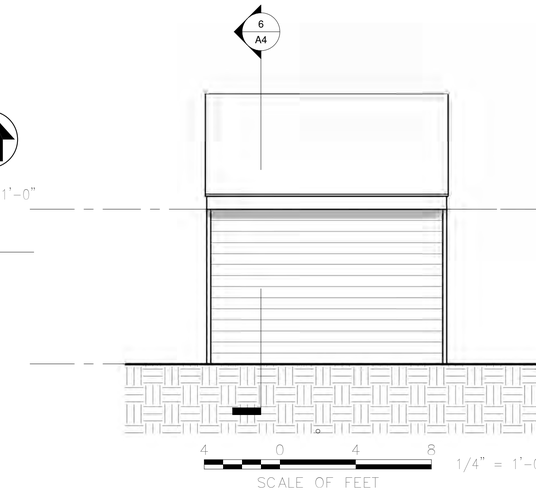
6 SECTION
SCALE: 1/2" = 1'-0"



9 FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"



1 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"



4 WEST ELEVATION
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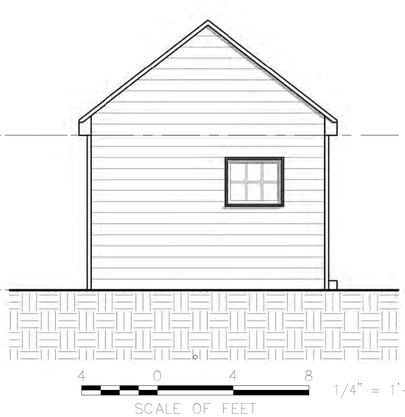

2 SOUTH ELEVATION
SCALE: 1/4" = 1'-0"

DOOR SCHEDULE

TAG	TYPE	WIDTH	HEIGHT	COMMENTS
T31	Single entry	3' - 0"	6' - 2"	

WINDOW SCHEDULE

TAG	TYPE	WIDTH	HEIGHT	COMMENTS
PP	Fixed	2' - 11"	2' - 5"	

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DESIGNED:
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DOS
TECH. REVIEW:
DRB
DATE
10-31-2016

SUB SHEET NO.
A4

TITLE OF SHEET
OLD SMOKEHOUSE

PETERSBURG NATIONAL BATTLEFIELD

DRAWING NO.

PMIS/PKG NO.

SHEET
4 OF 6

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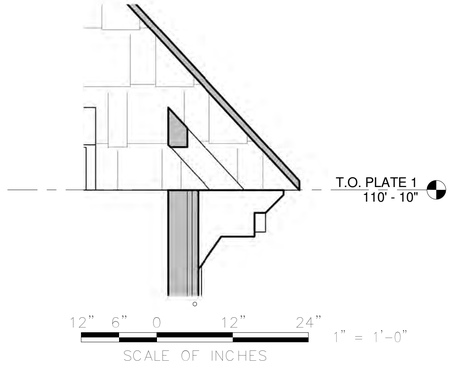
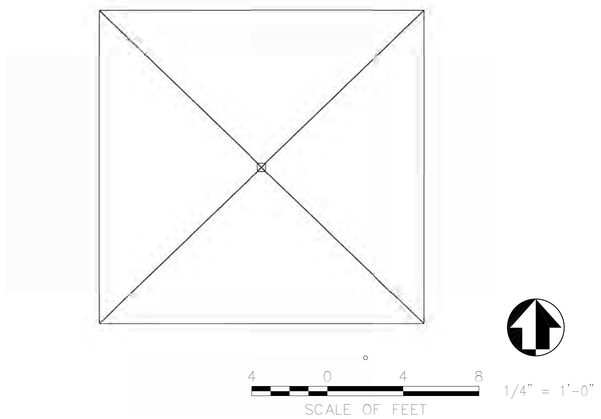
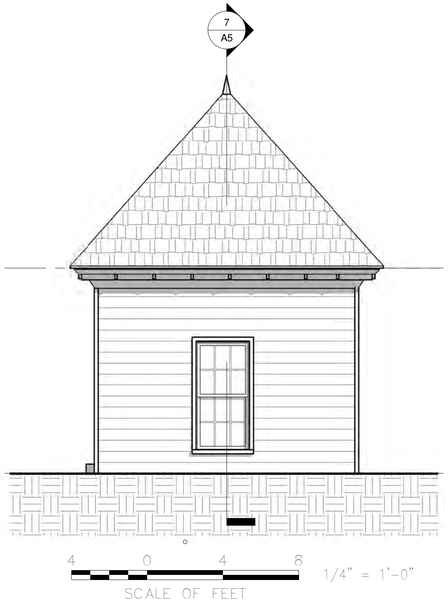
10/31/2016 9:24:37 AM



8 EAVE DETAIL
SCALE: 1" = 1'-0"



6 ROOF FRAMING PLAN
SCALE: 1/4" = 1'-0"



4 EAST ELEVATION
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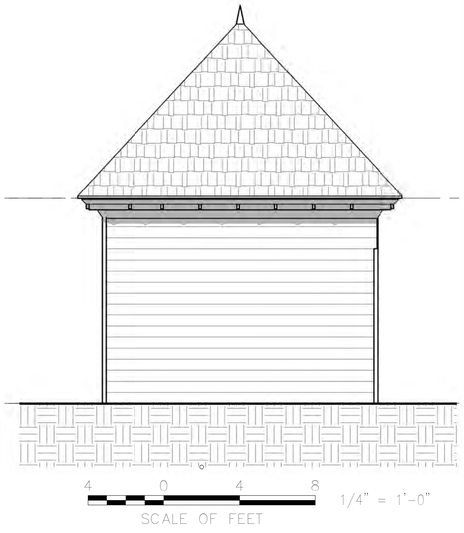

2 NORTH ELEVATION
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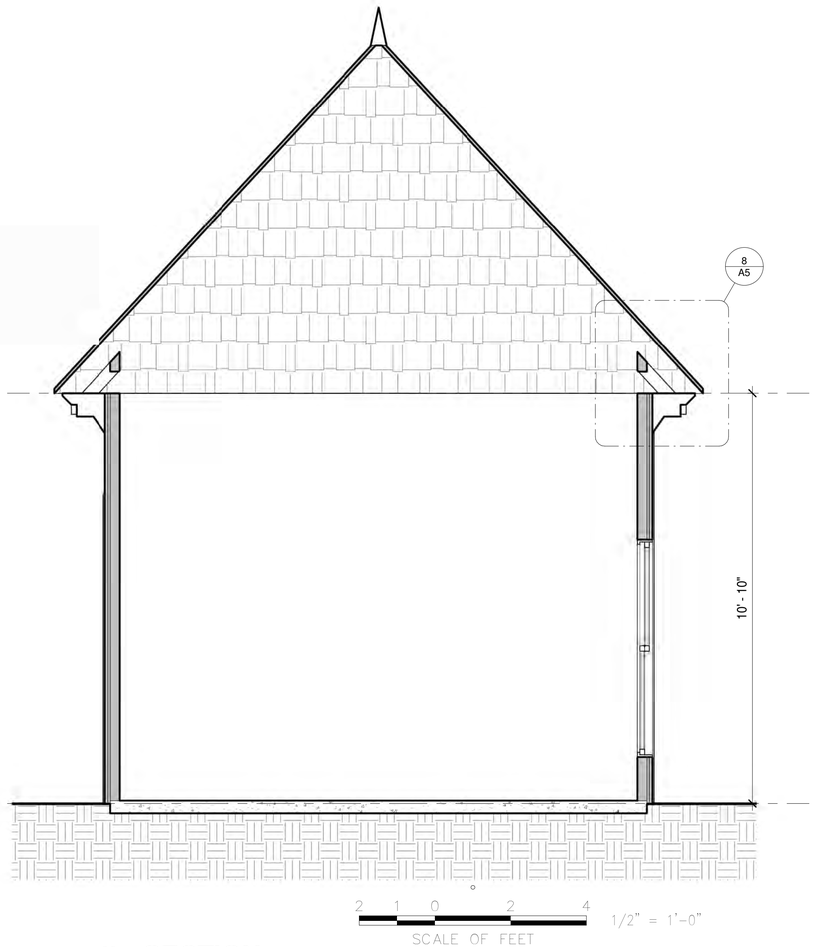
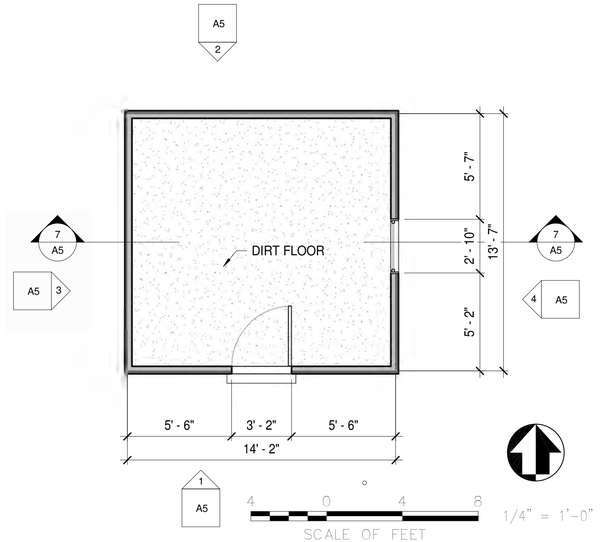


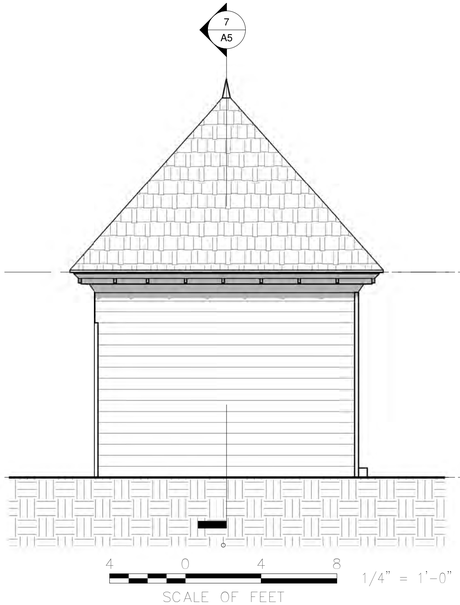
7 SECTION
SCALE: 1/2" = 1'-0"



5 FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

WINDOW SCHEDULE				
TAG	TYPE	WIDTH	HEIGHT	COMMENTS
PP	Single Hung	2' - 10"	5' - 9"	

DOOR SCHEDULE				
TAG	TYPE	WIDTH	HEIGHT	COMMENTS
T31	Single entry	3' - 2"	6' - 2"	



3 WEST ELEVATION
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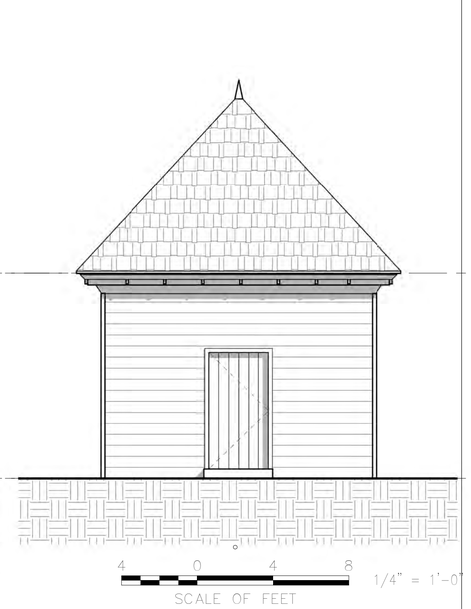


1 SOUTH ELEVATION
SCALE: 1/4" = 1'-0"

tCi the Collaborative inc

DESIGNED: CADD DOS
TECH. REVIEW: DRB
DATE 10-31-2016

SUB SHEET NO. A5

TITLE OF SHEET
NEW SMOKEHOUSE

PETERSBURG NATIONAL BATTLEFIELD

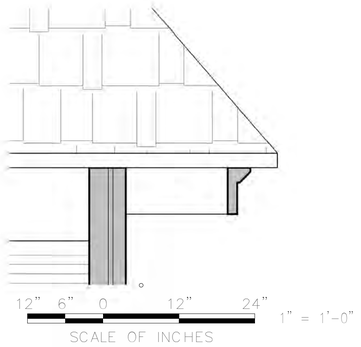
DRAWING NO.

PMIS/PKG NO. 188194A

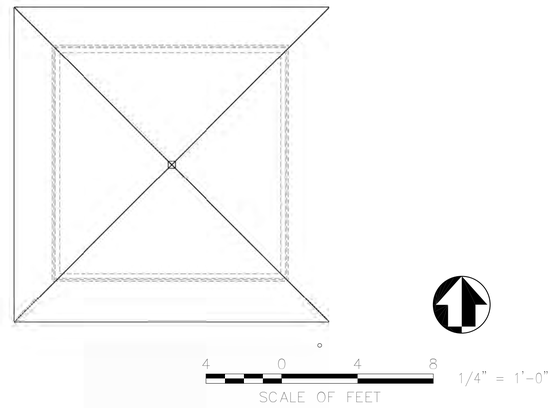
SHEET 5 OF 6

6/29/15 1:34:42 DSAC:HS R15 C:\SERS\DAVID SAC:HS\DOCUMENTS\BROOKE\14-FORKED LIGHTNING RANCH\ARCHITECTURAL DRAWINGS\TEMP NPS TITLEBLOCK.DWG

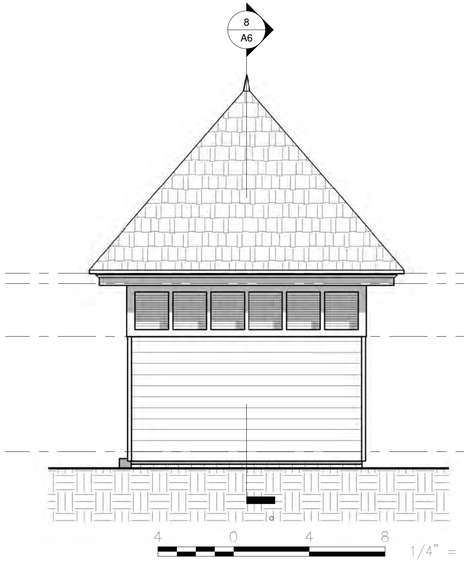
10/31/2016 9:30:01 AM



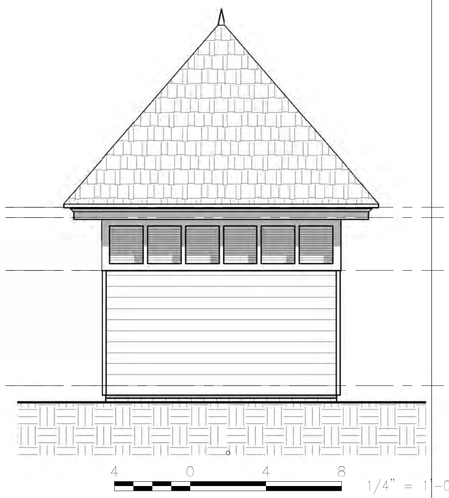
9 EAVE DETAIL
SCALE: 1" = 1'-0"



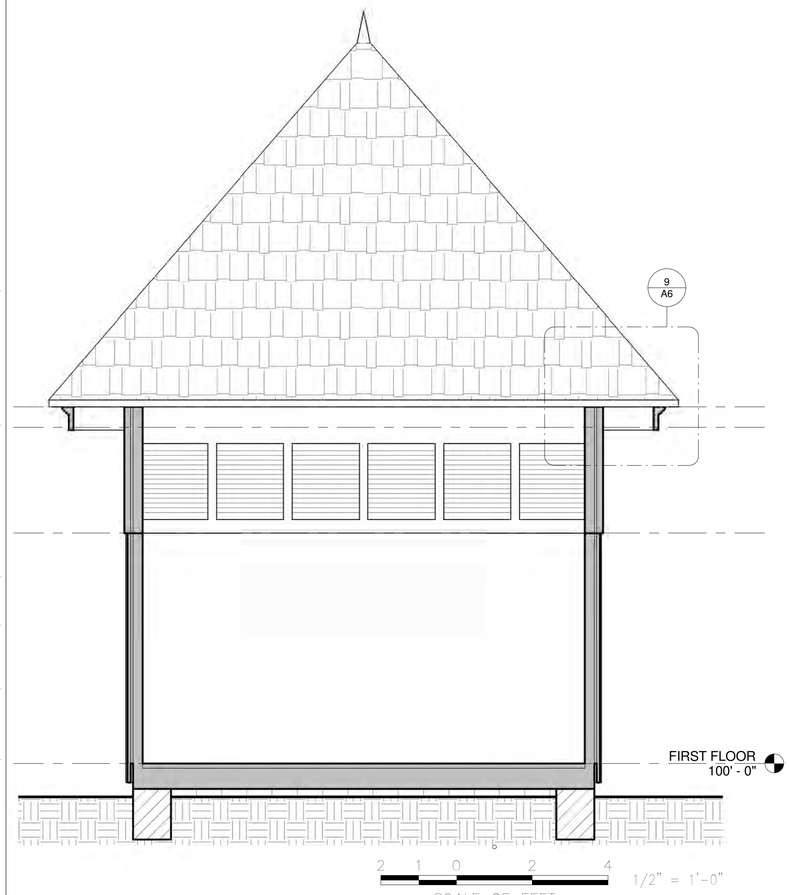
7 ROOF FRAMING PLAN
SCALE: 1/4" = 1'-0"



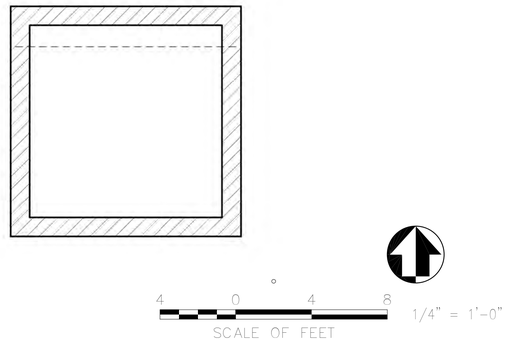
4 EAST ELEVATION
SCALE: 1/4" = 1'-0"



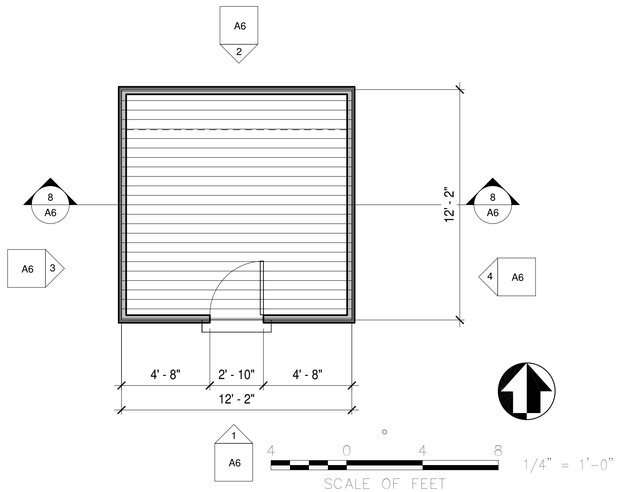
2 NORTH ELEVATION
SCALE: 1/4" = 1'-0"



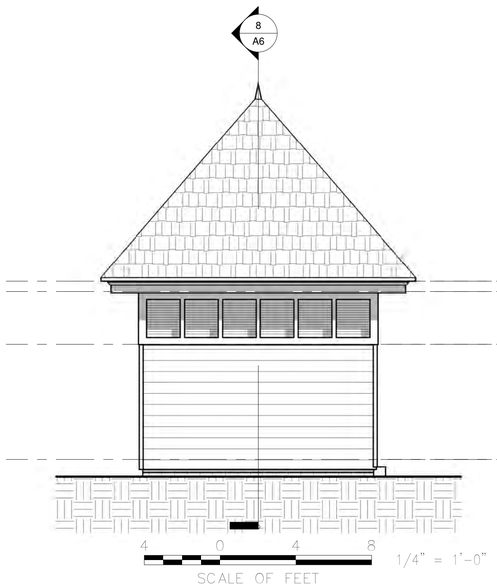
8 SECTION
SCALE: 1/2" = 1'-0"



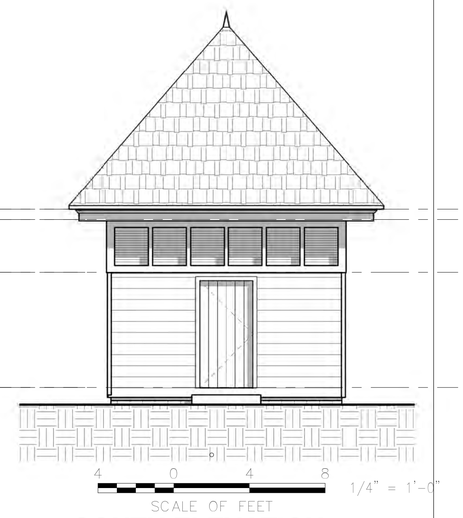
6 FDN / FLOOR FRAMING PLAN
SCALE: 1/4" = 1'-0"



5 FLOOR PLAN
SCALE: 1/4" = 1'-0"



3 WEST ELEVATION
SCALE: 1/4" = 1'-0"



1 SOUTH ELEVATION
SCALE: 1/4" = 1'-0"

DOOR SCHEDULE

TAG	TYPE	WIDTH	HEIGHT	COMMENTS
T31	Single entry	2' - 10"	5' - 8"	

tCi the Collaborative inc

DESIGNED: CADD DOS
TECH. REVIEW: DRB
DATE 10-31-2016

SUB SHEET NO. A6

TITLE OF SHEET: DAIRY

PETERSBURG NATIONAL BATTLEFIELD

DRAWING NO.

PMIS/PKG NO. 188194A

SHEET 6 OF 6

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Appendix 4

Building Materials Testing and Analyses, and Results

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Mortar and Plaster Analysis Report

Mortar hardness was measured on the exterior mortar joints on the north and south chimneys using a Schmidt Type PM pendulum hammer that was developed to evaluate mortar hardness. Mortar hardness can generally be correlated with compressive strength within a certain hardness range. Figure 1 shows the general relationship between mortar hardness, as measured with the pendulum hammer, and compressive strength for ASTM C 270 mortar Types S, N, O and K. Note that the device is not sensitive to harder mortars such as Type N and S. For mortars with a rebound number above 80, the hardness may vary only within the standard error of the test method while the compressive strength can vary by a factor of two. The expected rebound numbers for appropriate mortars should be in the range of 30 to 40 for lime-sand mortars.

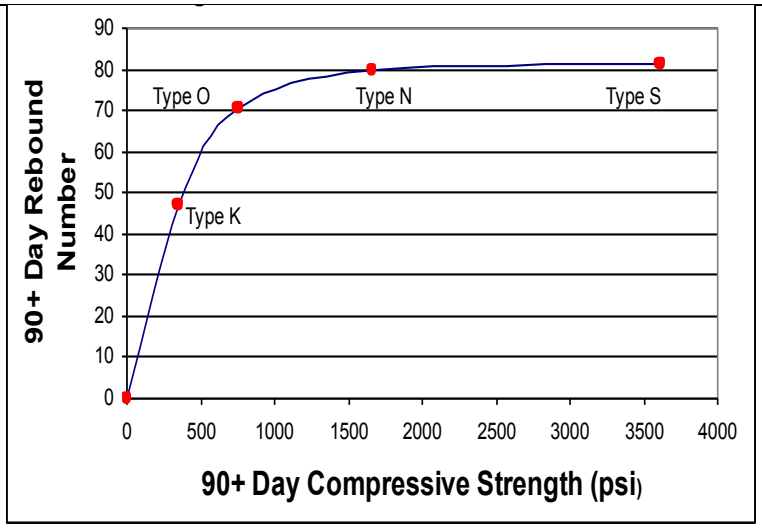

Figure 1. Graph of mortar compressive strength versus rebound number with Schmidt Type PM pendulum hammer.

Table 1. Results from mortar hardness testing with Schmidt Hammer, Type PM.

Location	Average Rebound No. (no dimension)
North Chimney Exterior – West Face – appropriate hardness	38
North Chimney Exterior – North Face – inappropriate hardness	46
North Chimney Exterior – North Face – appropriate hardness	34
North Chimney Exterior – East Face – appropriate hardness	31
South Chimney Exterior – West Face – inappropriate hardness	53
South Chimney Exterior – South Face – obvious gray Portland mix	84
South Chimney Exterior – South Face – inappropriate hardness	66
South Chimney Exterior – East Face – appropriate hardness	33

Mortar Analysis

Four mortar samples and one interior plaster sample were removed by Atkinson-Noland & Associates (ANA) from the Kitchen-laundry outbuilding at Appomattox Manor in Hopewell, VA and tested in the

Atkinson-Noland & Associates (ANA) laboratory for composition. In addition, one mortar sample was removed from brick believed to have been used for the foundation of the Old Smokehouse at the Manor and tested. The objective was to identify binder/aggregate ratio, aggregate color, and aggregate size gradation to provide an appropriate compatible replacement mortar formulation.

Aggregate Sieve Analysis

The mortar evaluation followed the requirements of ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. This method is based on the use of acid digestion of the binder and sieve analysis of the aggregate. The analysis process used does not distinguish between cement and lime-based binders. The sample identification list is shown in Table 2.

Table 2. Sample identification and location

Sample ID	Location
S-1	S. Chimney Laundry Interior
S-2	S. Chimney Laundry Exterior
S-3	N. Chimney Kitchen Exterior
S-4	N. Chimney Kitchen Interior
S-5	Old Smokehouse
S-6	K-L 2ND N. North Wall Plaster

The results of acid digestion of the sample are shown in Table 3. The binder component was found to be approximately 34%-44%, and the aggregate component was found to be approximately 56%-66%.

Table 3. Typical aggregate gradation of Kitchen-Laundry mortar and plaster samples.

Sieve No.	Mass Passing (g)	% Finer
4	911.35	2010.9
8	759.51	1675.9
16	609.47	1344.8
30	467.71	1032.0
50	342.02	754.7
100	210.50	464.5
200	1.60	3.5
pan	0.00	0.0

The aggregate gradation curve, plotted in Figure 2, shows that the aggregate from S-1 to S-6 generally contained finer aggregate than that for modern mortar as specified by ASTM C144, Standard Specification for Aggregate for Masonry Mortars.

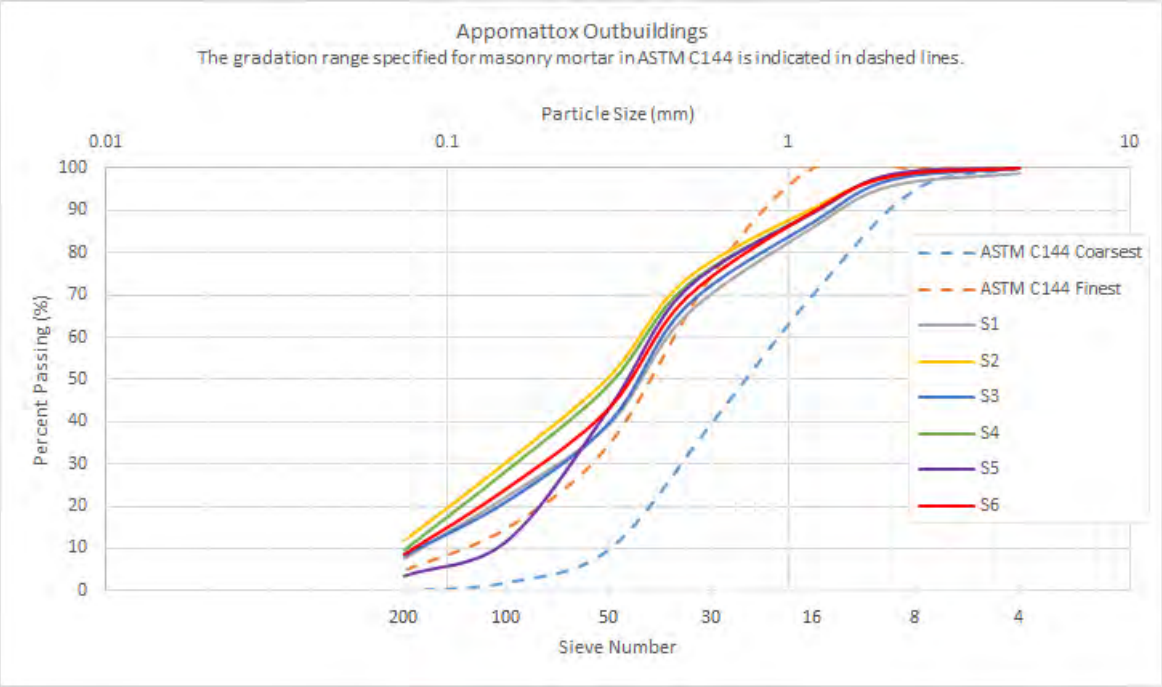

Figure 2. Aggregate distribution by sieve size for mortar sample.

The aggregate size distribution and colors are shown in Figure 3. Ideally, the aggregate for the replacement mortar should match the color and gradation of the existing aggregates. Trial mixtures may be required to produce a repair material that matches the original with respect to color and texture.

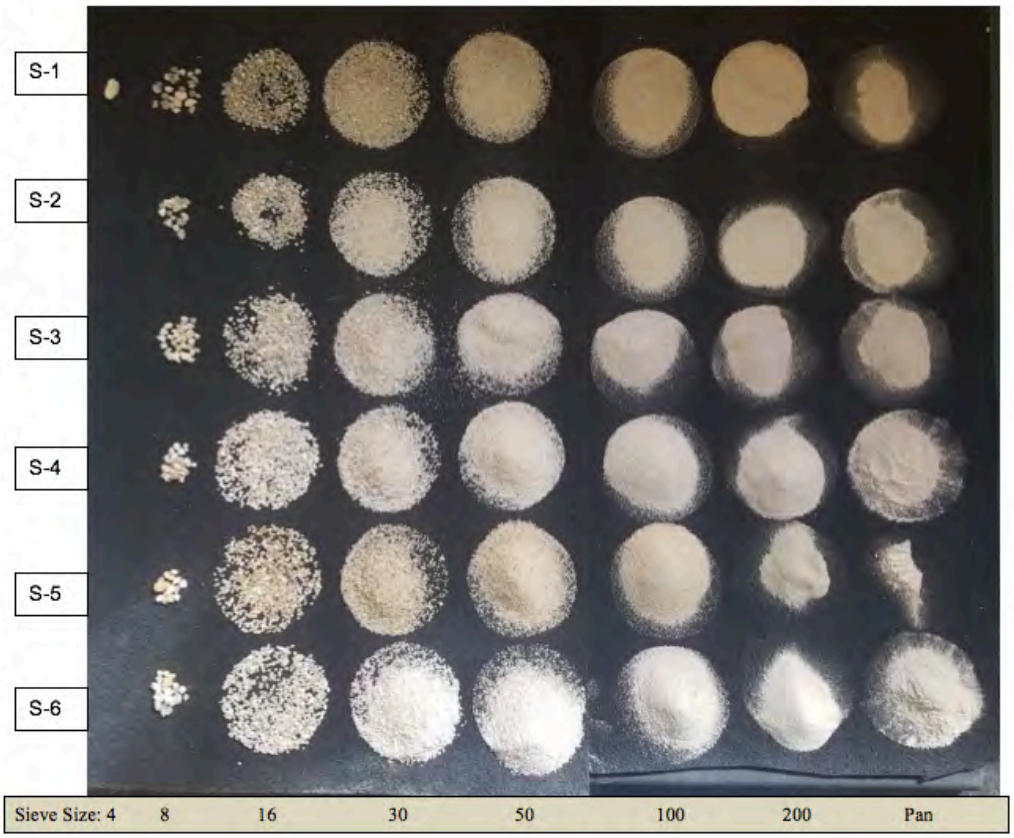

Figure 3. Aggregate distribution and color for mortar samples (S-1 through S-5) and plaster sample (S-6).

All mortar aggregates for the Kitchen-Laundry were similar in gradation indicating a common aggregate source. The gradation of the aggregate used in the Kitchen-Laundry plaster (2nd floor) was similar to the mortar aggregates. The aggregates for the Old Smokehouse are slightly coarser in gradation and the percentage passing on the smallest sieve size and pan are noticeably less (see figure 3 above). A typical gradation from the mortar samples is given in Table 4 below. An aggregate supplier could typically match this gradation.

Table 4. Results of acid digestion of mortar and plaster samples

Sample ID	Mass before acid digestion (g)	Mass after acid digestion (g)	Binder mass (g)	Aggregate mass (g)	Binder volume (cm^3)	Aggregate volume (cm^3)	Total volume (cm^3)	Binder (%)	Aggregate (%)
S1	60.59	43.68	16.91	43.68	26.39	34.09	60.48	44	56
S2	50.15	39.96	10.19	39.96	15.90	31.18	47.09	34	66
S3	61.78	45.36	16.42	45.36	25.63	35.40	61.02	42	58
S4	75.05	57.12	17.93	57.12	27.98	44.57	72.56	39	61
S5	62.75	45.90	16.85	45.90	26.30	35.82	62.12	42	58
S6	65.78	49.30	16.48	49.30	25.72	38.47	64.19	40	60

Recommended Mortar Formulation

Mortar used for repointing joints, crack repair, and rebuilding should be a sand lime mortar with a feebly hydraulic lime NHL2 or a lime putty and sand mortar. Aggregate fraction (by volume) should be 1-½ to 2 times the volume of the binder. These relatively soft repointing mortars should be compatible with both the stiffness and the vapor permeability of the surrounding masonry units, avoiding stress concentrations and moisture problems that could damage masonry units.)

The use of pigments may be required to match the hardened mortar color. Pigments conforming to ASTM C979, Standard Specification for Pigments for Integrally Colored Concrete, are suitable for mortar, but should not exceed 5% by weight of binder content in the mortar. Trial mixtures may be required to arrive at a mix that matches the original mortar with respect to color and texture.

Recommended Plaster Formulation

A trial mix for replication of plaster should be two parts aggregate to one part lime binder. Aggregate gradation for the plaster was nearly identical to the aggregates used for the Kitchen-Laundry mortar.

IR Report

Introduction

Infrared imaging can be of great assistance in making visible a number of elements and conditions that would otherwise be undetected. For this project, the IR images provided knowledge about:

1. the location and spacing of timber framing elements hidden in the walls as well as their relative size,
2. areas where the heat is transferring through the walls providing in part knowledge on fit of windows and doors,
3. areas where moisture is present, typically observed as saturated materials, and
4. voids in walls, displaying a different heat signature from the adjacent material.

The information from IR images assists in corroboration of information derived from other diagnostic techniques such as moisture detectors and radar. In allowing the evaluation personnel to detect small differences in surface temperatures using wave lengths beyond those of visible light, the buildings provide more diagnostic information to the field team than is otherwise available. This allows follow-ups to corroborate suspected issue areas. By example, the IR images indicate moisture penetration at the kitchen-laundry chimneys, the field visual observations indicated the likely path of moisture intrusion given the stepped portions of the brick chimneys having gaps with the flashing of the joint with the weatherboard siding. The suspected issue was thus confirmed.

Chimney Brick

Condition: There are three major causes of brick loss: thermal expansion and contraction cycles, freeze thaw cycles, and salts formation appearing as efflorescence at the surface and indicating sub-florescence below the surface. The overly hard mortar in conjunction with soft brick tends to break down the brick from the applied pressure of thermal cycles. The preference is for a mortar with enough softness to accommodate the small increments of size change due to heat and cold. Water can enter the masonry's brick and mortar and, if trapped, it will freeze. When it freezes, water expands in size thereby causing damage to brick and mortar. Soft mortars, typically lime based, allow for evaporation and release of water. Hard mortars, typically Portland cement based do not release the water as effectively and trap water. Efflorescence indicates the presence of salts, appearing on the surface of the masonry as white crystals. The crystals form at moisture percentages of between 3 and roughly 8. Higher than 8% keeps the salts in solution. The crystallization of salts within the masonry is the expansive force that can destroy the bricks and mortar. This below surface salts crystallization is called sub-florescence or cryptoflorescence.

The effect of these forces on the brick is in part determined by the quality of the brick. Low fired bricks often have incomplete vitrification of the clays, resulting in a weak matrix and greater porosity. The lower firing temperatures also result in the brick's face being harder than the body of the brick as it was exposed to higher temperatures for a longer time. When the three above described forces work individually, or in concert, the brick face can become separated from the body and be lost.

The causes of these forces can be mitigated by keeping water from concentrating in the masonry, and in using mortar with ultra low salt content and an appropriate softness. Keeping surface water away from the brick masonry reduces capillary action of the lower bricks in absorbing salt from the ground. Ground water is more difficult to redirect. Unfortunately, the number of bricks with face losses is typically lower than the number where the face is loose. During brick masonry repairs, it is important to test for face attachment by tapping with a small hammer to listen for a thump rather than the ring of a cohesive brick. As a rule, there are always many more bricks with partially detached faces than there are with fully detached faces.

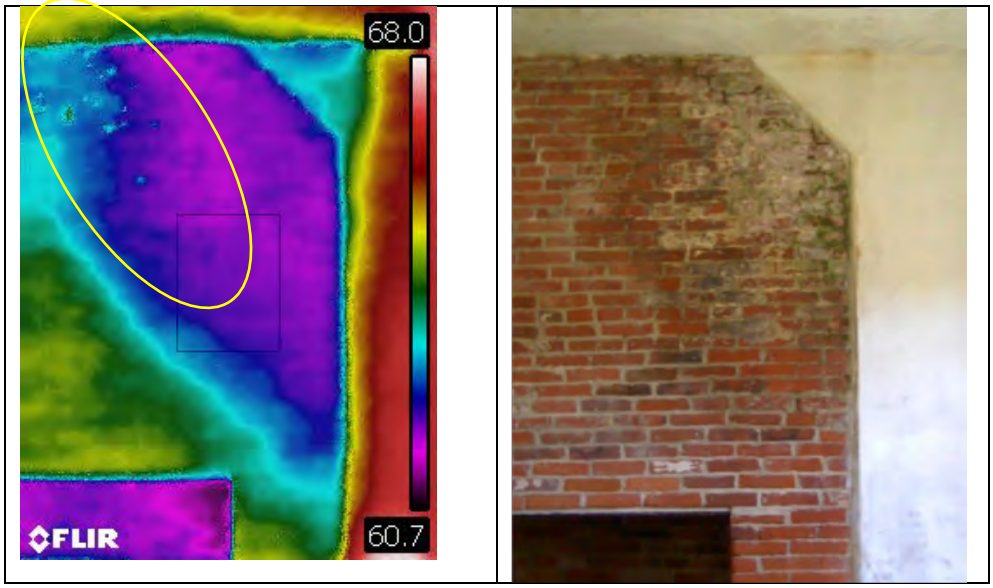

Figure 1. Image of the east portion of the fireplace in the Kitchen – infrared (IR) image at left, visible light at right. Cooler area (circled) in IR image indicates moisture in masonry. Color scale at right of IR image is the surface temperature in degrees Fahrenheit between the two bounding temperatures. Efflorescence on surface of masonry indicates frequent wetting that brings soluble salts to the interior surface.

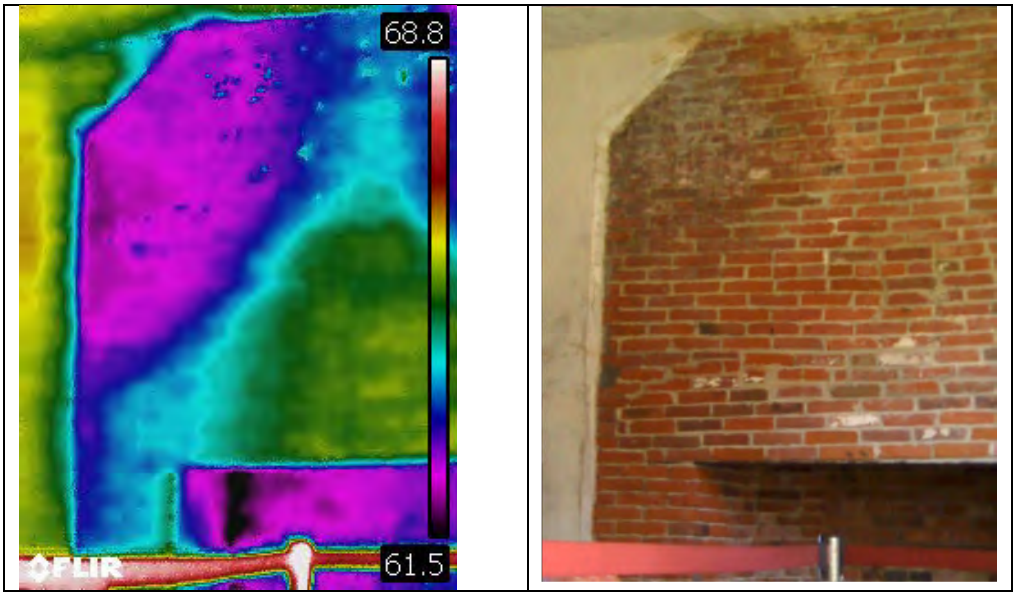

Figure 2. Image of the west portion of the fireplace in the Kitchen. Similar conditions as previous. Moisture ingress occurs at the stepped portion of the chimney as it interfaces with the weatherboards on the exterior.

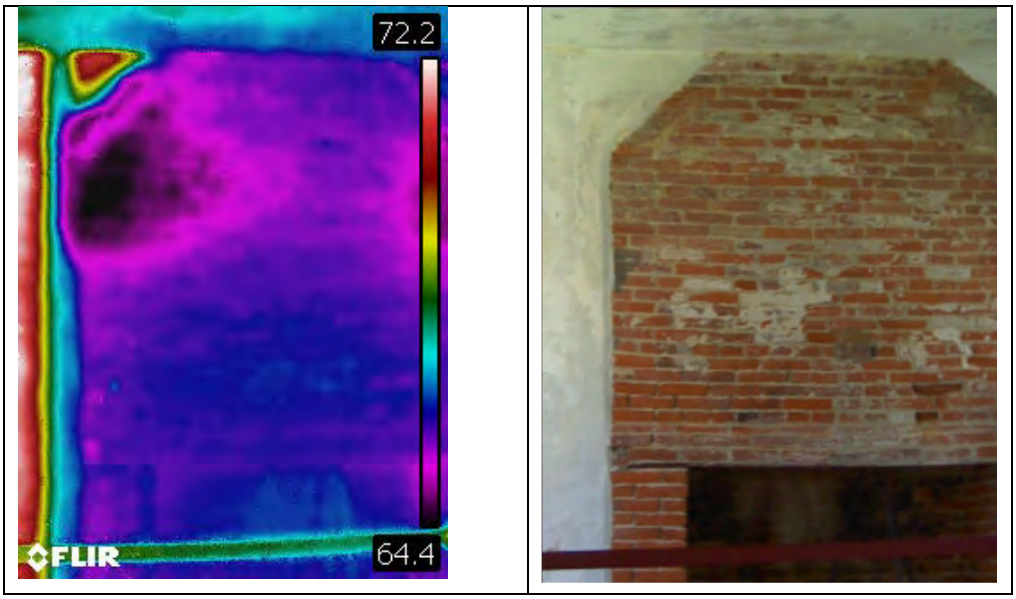

Figure 3. Infrared and visible light images from the fireplace in the Laundry. Moisture intrusion at chimney shoulder on south chimney is visible as cooler black and purple colors in IR image.

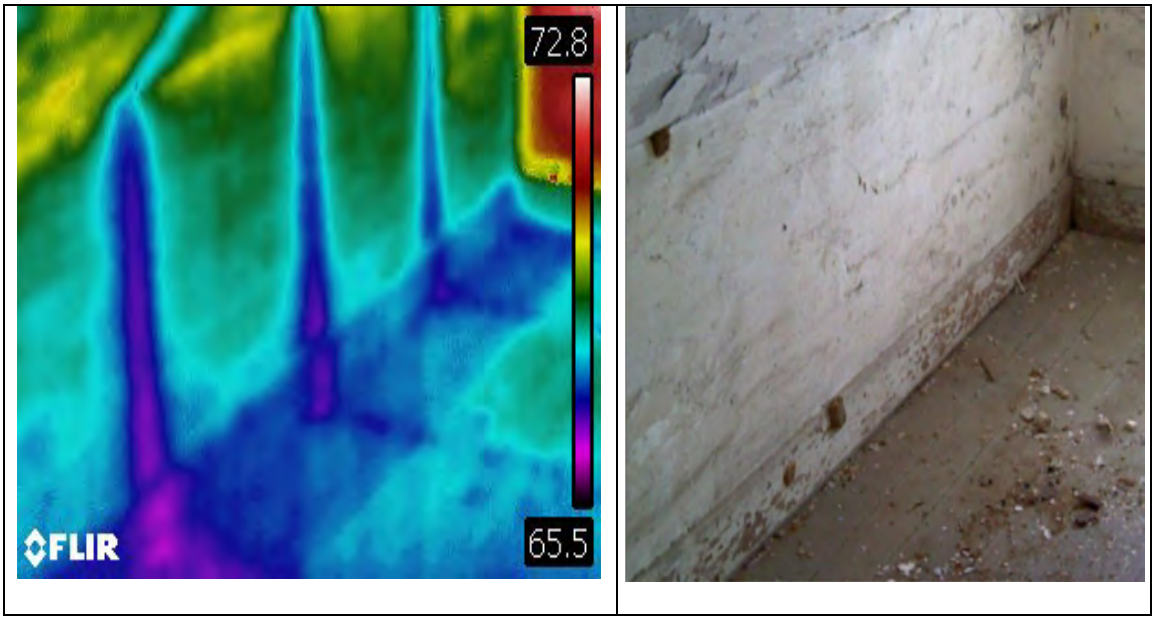

Figure 4. Images from southeast corner of half story south room. Studs and floor joists show cooler in IR image and indicate alignment of the knee wall studs and floor joists.

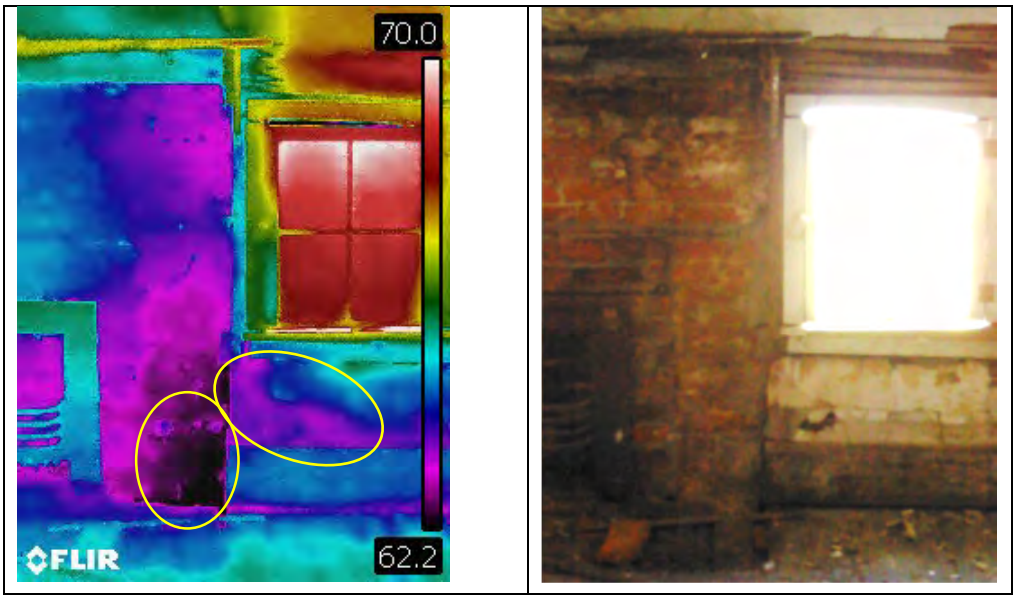

Figure 5. Infrared and visible light images of the fireplace in the north half story room. The lower right side of the clay masonry fireplace is cooler than the surrounding masonry due to the presence of moisture in the masonry. The plaster visible above the baseboard is also cooler due to the presence of moisture – either wicked from the damp masonry or due to leakage from the window.

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PAINT ANALYSIS REPORT

for

APPOMATTOX MANOR'S OUTBUILDINGS

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December 21, 2016

Appomattox Manor's Outbuildings

Paint Analysis

Introduction:

The process of paint analysis is in four stages:

1. PRE-FIELD: Given the specifics of the building, project objectives, and budget constraints a sampling plan is formulated. There may be an emphasis on determining the sequence of construction, the determination of relative ages of an addition to the main structure, and/or the originality of various elements such as windows. One difficulty in setting a budget is a lack of detailed familiarity with the structure prior to the field visit and historic research completion to set a budget sufficient for allowing comprehensive sampling. Another difficulty is that during historic research, questions may have arisen for which the answer may be provided by paint sampling or the research may indicate a documented comprehensive change such as all windows were replaced.

2. FIELD SAMPLING: Paint sampling in the field begins with the review of the potential locations conceived in the sampling plan and adjustments to the plan to deal with actual situation. Such adjustments will typically include the results of the first rounds of research and associated questions for which the paint analysis may provide answers. Specific locations are chosen for the subject element from areas with the least amount of ultraviolet deterioration and the most apparent paint layers. The samples are taken by a knife plunged into the surface at an angle to a depth that will allow the removed sample to include substrate and hopefully provide a beveled edge for the sample. The paint sample is placed into an envelope, each of which is sequentially numbered. The element and paint sample location are referenced on the envelope or on a sketch for complex elements with multiple sample locations, and further noted as to location on the drawings of the buildings; floor plans and/or elevations. Often, there is a question in the field of the integrity of a sample—a detached substrate is a common concern—and other samples from the same location are taken and put in the same envelope.

3. LABORATORY ANALYSIS: In the laboratory the sample is evaluated using a microscope. The sample is viewed flat, with substrate side up, and on edge. Each of the first three or more layers is matched to the "Munsell System of Color Notation," a widely recognized international system of color notation with specific intervals around the color wheel for hue, chroma, and value. There are specific additional tables for neutral colors: whites, grays, and blacks. The light source for viewing is natural daylight from the north, per ASTM D 1729 Standard Practice for Visual Evaluation of Color Differences of Opaque Materials. The color matching to the Munsell System is per the procedures set forth in ASTM D 1535-68 (Reapproved 1974) Specifying Color by the Munsell System. The results for each sample are recorded on individual forms on which each of the layers is identified (per the contracted amount, such as the earliest three) and the total number of layers is estimated. For projects in which the historic color scheme is the key objective, color matching the first three layers is typical. Other research objectives may require color matching for additional layers. A common language name may be used to identify a color, such as "Gray Avocado" along with the Munsell color notation of 10GY8/2. This common name designation serves two purposes: the reader gains a sense of the color, and it becomes easier to read the common names than to pick through the Munsell notations to see patterns. Our office has created many common names to ease understanding of the color's appearance.

4. REPORT: As part of the contract, we summarize the results and address the project objectives. Examples of response to project objectives are: all windows but one had the same number of layers (7), window #9 had two layers; the first three layers indicate the following earliest color scheme; or the earliest of the five layers of the addition was Gray Avocado, and this was layer four of the eight layers of the main structure.

The report should also note if any sample was a "mongrel," a sample with very different number of layers and colors than its "neighbors": (adjacent) or cousins (same element different location). A mongrel does not seem likely to have been a replacement element; for example, a sample in a sequence of wall samples with many more layers. By example, there are various explanations for such a mongrel: mislabeled sample, all of the rest of the wall was re-stuccoed (painted), the rest of the wall was stripped of paint, or this area was the spot where different colors were tried out for owner approval. Wall colors in interior spaces may be changed regularly so the definition of mongrel may change for the interior. Frequent changes on exteriors may occur at a commercial storefront with tenant turnover. In essence, these are judgment calls.

Paint Sampling on the Appomattox Manor's Complex of Outbuildings

The dominant criterion was to find locations for sampling where the original paint was most likely to be located. As the buildings were reported as having undergone lead paint abatement with removal of all paint, the quest for areas with original paint led to areas: generally inaccessible, such as under the door threshold; of declivities where a scraper would have difficulty in reaching, such as in the groove of the bead of the bottom edge of weatherboards; and where paint thickness indicated the likelihood of multiple layers, particularly in areas on the oldest appearing (pronounced grain due to loss of soft summer wood) wood pieces. In addition, where windows and doors were believed to be original, these features were sampled. Where interior elements were fairly obviously coated with white lime wash, sampling was limited. The approach was to take just two samples to confirm that the white coating that appeared to be lime wash was not paint. Likewise, elements such as weatherboards either known to be new by research findings or which appeared new were not sampled. Given the contract's limited number of paint samples, choices were made to have each sample tell us something about the building's history by the results.

Additional paint sampling is recommended to be completed on the elements with higher numbers of layers, indicative of older pieces. These recommended areas are: corner boards, casing, and other moldings and dimension pieces associated with the eaves.

Focused effort was made to find small specs of paint buried in the grain of the wood, given the past efforts to remove all surface paint. While tedious, the effort was in many cases successful. These specs were of quite dark brown color, almost black, and embedded within the coating were very uniformly sized sand particles of nearly clear quartzite. The coating could not be identified as an oil-based paint, its appearance in section did not have the appearance of wax, associated with oil-based paints; rather, it had a crumbly appearance. The latter may have been due to considerable weathering, or have been in its near original composition. It is possible the material was pine tar mixed with sifted sand, and such

speculation about composition may be one of many to be put forward. If a large enough area of the material in question can be found, XRF analysis may well provide the definitive answer.

Focusing on the number of layers found during the analysis provides a sense of age of a sampled area or element. Typically, the more layers the older is the sample, unless the piece has been stripped of its paint. As at these outbuildings where paint stripping is known to have occurred, extended analysis focuses on specks of paint between the grain fibers of the substrate wood. Obviously this is a hit or miss proposition. The extended paint analysis did find small specks of dark brown paint as noted on those sample sheets where the specks were found.

In the analysis one is also searching to find the paint schemes found on the buildings at different times in their history. The predominant color was white, in some cases with a bit of a cream tint. Light, medium, and dark grays were also found. Some orange browns were seen and the brightest color was an orange red. The surface of the color was quite a bit darker than the body as seen in the paint cross section. This orange red's surface color was more of a rust red; closer to a red brown. Clear conclusions can be drawn about colors when all the samples for a single building have the same sequence of colors from the earliest to the top layer. This was not the case for this paint analysis. The more ornamental the color scheme the more likely there will be highlight colors on windows, doors, and moldings. The expectations prior to analysis was that each building would be of one color for all elements, and the four buildings would have been of one similar color. These were not ornamental buildings, however, the appearance of functional buildings such as these was of particular importance in the look of plantations in the Tidewater region beginning in the period after the Revolutionary War.

This analysis was based on a modest number of samples, 40 in total (36 per the contract). However, as an estimate this total may have been a good budget as of the four buildings only two have coated interior surfaces, the Dairy and the Kitchen-Laundry, and ornamental paint schemes were not expected. A 2012 site visit noted the lack of interior painted surfaces. While the preferred standard is to take three samples for each element, the application of this standard to the Kitchen-Laundry building alone would have required over 100 samples to be taken. Where additional sampling is believed to likely yield additional information, such is recommended in the Future Research Section.

Not all of the coatings were found to be paint. The classic interior coating for dairies is whitewash, principally composed of lime and fine sand. Such was the case for the Appomattox Manor Dairy as well. Whitewash is an historic selection for its near sterile qualities favorable for dairies and kitchens. The Appomattox Manor Kitchen-Laundry interior finishes of both the first floor and second floor were also principally whitewash. While whitewash has the disadvantage that it does not last long (it is recommended to be renewed every two years), it has the advantage of being an inexpensive material and historically labor at Appomattox Manor was "plentiful." Whitewash is fairly friable and will wear off with minimal contact so those surfaces touched often were painted: doors, windows, shelves, and cupboards.

The paint analysis found a dark brown first layer, which did not have the wax like consistency of oil-based paint. The layer was in small "chunks" loosely together. In addition to its distinctive very dark brown color, the layer displayed embedded fine sand particles, of a consistent size, mostly quartzite and

translucent. The material of this layer has not as yet been defined but may be a pine tar and linseed oil mix, well respected for centuries as an effective natural preservative, and locally available.

Understanding the meaning of the colors found in a paint sample can be difficult. Sometimes the color used was in fashion. Sometimes the color was simply what was available. Sometimes the color was one left over from another paint campaign such as for the Manor house. Paint analysis may yield a color history consistent with the expectations of the time period. Colors beyond the basic barn red or houses painted white—both the least expensive paint colors—indicated some degree of above average wealth. Victorian period houses had more colors because more colors were available from manufacturers. Earlier paint colors were limited in numbers of colors and some were simply created from what was at hand: linseed oil as a base, or milk, or lime, or pine tar, or all of them together and colored by red oxide, lamp black, or local colored clays. The components of a paint can be examined, such as by XRF, in cases where more information is needed than just the determination of colors by paint analysis.

There is still another complication present in paint analysis. Colors can change over time. Yellows can fade due to ultra violet exposure. Red colors with iron oxide base can darken. Whites can yellow somewhat due to the linseed oil base. Linseed oil bases will darken with time. This can present a preservation philosophical conundrum. The first alternative is to use the color as seen right after application. Alternatively, interpreting an historic color scheme may require a selection of time period, such as the Period of Significance, at which point the colors may differ in appearance from when they were originally applied. Analysis of the paint sample under the microscope has as a protocol the two observation positions for the sample: on edge and flat. The cut edge will provide the ability to match to the original color. In some cases, the color shift between layers may be marked by a darker line. By example, the dark red color in many of the samples had a darker red brown line indicating the surface of the dark red color had darkened to a deep red brown. In the flat position, this layer may or may not be exposed for that layer. It is desirable to cut a beveled edge into the sample to gain the benefit of both views. Of course, for some samples the paint layer is so weathered as to have lost its cohesiveness and any attempt to cut a bevel is unsuccessful. On the four buildings, many of the early whites had yellowed, the early yellows had a faded top surface, and the top surface of the red browns had changed to a dark red brown.

Future Research

The potential of finding more colors for specific building elements varies by element. In most cases, additional samples will assist in confirming results for the element.

- Weatherboards for each building, up under the eaves, three more per building.
- All moldings, additional to the total three per structure: casing, corner boards, and eave elements.
- Window sash, additional to total three per type.
- Historic doors, additional to total three per type.

Paint Analysis Summary

Dairy

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: northwest corner column: white	1	White Wash	White Wash	—	2
Interior: northeast diagonal, north wall: white	2	White Wash	White Wash	—	2
Interior: east diagonal: red	3	5YR2.5/2	10GY3/1	10R4/10	3
Exterior: east elevation lap siding bottom edge of third from bottom: cream	4	N9.5/90.0%R	10YR9/2 putty yellow	10YR10/2 creamy white	3
Exterior: bottom of threshold of south door: cream	5	*	N9.5/90.0%R white **	N8/59.1%R	10YR10/2 creamy white 5
Exterior: north lap siding under edge, 9th up: cream	6	White	10YR9/2 Putty Yellow	10YR9/2	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

**Spots of N8/59.1%R only

New Smokehouse

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Southeast corner board (rotted) flat	7	N8/59.1%R gray	N9.5/90.0%R white	10YR9/2	1
Southeast corner board bead	8	N1.75/2.5%R black vestiges	White	—	2
Older looking board of lap siding, 8th from the bottom, face	9	N8/59.1%R gray	10YR9/2	N9.5/90%R white	3
Door jamb casing	10	N8/59.1%R gray (thin)	10YR9/2 Creamy Yellow / N8/59.1%R gray / 10YR9/2 Creamy Yellow		4
Underside of threshold	11	*	White	White	3
Top casing of door, architrave	12	*	White	White	3
Lower molding, south elevation	13	White / Cream / White	Putty gray / White	White / Light cream white	7
Upper molding, south elevation at underside of roof	14	White	Red	White	3
Upper molding, south elevation at underside of roof	15	White	Spots of cream	White	3
Soffit	16	White	Red (thin)	White	3

*Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

Old Smokehouse

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
Interior: South crossbeam	17	White Wash (lots of wood fiber)			1
Interior: north crossbeam	18	Creamy white	Creamy white	—	2
Exterior: trim at top of wall	19	White	White	White	3
Exterior: soffit	20	White	Silver gray white	White	Cream	Light cream white	5
Exterior: fascia	21	7 layers of white	Red (thin)	White	9
Exterior: north elevation siding, high up at gable peak	22 White	N978.7 %R gray	Cream	Gray	3 layers of White	Red (thin)	White	9

Kitchen-Laundry Exterior Windows

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
West: north	23	White	Gray	White	White	4*
West: south	24	10R3/1 Dark brown (very small area)	2.5Y8.5/4 creamy yellow	White	White	4
East: north	25	White	White	—	2
East: south	26	White	—	—	1
East: south window sill	27	White	White	Creamy white	3
East: south window sill	28	White	White	Very light cream white	3

Kitchen-Laundry Exterior Siding and Moldings

Wall siding in groove, east	29	White	White	Very light cream white	3
Wall siding in groove, east	30	White (extremely weathered)	White	White	3
Wall: northeast corner molding (looks like green early)	31	White (extremely weathered)	White	White	3

*Incomplete layers, may have a first coat of shellac primer; spotty

Kitchen-Laundry Exterior Doors

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East, north door	32	White	White	—	2
East, north door	33	10R4/6 medium red brown	N5/ 19.8 %R med. gray	N7/ 43.1 %R gray	Creamy white	White	Creamy white	White	7

Kitchen-Laundry Interior

Location	Sample ID #	1st Layer	2nd Layer	3rd Layer	Total # of Layers
East elevation, 1st story north door: brown	34	10R4/6 medium red brown	N5/19.8%R medium gray	10R3/1 dark red brown	White	4
North room, 1st story, south wall wainscot	35	10R4/6 to black	—	—	1
North room, 1st story, east wall wainscot	36	Creamy white	White	Butter-scotch white	2.5Y8.5/4 creamy yellow	Med. Brown	Dk. Brown	6
First floor, south room, window casing, east window	37	White	White	—	2
2nd floor, south room, door, south face	38	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd floor, north room, west elevation baseboard	39	Traces of light gray	10R4/10 red brown	10R3/1	3 layers of white	6
2nd floor, north room, west elevation baseboard	40	10R4/6 thin	—	—	1

Creams	Dark Browns
10YR9/2: Cream	5YR3/2
10YR8/2: Putty yellow	5YR2/2
10YR7/4: Butterscotch	10R3/1
	10GY3/1

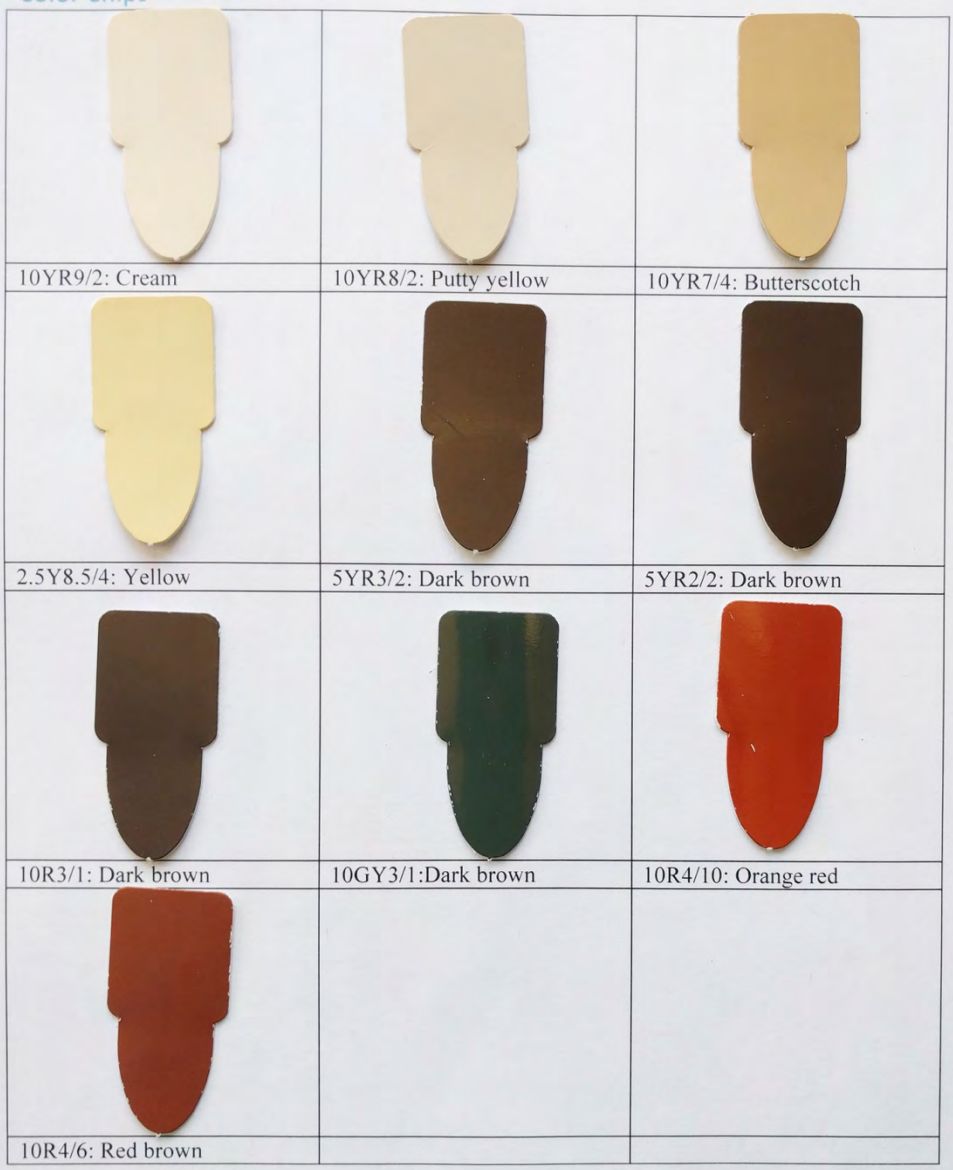
Yellow	Orange Browns
2.5Y8.5/4: Yellow	10R4/10: Orange red
	10R4/6: Red brown

Grays	Whites
N8/59.1%R: Light gray	N9.5/90.0%R: Ultra white
N5/19.8%R: Medium gray	N9/78.7%R: Silver gray white

Black	
N1.75/2.5%R	

Color Chips*

Color Chips*

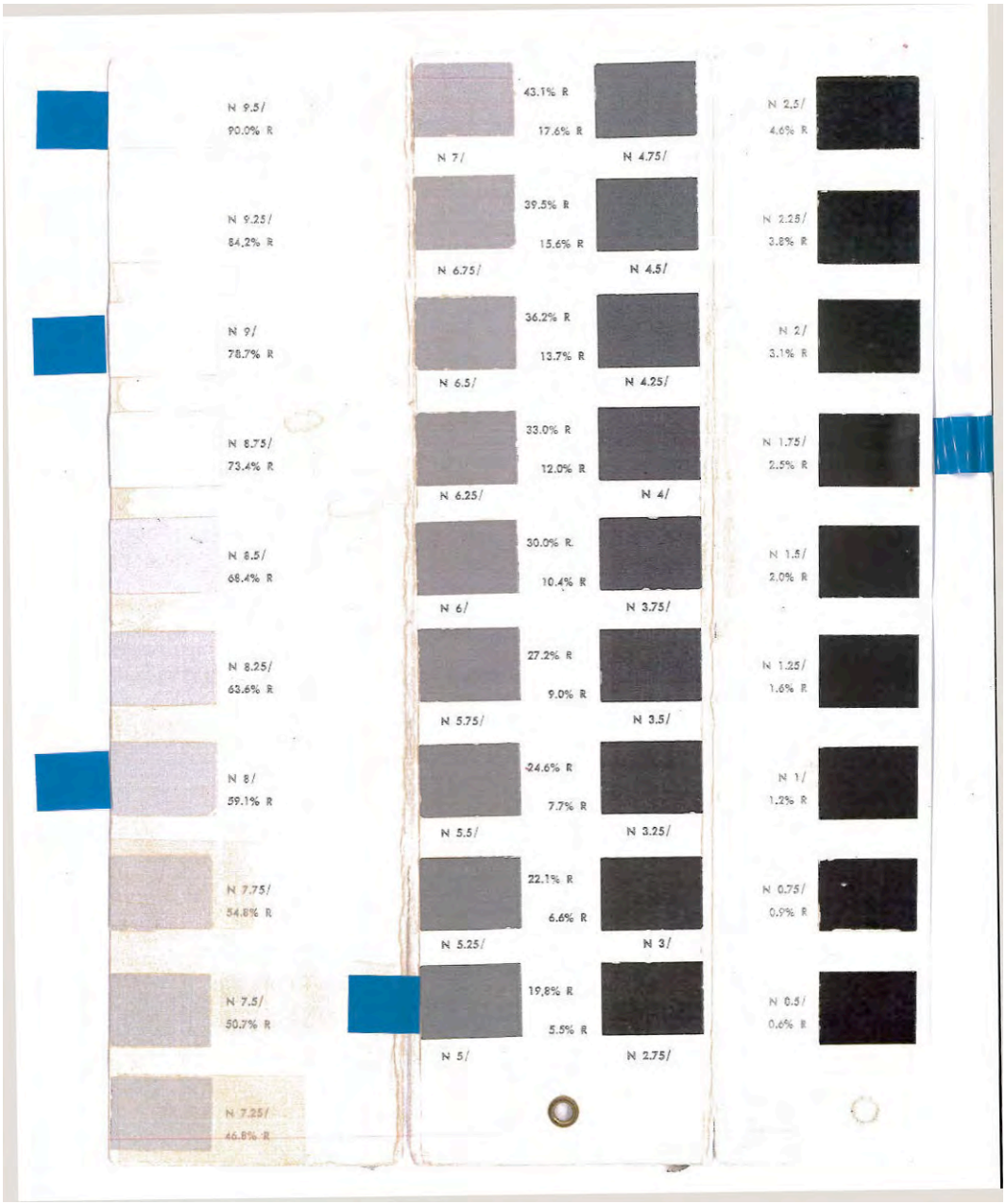


10YR9/2: Cream	10YR8/2: Putty yellow	10YR7/4: Butterscotch
2.5Y8.5/4: Yellow	5YR3/2: Dark brown	5YR2/2: Dark brown
10R3/1: Dark brown	10GY3/1:Dark brown	10R4/10: Orange red
10R4/6: Red brown		

*NOTE: The colors represented here do not necessarily match what you would see when viewing the actual Munsell Color Notation System chips due to the inherent variations of electronic scanning and printing discrepancies.

The figure below is a reproduction of a page (showing the whites, grays, and blacks) from the book of the Munsell System of Color Notation. The blue tabs show the five colors that are relevant to the Appomattox Manor's Outbuildings and are the following:

- N9.5/90.0%R: Ultra white
- N9/78.7%R: Silver gray white
- N8/59.1%F: Light gray
- N%/19.8%R: Medium gray
- N1.75/2.5%R



*NOTE: The colors represented here do not necessarily match what you would see when viewing the actual Munsell Color Notation System chips due to the inherent variations of electronic scanning and printing discrepancies.

Key Maps

Individual Sample Sheets

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 1	**Location of sample:** Interior: northwest corner column
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White Wash
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*	White Wash		
	White Wash		

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 2	**Location of sample:** Interior: northeast diagonal, north wall
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White Wash
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*	White Wash		
	White Wash		

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 3	**Location of sample:** Interior: east diagonal
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Orange Red
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		5YR2.5/2	
		10GY3/1	
		10R4/10 orange red	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 4	**Location of sample:** Exterior: east elevation lap siding bottom edge of third from bottom
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** creamy white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		N9.5/90.0%R	
		10YR9/2 putty yellow	
		10YR10/2 creamy white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 5	**Location of sample:** Exterior: bottom of threshold of south door
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** creamy white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		**	
		N9.5/90.0%R white	
		***	
		N8/59.1%R	
		10YR10/2 creamy white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

**Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

***Spots of N8/59.1%R only

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Dairy
Sample #: 6	**Location of sample:** Exterior: north lap siding under edge, 9th up
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** cream
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		10YR9/2 Putty Yellow	
		10YR9/2 cream	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 7	**Location of sample:** Southeast corner board (rotted) flat
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** cream
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		N8/59.1%R gray	
		N9.5/90.0%R white	
		10YR9/2 cream	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 8	**Location of sample:** Southeast corner board bead
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		N1.75/2.5%R black vestiges	
		white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 9	**Location of sample:** Older looking board of lap siding, 8th from the bottom, face
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		N8/59.1%R gray	
		10YR9/2	
		N9.5/90%R white	
Further Observations, Documentation or Sketches: *** = Original Paint Layer**			

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 10	**Location of sample:** Door jamb casing
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** cream
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		N8/59.1%R gray	thin
		10YR9/2 Cream	
		N8/59.1%R gray	
		10YR9/2 cream	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 11	**Location of sample:** Underside of threshold
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		**	
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

**Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 12	**Location of sample:** Top casing of door, architrave
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		**	
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

**Extremely weathered, may not be paint, lots of embedded clear quartzite sand, very dark brown

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 13	**Location of sample:** Lower molding, south elevation
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Light cream white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		Cream	
		White	
		Putty gray	
		White	
		White	
		Light cream white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 14	**Location of sample:** Upper molding, south elevation at underside of roof
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		Red	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 15	**Location of sample:** Upper molding, south elevation at underside of roof
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		Spots of cream	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** New Smokehouse
Sample #: 16	**Location of sample:** Soffit
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		Red	Thin
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 17	**Location of sample:** Interior: South crossbeam
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white wash
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White Wash	lots of wood fiber

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 18	**Location of sample:** Interior: north crossbeam
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Creamy white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		Creamy white	
		Creamy white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 19	**Location of sample:** Exterior: trim at top of wall
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		white	
		white	
		white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 20	**Location of sample:** Exterior: soffit
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** light cream white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		Silver gray white	
		White	
		Cream	
		light cream white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 21	**Location of sample:** Exterior: fascia
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		White	
		White	
		White	
		White	
		White	
		White	
		Red	Thin
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Old Smokehouse
Sample #: 22	**Location of sample:** Exterior: north elevation siding, high up at gable peak
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		N978.7%R gray	
		Cream	
		Gray	
		White	
		White	
		White	
		Red	thin
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 23	**Location of sample:** Exterior windows: west, north
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White**	
		Gray**	
		White**	
		White**	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

**Incomplete layer, may have a first coat of shellac primer; spotty

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 24	**Location of sample:** Exterior windows: west, south
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		10R3/1 Dark brown	very small area
		2.5Y8.5/4 yellow	
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 25	**Location of sample:** Exterior windows: east, north
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 26	**Location of sample:** Exterior Windows: east, south
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 27	**Location of sample:** Exterior Windows: east, south window sill
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** creamy white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		White	
		Creamy white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 28	**Location of sample:** Exterior Window: south window sill
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Very light cream white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		White	
		Very light cream white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 29	**Location of sample:** Exterior window: wall siding in groove, east
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Very light cream white
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		White	
		Very light cream white	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 30	**Location of sample:** Exterior window: wall siding in groove, east
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** white
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	extremely weathered
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 31	**Location of sample:** Exterior window: Wall: northeast corner molding (looks like green early)
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	extremely weathered
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 32	**Location of sample:** Exterior door: East, north door
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 33	**Location of sample:** Exterior Door: East, north door
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		10R4/6 medium red brown	
		N5/19.8%R med. gray	
		N7/43.1%R gray	
		Creamy white	
		White	
		Creamy white	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 34	**Location of sample:** Interior: East elevation, 1st story north door: brown
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		10R4/6 medium red brown	
		N5/19.8%R medium gray	
		10R3/1 dark red brown	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 35	**Location of sample:** Interior: North room, 1st story, south wall wainscot
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** 10R4/6 to black
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		10R4/6 to black	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 36	**Location of sample:** Interior: North room, 1st story, east wall wainscot
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** Dk. Brown
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		Creamy white	
		White	
		Butter-scotch white	
		2.5Y8.5/4 creamy yellow	
		Med. Brown	
		Dk. Brown	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 37	**Location of sample:** Extras: First floor, south room window casing, east window
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 38	**Location of sample:** Extra: 2nd floor, south room, door, south face
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		Traces of light gray	
		10R4/10 red brown	
		10R3/1	
		White	
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 39	**Location of sample:** Extra: 2nd floor, north room, west elevation baseboard
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** White
Data:	

Approx Historic Date	Layer Description (color, varnish, dirt, etc.)	Munsell #	Characteristics
*		Traces of light gray	
		10R4/10 red brown	
		10R3/1	
		White	
		White	
		White	

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

Identification: APPOMATTOX MANOR'S FOUR OUTBUILDINGS	
Project: HSR	
Location: Pecan Avenue, Hopewell VA	**Structure:** Kitchen-Laundry
Sample #: 40	**Location of sample:** Extra: 2nd floor, north room, west elevation baseboard
Date Taken: 10/13/16	
By: JDF	
Date Examined: 12/13/16-12/19/16	**Substrate:** Wood
By: JDF	**Top Color:** red brown
Data:	

Approx Historic Date	**Layer Description (color, varnish, dirt, etc.)**	**Munsell #**	**Characteristics**
*		10R4/6 red brown	thin

Further Observations, Documentation or Sketches: *** = Original Paint Layer**

October 29, 2016

Dave Woodham
Atkinson-Noland & Associates
2619 Spruce St.
Boulder, CO 80302

RE: Wood species identification of samples from the outbuildings of Appomattox Manor in Hopewell, VA.

Mr. Woodham:

Two wood samples from outbuildings of Appomattox Manor in Hopewell, Virginia, were examined for species identification. Identifying wood species makes it possible to identify compatible material for repairs and can aid in historic interpretation of construction or repair campaigns.

The samples were assessed for macroscopic characteristics that aid in species identification. Thin sections of each sample were also examined at 100x to 1000x magnification with a light microscope to identify cellular features that allow for species differentiation. The samples were identified as follows:

Sample 1 - Old Smokehouse siding: southern yellow pine (*Pinus s*pp.).

Sample 2 - Dairy siding: southern yellow pine (*Pinus s*pp.).

Southern yellow pine is a species group of eleven southern yellow pine species that cannot be distinguished from one another solely on cellular characteristics. Of those eleven, four species - loblolly (*Pinus taeda*), shortleaf (*Pinus echinata*), longleaf (*Pinus palustris)*, and slash pine (*Pinus elliottii*) - represent over 90 percent of the standing timber along the east coast of the U.S. It is therefore likely that the samples from the Appomattox Manor outbuildings can be narrowed down to one of those four species. Southern yellow pines have a natural range that extends from Florida to southern Maine. It was used historically and is still used today for structural and architectural applications.

If you have any questions regarding the species identification, or if I can be of any further assistance, please do not hesitate to contact me.

Best regards,

Kimberly Dugan
Wood Specialist
(720) 518-6057
kdugan.preservation@gmail.com

5. Richard Eppes Diary Entries 1851-1860: Outbuildings References

Appendix 5:
Richard Eppes Diary Entries 1851-1860: Outbuildings References

October 18 1851

Madison cleaned out and whitewashed the dairy...[1]

Friday October 31st 1851

Brought over Dilsy to take care of the children & keep them out of the kitchen.[2]

Wednesday Dec: 21st 1853

Sent Madison to Petersburg to change shoes, staid all day & took keys with him, compelled to break open dairy.[3]

Tuesday January 2nd 1854

Madison & Steward occupied hanging up meat today, finished hanging up hams to be smoked.[4]

Thursday Jan 5th 1854

Day misty & rainy. had fires made in smoke house today to commence smoking the meat, hickory wood used.[5]

Wednesday Dec: 31st 1856

The close of the year 1856. Since Christmas we have had nothing to break the monotony of these festive times but a marriage & marriage party between two of the Bermuda negroes John Bird & Patience Anderson married by me in this Dining room Sunday Dec: 28th according to the service of the P. E. Church. in presence of Mrs E & Emma nurse white & the house servants. the party came off the following night Monday in the kitchen given by Harriet & Emma. [snip][6]

Monday April 26th 1858

Madison overhauled and removed meat from old to new smoke preparatory to putting in fish Reported 86 pieces of plantation meat.[7]

Tuesday April 27th 1858

Had fish brought up from fish house & put in old smoke house this morning.[8]

Tuesday Dec: 28th 1858 Therm: 7 ½ O.C.P.M. 40 [degree]

George our dining room servant was married tonight to a girl belonging to Mrs Wood by name of Anna Mrs Eppes gives them an entertainment in our kitchen[9]

Thursday Dec: 15th 1859

Wind N Therm: 8 O.C.P.M. 35
Fifty hogs came from Bermuda farm & Thirty eight from Island=88
Weight of Hogs Bermuda Weight of Hogs Island

On the previous page will be found the number and weight of Hogs from Bermuda and Island plantations. Bermuda producing 50 hogs weight 7248 pounds an average of 145 lbs per hog within a small fraction. Island producing 38 hogs weight 4694 pounds an average of 123 2/3 per hog, making amount total of hogs killed on both estates 88 weighing 11942 ½ pounds
Amount of weight of hogs killed on both farms in 1857. Island 3441 ½ Bermuda 4890 ½ 8332 lbs
Amount of weight of hogs killed on both farms 1858 Island 4823
Bermuda 4811 ½ 9634 ½ lbs
Amount of weight of hogs killed on both farms 1859 Island 4694 ½
Bermuda 7248 11942 ½ lbs

Sent Mr Conway at Bermuda 560 lbs
Sent Mr Crawford at Island 508= 1068 pounds
Amount salted up today 10874 ½ pounds
Quality of meat that from Island very flabby & badly fattened
That from Bermuda as good as I could desire
Stewart & Robert cut out the hogs Madison had charge of the salting department. 9 hands in all occupied in salting the 80 hogs viz Madison, Stewart, Robert, Sandy, George, Charles, Booker, Jim & Sally Webb. commenced at 9 ½ O.C.A.M. & finished by night, owing to the rain last night kept the hogs in smoke house & kitchen & dairy & did not hang them out all night as usual, had hogs from Bermuda hung this morning, those from Island were not hung at all, the Island hogs did not stiffen Bermuda did, commence killing at Island at 9 O.C.P.M. last night, at Bermuda after 12 O.C.A.M. Island hogs came over by 4 O.C. Bermuda not until 8 & 0 O.C.P.M. all the meat was cold Used saltpetere on the shoulders & a little on the hams which are all sugar & molasses cured. Lost no meat last year, the pepper black rubbed on the hams prevented the fly & worms. [10]

Saturday January 14th 1860

Had a barrel of molasses put in old smokehouse today for Hopewell farms.[11]

Tuesday Dec: 18th 1860

Wind N E Therm: 7 O.C.P.M. 40

Received 18 hogs from Island number killed on this farm this year also 24 from Bermuda farm making 42 in all killed on both farms. This small number is to be attributed at Island to bad management and at Bermuda to hog cholera 40 being lost by that disease on this farm.

Weights Island

277	104	63	1251 ½	Sent 500 lbs to Crawford overseer at Island
211	100	61	615	
170	101	52	319	
143	94	143	2185 ½ lbs amount total 1860	
124	82			
120	64			
206 ½	70			
1251 ½	615	319		

Hogs from Bermuda farm came over too late to weigh, had them put in smoke house. Being very unwell today have not been able to superintend the salting leaving it to servants. Gave an order on Mr Wendenburg for two sacks of salt. Hands employed at Hopewell slabbing cow shelter.[12]

Wednesday Dec: 19th 1860

Wind N E Therm: 7 O.C.P.M. 38 Mist & thaw

Hogs having been brought over from Bermuda farm last night 24 in number I weighed them before breakfast

Weights of Hogs Bermuda

245	114	152	120 ½	1070 1/2
189	154	112	161	761 1/2
191	149	158	133 ½	839
138 ½	127	147	116 ½	826 ½
149	112 ½	126 ½	184 ½	3497 ½ pounds
158	105	143 ½	110 ½	
1070 ½	761 ½	839	826 ½	

Average weight at Island per hog 121 7/18 lbs
Average weight at Bermuda per hog 145 17/24 lbs

Total amount killed to day 5683 pounds
Amount allowed overseers 1054 "
Balance salted 4629 pounds[13]

[1] Mss1Ep734d289, Diary of Dr. Richard Eppes, 1851 September 29 - 1852 March 11, Virginia Historical Society, Richmond, Va. [hereafter cited as VHS].
[2] Ibid.
[3] Mss1Ep734d291, Diary of Dr. Richard Eppes, 1852 October 1 - 1854 March 11, VHS.
[4] Ibid.
[5] Ibid.
[6] Mss1Ep734d292, Diary of Dr. Richard Eppes, 1854 March 12; 1855 October 24-1857 December 31, VHS.
[7] Mss1Ep734d294, Diary of Dr. Richard Eppes, 1858 January 1 - November 19, VHS.
[8] Ibid.
[9] Mss1Ep734d295, Diary of Dr. Richard Eppes, 1858 November 20 - 1859 August 11, VHS.
[10] Mss1Ep734d296,Diary of Dr. Richard Eppes, 1859 August 12 - 1862 July 1.
[11] Ibid.
[12] Ibid.
[13] Ibid.

6. Cookbook of Elizabeth Welsh Eppes

Appendix 6

Cookbook of Elizabeth Welsh (Horner) Eppes

From Mss1Ep734d429 Section 73

Ice cream

Boil one vanilla bean in ½ pt of milk mix with it 2 tablespoonsfull arrowroot, adding cold milk enough to make a thin paste & beat it well then stir in 1 pt. milk, 1 pt. cream, 1 lb sugar strain it & freeze.

Mrs. M. Cocke (Martha Cocke of Tar Bay Plantation and a cousin of Richard Eppes)

Blackberry Wine

To every ½ bushel of berries, put 5 gallons water, after letting it stand for 24 hrs, mash the berries with the hand, but do not bruize the seed, then strain the juice, and to every gallon of the liquor, put 3 lbs from sugar put it into a cask, Cleaning bung out until fermentation ceases, which you can ascertain by putting your ear to the bung hole, then stop it closely, it should not be used for several months.

Currant Shrub

Take 6 qts currants, squeeze them and to 1 pint of currant juice add 1 pint of water & 1 lb. sugar. Boil 10 minutes & to every qt. add 1 gill of brandy.

The index has the following foods listed:

Bread pudding
Beer
Burgess Cake
Bachelor's biscuit
Almond Bread
Batter pan Cakes
Beef a la mode Birmingham
Black Cake

1 lb. currants, well washed, 1 lb. raisins stoned & cut in half, drudge currants & raisins well with flour, dessert spoon of cinnamon, do. Of mace, & nutmegs mix all the spice together, 1 glass of white wine with half glass of brandy, ½ glass rose water, ½ lb. citrons cut in very small pieces, ½ lbs. sifted flour, ½ lb. sifted sugar, ½ lb. butter stir butter & sugar to a cream. 6 eggs beaten until light, add the butter & sugar by degrees to the flour, then add gradually the other ingredients & stir the whole very hard, rub it into a buttered pans & bake slowly 4 hrs.

Blanc Mange
Beef's liver
Beef's heels
Brandy Peaches
Blackberry wine Mrs. Cocke

Block Biscuit Miss A.H.
Butter Cake Mrs. Bact
Boiled Icing

Take ½ cut sugar, pour over it ½ gill of water, boil without stirring 4 minutes, then add the beaten white of one egg.

Pour boiling syrup gradually on the white, add 1 teaspoonful orange juice.

Composition Cake
Cherry Bounce
Preserved: cranberries, cherries
Cup Cake
Charlotte Ruse
Chocolate Custard
Cottage Pudding
Dried Yeast Cake
Calves' feet Jelly
Chocolate Pudding
Currant wine
Calves' head
Crackers
Currant Jelly
Currant Shrub
Corn Dodgers
Chocolate Cake
Chocolate Pudding
Cream Pies
Cream Glace
Flannel Cakes
Foster Cakes
French Tea Cake
Economic Pudding
Egg Tea
Fresh Peaches
Feather Cake
Ginger nuts
Gingerbread Pound Cake
Herring potted
Hard Ginger Bread
Hasty Pudding
Ginger Crackers
Grape Wine
Jumbles
Jelly Cake
Jelly of Gelatin
Imperial
Indian Pudding
Ice cream
Italian Cream (two recipes)
Jelly of Cox's Sparkling Gelatine

Indian Meal pudding
Milk Biscuit
Lady Cake
Muffins
Maccarroons
Lady Madison's Whim (two recipes)
Mush Cakes
Moss Jelly
Lady Fingers

Mince Pies

1 lb stoned raisins, 1 lb clean currants, 1 lb heart or beef, (a heart will make two pounds) clean it well from the fat, 1 lbs suet, 1 lb sugar 2 lbs apples all chopped fine separately, 1 pt of wine, ^ & brandy [written in pencil] 6 cloves, a little mace, cinnamon, nutmeg, ½ lb. citron orange peel pounded fine a wine glass of rose water, sit well together.

Melon rinds preserved

Lemon Pie

2 Lemons. 2 cups of water. 2 cups sugar. 3 tablespoonful flour. 4 eggs.
Grate the lemons & squeeze the juice, then strain it. Take the yolks of the egs & mix with the above ingredients. After the pie is baked, take the whites of the eggs & beat them very light mix with white sugar & put over the pies & bake them very slightly Only one crust. Makes two pies.

Muskmelon preserve
Mangoes & stuffing
Oyster Pie
Ochra Soup

Put 1 pt. of ochras into warm water & soak them on stove all night. The next day take any kind of meat & a slice of ham put two qts. of water on this & boil it but not too hard for 3 hrs. Pepper & salt to taste, strain all through a cullender, add more water if necessary.

Omelette

Plum Pudding

1 lb stoned raisins, 1 lb. currants, 1 lb suet chopped fine. ½ lb. flour or break finely crumbled, 3 oz. sugar, ½ oz. grated lemon peel, a Hand of mace, ½ nutmeg, one teaspoonful of ground ginger, ½ doz. eggs, well beaten, work it well together, put it into a cloth, tie it firmly, allowing room to sweet, & boil not less than two hours. Wine sauce.

Preserved Pears
Plumb Cake
Peach Bararoise
Potatoe Pudding
Pine apple
Brandied Plums
Pickled Tomatoes

Purple Cabbage
Pickling Cucumbers
Plum Pudding
Pepper Pickle
Plum Pudding
Poor Man's Pudding
Pickle Cantaloupe
Preserved Oranges
Soft Ginger Bread
Rolls french
Scallop Oysters
Rice blanc mange
Rice Fritters
Rice Pudding
Rich Paste
Sponge Cake
Soft Ginger Bread
Sugar Candy

4 cups of sugar
2 cups of water
1 " of vinegar
Boil quickly until it commences to thicken, then let it simmer until done.

Sauce
Sally Lunn
Soft Ginger Bread
Strawberries preserved
Raspberry Jelly
Raspberry Vinegar
Spanish Cream
Sweet Pickle Peaches
Stuffing for Mangoes
Sago Pudding
Swedish Jelly
Snow Dessert
Sally Lunn Mrs Proctor (a neighbor of the Eppeses)
Sunshine Cake
Sally Lunn
Wine Sauce Mrs. G. G. Lee

1 cup Powdered Sugar, ½ cup Butter ½ cup Sherry Wine, yolk of 1 egg season with nutmeg. Cream the butter & sugar, then beat the egg. Mix the wine very gradually stirring constantly, beat very light. Put into a vessel that will fit into a kettle of boiling water. Stir while cooking for 10 minutes or until the consistency of cream.

Several items were not transcribed; most have been however.

7. Foodways by E. Dabney

Appendix 7

Eating with the Eppes: Foodways on the Eppes' Plantation

by Emmanuel Dabney, Curator, Petersburg National Battlefield

Dr. Eppes and his family saw food as a means to display their hospitality to friends and family. The skillset of enslaved women (and after the Civil War, hired African-American women) turned raw vegetables, unprocessed meat, and flavorings into elaborate meals. In addition to the cooks, the Eppes family made themselves dependent on the work of dining room waiters, gardeners, and field hands who fed and slaughtered livestock.

In the antebellum period, at least three female slaves labored in the kitchen. The earliest known cook was Hannah Slaughter (born 1786) who probably prepared the meals of Archibald Eppes (d. 1820) and definitely for Mary (Eppes) Cocke (1783-1844) and her husband, Benjamin Cocke (1781-1836) and their surviving son, Richard (1824-1896).[1] By the 1850s, Hannah's daughter-in-law, Susan Slaughter (born 1813), was the Eppes' cook. At the end of 1857, Elizabeth Eppes decided to have Ursula Slaughter (born May 1844) assist her aunt in the kitchen.[2] In 1858, Dr. Eppes noted Ursula worked as a scullion.[3]

Without question the most commonly eaten food on the plantation for white or black people was pork. The consumption of pork was so commonplace in the big house that Dr. Eppes rarely mentioned it.[4] In December or January, Eppes had slaves slaughter, cut, dry, salt, and smoke pork. A particularly good accounting of this process he wrote about in 1853. Eppes had 6,846 pounds of hog meat. He wrote that his overseer at Bermuda Hundred, George Conway, oversaw the operation. Eppes had the hams salted first followed by the shoulders, "then midlings *[sic]*, chines & sparribs *[sic]* it being so warm compelled to take out to lessin *[sic]* the danger of meat spoiling. last jowls & heads salted." The work of cutting the meat started that morning at 8:00 a.m. and was finished by 1:30 p.m. and by nightfall the salting and packing of the meat was complete. Eppes ordered that the pork "be resalted next tuesday [*sic*.]" He identified the group of enslaved people involved in the process: James Madison Ruffin, George Oldham, Paul Slaughter, Harriet Ruffin, Susan Slaughter, Stewart Slaughter, and Henry Smith. Eppes stated, "Stewart was cutter out. Madison applied saltpetre *[sic]* about a tablespoonful to a ham to be well rubbed on both sides, particularly around the bone on inside. Had saltpetre *[sic]* applied also to the shoulders."[5] Eppes wrote four years later that Madison took charge of salting the pork since Richard Eppes was purchasing additional land that day.[6]

In 1859, Eppes wrote another detailed description of the processing of 11,942 ½ pounds of pork. After he subtracted the amount for his overseers' annual allowance as part of their wages, he was left with 10,874 ½ pounds. Stewart Slaughter and Robert Moody (sometimes called Robert Bolling) were the men cutting the hogs while Madison Ruffin salted. A total of eight men and one woman performed this work from 9:30 a.m. until night. Eppes wrote of the frenzy to preserve his pork, "owing to the rain last night kept the hogs in smoke house & kitchen & dairy & did not hang them out all night as usual, had hogs from Bermuda hung this morning, those from Island not hung at all." He noted that the hogs from the Bermuda Hundred property got stiff though the ones from the Island did not. Eppes' slaves slaughtered the hogs in the overnight hours the night prior to cutting and salting. He recorded that saltpeter was used "on the shoulders & a little on the hams which are all sugar & molasses cured. Lost no meat last year, the

pepper black rubbed on the hams prevented the fly & worms."[7]

Even with Eppes' swine, he still did not always have enough to feed his family, overseers, and the enslaved community and thus purchased extra principally from Petersburg merchants, especially his commission merchant of choice, Thomas Branch & Sons and his wholesale grocer of choice Sturdivant, Hurt, Gee and Company.[8]

The Eppes consumed beef and lamb, but, to a lesser degree than pork. On one occasion, Eppes told his overseer at Eppes' Island "to kill a lamb" two days prior to his friends in the Prince George Hole and Corner Agricultural Club coming for dinner.[9] Another time, Eppes had a lamb killed at the Bermuda Hundred farm for his house.[10] For Christmas 1857, the Eppes had mutton.[11] Eppes reported having bills for butchers in Petersburg for beef.[12] In the spring, it was likely common for the family to have veal. In April 1857, Eppes had a four-week-old veal killed; but it was not done to his liking. Eppes complained the day after that he was angered with Stewart Slaughter for "having had the sweetbreads of the veal thrown away." Eppes promised he would "caution" Stewart and "the next time certainly inflict punishment for such arrant carelessness."[13] He says almost in passing in April 1859 of having one of his slaves kill veal "the first of the season." Weeks later, he had another veal killed and ordered a lamb slaughtered on the Monday following.[14]

The published cookbooks owned by Richard's wives, Josephine (Horner) Eppes (1826-1852) and Elizabeth Welsh (Horner) Eppes (1832-1905) are a part of the Petersburg National Battlefield Museum collection. Josephine had a copy of *The Complete Cook* by J. M. Sanderson (which became Elizabeth's following Josephine's death and Elizabeth's marriage to Richard) and Elizabeth had a copy of *Cookery as it Should Be* by Mrs. Goodfellow.[15] They contain beef recipes (or receipts as they were often called in the period). Additionally, Elizabeth Eppes wrote receipts for "Beef a la mode Birmingham," "Beef's liver," "Beef's heels," and "Mince Pies" (which used beef heart) in an undated cookbook in the Virginia Historical Society's collection.[16]

The Eppes also consumed poultry, typically more turkey than chicken. For example, at the same 1852 dinner for the Prince George Hole and Corner Agricultural Club where lamb was consumed, the group also dined on "two turkeys" which were sent from Eppes' Island.[17] In early 1854, five turkeys were sent from Eppes' Island to City Point.[18] Eppes once traded a quarter of one of his mutton for one of his overseers' wild turkeys. Dr. Eppes pronounced that wild turkey was "very good."[19]

Prior to the Civil War, Dr. Eppes hunted wild game regularly, particularly ducks, snipes, and partridges.[20] He notes sending birds killed to friends and family as presents. Presumably, he and his family ate some of these birds. He also irregularly mentioned squirrels and hares.[21] There is no mention of deer and only one mention of a wild turkey.[22]

The Eppes family, overseers, and the enslaved laborers often consumed fish. As Eppes' properties lay along the James and Appomattox rivers, fishing was the primary means by which those on the plantation were able to consume them. Each spring, Eppes deployed enslaved men to use seines to gather fish. He set his field hands to knitting the seines at times. On April 11, 1856, Eppes and a friend went to Eppes' Island taking clothing for the enslaved women and boys as well as "4 bundles of seine twine to have knit by hands." This work, for whatever reason, Eppes considered extra work as he pledged, "to give negroes 16 2/3¢ per pound for knitting herring mesh seine."[23] It appears that only Nancy Lewis (b. 1816) had the time to make a seine as Eppes paid her $1 "for knitting 6 lbs of twine."[24] The following year, Eppes paid George Oldham, Katy White, and Sally Webb $3.34 among them for "knitting seine."[25]

The Eppes family's consumption of fish is not well documented, likely because it was so commonplace. Eppes does mention consuming shad in February 1861 which he said was "caught on my shore last night in my seine" and that he "never knew one caught on this shore so early" which he wondered was an indication of spring coming earlier than normal.[26] The published cookbooks owned by Richard's wives and Elizabeth Eppes' handwritten cookbook all contain recipes for fish. The only one mentioned in the handwritten cookbook is potted herring.[27] In *Cookery as it Should Be* there are shad receipts present for boiling, broiling, frying, and potting.[28] Herrings are an alternative fish mentioned in the potted shad receipts.[29] *The Complete Cook* has receipts for boiled and stewed rockfish.[30]

The Eppes family ate large quantities of oysters that were purchased from merchants in Petersburg and City Point.[31] Mrs. Eppes scribbled down receipts for scalloped oysters and oyster pie.[32] Both published cookbooks owned by Richard's wives have receipts for oysters. Additionally, oyster shells show up from the 1989 archaeological dig at the kitchen/laundry building and a 2005 archaeological dig adjacent to the west porch of the Eppes' house.[33]

References to the Eppes' consumption of vegetables are scattered in his journals and often after they were planted, he failed to discuss them again. There was a variety of vegetables grown on the estate. In the antebellum period, Eppes purchased seeds primarily from Wilson & Alfriend located in Petersburg.[34] Eppes had two enslaved gardeners in the years before the Civil War. First was James Madison Ruffin (1812-1876) whom Eppes purchased in 1847.[35] His second gardener was a man named Sandy (born about 1811), whom Eppes purchased in 1858 because he wanted "Madison's services about the grounds and house, he [Madison] being a poor gardner *[sic]* though excellent in the grounds."[36] These men planted and gathered lettuce and red lettuce, artichokes, asparagus, cauliflower, Early York cabbage, peas, beets, and pumpkins and cymblins (squash), radishes, onions, and broccoli.[37] Eppes also had field hands plant a significant number of Mexican beans on various parts of the plantation though it is not clear if they were consumed.[38] There are numerous references to Irish and sweet potatoes planted in Eppes' garden and across various parts of his plantation.[39] He purchased potatoes as plants to be put in and others that were ready to eat primarily from the aforementioned Thomas Branch & Sons and Sturdivant, Hurt, Gee and Company.[40] Also like vegetables, the Eppes bought spices from Wilson & Alfriend.[41]

Like other groceries, the Eppes purchased rice, vinegar, flour, syrup, and sugar primarily through Petersburg commission merchants and sometimes Mrs. Eppes' brother, Alfred's Philadelphia business.[42] For example on November 5, 1851, Eppes and his first wife, Josephine went to Petersburg where he requested "2 gallons of cooking wine & 2 of sugar house molasses from Sturdivant & Hurt."[43] On another occasion, Dr. Eppes and his second wife, Elizabeth went to Petersburg and "bought of Sturdivant Hurt & Co 5 gallons syrup" and a "keg of rice & sugar & buckwheat meal."[44] Another example comes from Eppes' ordering of "½ barrel of coffee sugar" from Sturdivant, Hurt, and Company in early 1858.[45] Dr. Eppes also purchased already prepared food. For example, on April 13, 1857 he ordered among other items "1 doz of cans of peaches, & same of tomatoes to be forwarded to City Point" from his brother-in-law.[46] Two years later, he copied a memorandum of Elizabeth Eppes "for future reference" noting it was "nearly the same every year." It included pickled peaches, pickled mangoes, pickled tomatoes, pickled cucumbers, preserved quinces and peaches, grape jelly, four dozen bottles of fresh tomatoes, cucumber catsup, tomato catsup, "May pops & green preserve," and pickled "martignons."[47]

Richard Eppes rarely mentioned dessert, but, Elizabeth's handwritten cookbook has more than fifty dessert receipts reflecting the family's sweet tooth. There are numerous types of cakes including "Composition Cake," "Cup Cake," "Chocolate Cake," "Jelly Cake," "Plumb Cake," "Sponge Cake," and numerous others. Pie receipts include "Cream Pies" and "Lemon pie." Other dessert included ice cream, blanc mange, macaroon, custards, and various puddings.[48] During this period, it was also fairly common for fruit to be a part of a dessert course and receipts include "Brandy Peaches," "Preserved: cranberries, cherries," "Preserved Oranges," "Preserved Pears," "Strawberries preserved," "Brandied Plums," and "Pine apple." The Eppes' fruit trees and some of the fruit plants are well documented in the appendix of *Civil War City Point: 1864-1865 Period of Significance Landscape Documentation*.[49] A few other references were accidentally overlooked in that document but reinforce what was presented. For example, May 10, 1852 Eppes noted he had his first strawberries of the season on May 8.[50] In September 1853, Eppes received strawberry plants and "had them immediately planted."[51] In a rare case, Eppes' gardener, Sandy used forcing beds and harvested enough fresh strawberries in December 1859 for the Eppes to eat and send some to Mrs. Eppes' mother in Philadelphia.[52]

The Eppes quenched their throats with a variety of liquids. They started their days with coffee, which they regularly drank. They bought coffee primarily from Petersburg commission merchants but also at times from Richard's brother-in-law, Alfred.[53] Eppes also mentions tea with some regularity.[54]

The family and their guests consumed various types of wine and champagne. The purchases of port suggest the Eppes' love of dessert.[55] Eppes inventoried his wine and liquor in the fall of 1854 as he prepared to depart for his wedding in Philadelphia and subsequent European honeymoon with his second wife. Of the wines in the cellar of the house were five boxes of claret unopened, four boxes of opened claret, one box of champagne which was open, and one opened box of "Cincinatti *[sic]* wine."[56] Even after Virginia seceded from the Union, the Eppes planned to continue their fine tastes as Dr. Eppes placed an order for "a box of champagne & a box of Claret of Sturdivant Hurt Gee & Co."[57] Mrs. Eppes' handwritten cookbook includes receipts for currant wine, egg tea, grape wine, and blackberry wine (which she got from her husband's cousin, Martha Cocke). The printed cookbooks owned by the two Mrs. Eppes' include recipes for making alcoholic beverages as well.

In contrast to wine, there is little mention of beer though it may have been a part of regular consumption.[58] Mrs. Eppes' handwritten cookbook contains a beer receipt. The only alcoholic recipe in Richard Eppes' hand is one for small beer:

> Take a peck of corn & boil it slowly until the skin can be rubbed off, then put it in a tight cask & add molasses & water say 1 pint to 1 ½ pints to the gallon, putting say 3 or 4 gallons in a cask at a time, draw this off for 3 days as good for nothing, then put as much molasses & water as you wish beer in the cask at night & it will be ready for use by 12 O. C or afternoon next day, as soon as you draw it off bottle it & it is fit for use, stop the bottles tightly It is said to be very good. The corn will be perfectly good for 6 or 7 years.[59]

There are a few scattered references to mixed alcoholic drinks in the antebellum diary. Eppes sometimes had hot toddies and mint juleps.[60] During the Christmas season he and friends drank eggnog. For example, Dr. Eppes requested some friends "to drink egg nog" with him on the evening of December 28, 1857.[61]

While there are various occasions that Richard Eppes or his second wife, Elizabeth went to Petersburg to order or purchase groceries before the Civil War, it was not uncommon to rely on Madison Ruffin.[62] For example, on January 7, 1854, Eppes dispatched Madison to Petersburg to purchase several items including "two barrels of molasses & a barrel of sugar" though Madison was unable to procure the foodstuff. [63] On another occasion, Madison shopped for "10 lbs of sifted sugar" at Sturdivant, Hurt, Gee & Company.[64]

In contrast to the items that had to be bought, Richard Eppes' milking cows were animals that he used to develop a busy dairy operation. Previous research on butter production in the two census years before the Civil War shows that annually "Southerners consumed less than seven pounds per person."[65] On Richard Eppes' plantation, he had so many milking cows that there were two dairies. One was located at the Island farm and another located adjacent to the Eppes' house. Eppes decided to establish the dairy at the Island farm on August 19, 1852.[66] In April 1853, thirteen pounds of butter was sent from the Island farm to City Point. The next month, thirty-five pounds of butter was sent over and in June, forty-three pounds were sent.[67] High production continued in July and August when 78 and 67 ½ pounds of butter respectively, came from the Island.[68]

Eppes had two of the enslaved men on the estate, Madison Ruffin and his stepson, George Bolling sell the excess butter.[69] In mid-January 1858, Eppes had a dispute over the production of butter at the Island farm. He went to the Island farm and slapped Jane (Oldham) Booker (born 1841) who worked as the "dairymaid" because "the butter [had] fallen short six pounds in one week." That dairy was then cleaned and Eppes "put on a new lock" and gave the key to the enslaved woman. He gave "positive orders that the butter & milk was to be kept in the dairy & not allowed to go in the" overseer's house "under any circumstances that the overseer or his wife had nothing to do with the milk or butter, except that the overseer measured the milk once a week. No one & no thing to be allowed in the dairy except the dairy utensils." While signing the contract for William Crawford, the overseer at the Island farm, his wife and Eppes had a heated conversation about the milk and butter. Eppes told her she would "have nothing to do with the milk & butter" and that Eppes would allow "no interference" between him and Jane. Eppes reported that Mrs. Crawford "appeared to be quite warm" but "I told her it was no use that the contract signed by Mr Crawford allowed me to discharge him when I was dissatisfied, that I could & would not make any change to please any one."[70] About two weeks later, perhaps with his temper cooled, Eppes gave "Mrs Crawford a present of a pot of butter today."[71]

Beyond the surviving outbuildings adjacent to the Eppes' house, there were other important features on the plantation landscape. A now missing important landmark on the estate was an ice pond south of Eppes' house.[72] Two surviving natural features are the James and Appomattox Rivers, from which Dr. Eppes' slaves also harvested ice.[73] There was an icehouse to store the ice harvested or purchased.[74] Eppes also had his enslaved carpenters build a pigeon house in his stable lot.[75]

Cooking and cleaning required water and Eppes had a series of wells on his property. Eppes contracted for a new well in 1856 to serve the house and adjacent outbuildings with the work performed by William Conner. While Eppes was away on the ritual of visiting Virginia's springs and then to his mother-in-law's in Philadelphia, Conner had dug a well shaft behind the new smokehouse but after going down fifty feet and hitting marl rock and finding no water he stopped. Once Eppes returned Mr. Conner suggested starting a new well "back of dairy commencing October 2."[76]

In mid-October 1856, the well "between smoke house & dairy" was "54 feet deep, marl bed 11 feet" which had yet to be gotten through.[77] Mr. Conner was able to get through the marl estimated at "13 or 14 ft thick" but Conner left for his home in Petersburg although Eppes "told him there was danger of loosing *[sic]* the well." Eppes continued that the "stream [was] not very strong."[78] Mr. Conner started to lay bricks for the well in the afternoon of October 20. The well was "61 feet" deep with "black sand" bottom and having a "breadth at bottom of well 2 feet bricks." There was then 4 feet, 10 inches of water in the well in one day.[79] Five days later, Mr. Conner was nearly done with the bricklaying and there was ten feet of water in the well.[80] Bricks purchased from David Lyon of Petersburg arrived in mid-November for a variety of projects including the well. Eppes told Mr. Conner to return to finish the bricklaying at the well which he did and "got it bricked up to sills…& will commence drawing off water & giving it a final cleaning out tomorrow."[81] Eppes settled his account with Conner on November 13, which included the failed attempt at digging a well behind the new smokehouse, plus the wells cleaned at the Eppes' Island and Bermuda Hundred farms.[82] The well behind the smokehouse was filled in on February 6, 1857.[83]

The enslaved community received rations doled out by Eppes and his white overseers. The amount of rations varied throughout the antebellum period.[84] A circa 1857 list of rules of Eppes' plantation included a note about rations. Eppes wrote, "Your weekly allowance will be a peck and half of meal for the men and a peck for the women apiece. Two pounds and half of pork for the men and two pounds for the women and boys over fourteen apiece. To the Foreman and Head Plougher will be given three pounds of pork apiece."[85] Later that year, Eppes wrote "Allowance for farms. Men 2 ½ pounds of meat, 2 quarts of molasses & 2 shad or 12 herrings per 2 weeks women 2 lbs of meat same quantity of molasses & fish"[86] Eppes increased his slaves' ration in 1859 after a conversation with his friend and the plantation physician, Dr. Virginius Harrison. Eppes wrote, "... [the] mens allowance would be increased to 5 lbs & womans to 4 lbs per fortnight [two weeks] with 1 quart of molasses & 6 herrings, also that plough boys should be put on mens allowance and all children over 3 years of age should draw 2 lbs of bacon with their quart of molasses & one peck [eight quarts] of meal per fortnight."[87] In addition to the rations, as noted in Gail Brown's report, Eppes' enslaved laborers were allowed a small amount of land to keep a garden.[88] It is unknown if the Eppes' cooks had any time to garden for their own sustenance, though with the demands of the kitchen it is unlikely Susan and Ursula had much time to garden, if any. Likewise, it is unknown if the Eppes' laundress, Sarah Caldwell had a garden. It is possible that the enslaved domestic servants pooled their resources together to make communal meals. Probably because of the watchful eyes of Dr. and Elizabeth Eppes, there is no mention of Eppes' domestic servants taking food to supplement their diets, unlike some of the enslaved field hands.[89]

The enslaved cooks on the Eppes plantation had a different wartime experience than most of the enslaved community. In the spring of 1862, Mrs. Eppes fled to Petersburg with her children and several of the domestic servants, including Susan and Ursula Slaughter. Most of the rest of the Slaughter family and indeed most of the Eppes' slaves escaped with the Federal navy and army between May and August 1862. Once Eppes resumed his diary in September 1865, he makes no mention of Susan and Ursula. Susan's son, Richard (who became a United States soldier during the war) recalled that his mother found her family in Hampton, Virginia. Unfortunately, during Richard Slaughter's military service, his father died. Susan remarried in 1867 and remained in Hampton the remainder of her life.[90] The elderly Hannah and her husband, Mat likely died after the spring of 1862 and before Eppes returned to his estate in 1865.

[1] Benjamin Cocke, Account Book, 1826-1834, Mss 1 Ep734 d 129, Eppes Family Papers, Virginia Historical Society (hereafter cited as EFP, VHS).
[2] Richard Eppes, Diary, December 27, 1857, Mss1Ep734d, EFP, VHS.
[3] Richard Eppes, Diary, January 1, 1858 inventory, Mss1Ep734d292, EFP, VHS. Scullions did the dirty work of a kitchen such as cleaning dishes, cleaning animals prior to cooking, and served as an assistant to a cook.
[4] One exception is Eppes' reference to eating "porc chop." See Richard Eppes, Diary, December 25, 1852, Mss1Ep734291, EFP, VHS. Another example comes from an April 1853 report by the Island farm overseer who noted that a pig was "killed for house at Point," Richard Eppes, Diary, July 14, 1853, Mss1Ep734d291, EFP, VHS.
[5] Richard Eppes, Diary, December 6, 1853, Mss1Ep734d291, EFP, VHS.
[6] Ibid, Diary, December 16, 1857, Mss1Ep734d291, EFP, VHS.
[7] Ibid, December 15, 1859, Mss1Ep734d296, EFP, VHS.
[8] Ibid, January 2, 1852, Mss1Ep734d289; ibid, October 1, 1856, March 18, 1857, October 17, 1857, Mss1Ep734d292; ibid, July 13, 1860, Mss1Ep734d296, EFP, VHS.
[9] Richard Eppes, Diary, March 23, 1852, Mss1Ep734d290, EFP, VHS. Another reference to lamb appears on August 31, 1853, Mss1Ep734d291, EFP, VHS.
[10] Richard Eppes, Diary, August 31, 1854, Mss1Ep734d291, EFP, VHS.
[11] Ibid, Diary, December 17, 1857, Mss1Ep734d292, EFP, VHS.
[12] Ibid, March 12-13, 1856, October 1, 1856, Mss1Ep734d292; ibid, January 9, 1860, Mss1Ep734d296, EFP, VHS.
[13] Ibid, April 28, 1857, Mss1Ep734d292, EFP, VHS.
[14] Ibid, April 11, May 6, 1859, Mss1Ep734d295, EFP, VHS. Another veal reference is found, April 23, 1861, Mss1Ep734d296, EFP, VHS.
[15] J. M. Sanderson, *The Complete Cook* (Philadelphia: W. A. Leary & Co., 1850), PETE Catalog Number 1984 and Mrs. Goodfellow, *Cookery As it Should Be* (Philadelphia: Willis P. Hazard, 1856), PETE Catalog Number 2120, Petersburg National Battlefield.
[16] Elizabeth W. Eppes, Cookbook, Mss 1 Ep734d429, EFP, VHS.
[17] Richard Eppes, Diary, March 23 and 25, 1852, Mss1Ep734d290, EFP, VHS.
[18] Richard Eppes, Diary, January 30, 1854, Mss1Ep734d291, EFP, VHS.
[19] Ibid, December 7, 1855, Mss1Ep734d292, EFP, VHS.
[20] Ibid, March 16, 18, 1852, September 1 and 2, 1852, October 13, 19, 20, 21, 1852, Mss1Ep734d290; ibid, November 3, 4, 5, 11, 13, 15, 1852; October 10, November 17, 23, 24, December 3, 7, 9, 10, 1853; January 3 and 11, 1854, Mss1Ep734d291; ibid, October 30, 31, December 7, 8, 1855; November 17, 18, December 12, 1856; December 21, 1857, Mss1Ep734d292; November 20, 22, 24, 1858; April 18, 1859, Mss1Ep734d295, September 21, November 18, 1859, December 7, 11, 1860, Mss1Ep734d296, EFP, VHS.
[21] For birds see, ibid, October 22, 28, 1852, October 17, November 23, 1853, Mss1Ep734d291; December 24, 1856 Mss1Ep734d292; September 21, 22, 1858, Mss1Ep734d294; April 18, 1859, Mss1Ep734d295, January 21, 1860, Mss1Ep734d296. For hares see ibid, January 10, 1854, Mss1Ep734d291; December 24, 1856, Mss1Ep734d292; November 20, 22, 24, 1858, Mss1Ep734d295; November 18, 1859, January 16, 1860, January 21, 1860, February 2, 1860, Mss1Ep734d296, EFP, VHS.
[22] Ibid, December 9, 1858, Mss1Ep734d295. EFP, VHS.
[23] Richard Eppes, Diary, April 11, 1856, Mss1Ep734d292, EFP, VHS.
[24] Richard Eppes, Diary, April 22, 1856, ibid.
[25] Ibid, Diary, December 30, 1857, ibid.
[26] Richard Eppes, Diary, February 28, 1861, Mss1Ep734d296, EFP, VHS.
[27] Elizabeth W. Eppes, Cookbook, Mss 1 Ep734d429, EFP, VHS.
[28] Mrs. Goodfellow, *Cookery as it Should Be* (Philadelphia: Willard P. Hazard, 1856), 65, 131-132, 134, 136.
[29] Ibid, 134, 136.
[30] J. M. Sanderson, *The Complete Cook* (Philadelphia: W. A. Leary & Co., 1850), 64, 136.
[31] Richard Eppes, Diary, January 3, 1852, Mss1Ep734d289;ibid, October 31, 1852, Mss1Ep734d291;ibid, February 24, 1857, Mss1Ep734d292; ibid, December 28, 1858, March 31, 1859, Mss1Ep734d295; ibid, January 18, 1860, Mss1Ep734d296, EFP, VHS.

[32] Elizabeth W. Eppes, Cookbook, Mss 1 Ep734d429, EFP, VHS. There are recipes for oysters also in *The Complete Cook* and *Cookery as it Should Be*.
[33] Andrew S. Veech, Draft Report—Investigation of Proposed Appomattox Manor Handicapped Accessible Ramp (National Park Service, 2005), Petersburg National Battlefield.
[34] Richard Eppes, Diary, February 28, 1854,Mss1Ep734d291; Ibid, March 31, 1857, Mss1Ep734d292; Ibid, April 21, 1858, Mss1Ep734d294 , EFP, VHS.
[35] Ibid, January 1, 1858 inventory, Mss1Ep734d292; ibid, February 20, 1876, Mss 1 Ep734 d 303, EFP, VHS.
[36] Richard Eppes, Diary, April 1, 1858, Mss1Ep734d294 , EFP, VHS.
[37] For reference to lettuce see November 15, 1856, Mss1Ep734d292; for red lettuce see March 27, 1856 Mss1Ep734d292, for artichokes see Richard Eppes, Diary, March 26, 1852, April 18, 1852, Mss1Ep734d290; August 2, 1856, Mss1EP734d292, EFP, VHS; for asparagus see March 17, 1859, Mss1Ep734d295; for cauliflower see April 21, 1858, Mss1Ep734d294, EFP, VHS; for Early York cabbage see January 16, 1852, Mss1Ep734d289; for peas see January 16, 1852, Mss1Ep734d289; May 10, 1852, Mss1Ep734d290 and April 21, 1858, Mss1Ep734d294; for beets see May 24, 1859, Mss1Ep734d295, for pumpkins and cymblins (squash) see July 24, 1853, Mss1Ep734d291, EFP, VHS; for radishes see ibid, February 10, 1857, Mss1Ep734d292; for onions and broccoli see ibid, September 3, 1859, Mss1Ep734d296, EFP, VHS.
[38] Richard Eppes, Diary, May 5, 1859, Mss1Ep734d295; Ibid, June 4, 1860, February 23, 1861, Mss1Ep734d296, EFP, VHS.
[39] For Irish potatoes see November 17, 1856, Mss1Ep734292; ibid, January 25, 1860, May 24, 1860, May 25, 1860, February 21, 1861, May 17, 1861, Mss1Ep734d296; for sweet potatoes see Richard Eppes, Diary, March 29, April 18, 1856, Mss1Ep734d292; May 24, 1859, Mss1Ep734d295; May 9, 1860 May 24, 1860, May 25, 1860, June 4, 1860, Mss1Ep734d296, EFP, VHS. Unspecified potato but likely Irish see May 24, 1859, Mss1Ep734d295, EFP, VHS.
[40] For examples see Richard Eppes, Diary, April 7, 1852, Mss1Ep734d290; Ibid, May 9, 24, 25, 1860, Mss1Ep734d296, EFP, VHS.
[41] Ibid, December 16, 1856, Mss1Ep734d292, EFP, VHS.
[42] For rice see, Richard Eppes, Diary, April 19, 1852, Mss1Ep734290, Ibid, September 8, 1853, Mss1Ep734d291; for vinegar see Ibid, Diary, April 19, 1852, Mss1Ep734290; Ibid, August 29, 1859, September 20, 1859, Mss1Ep734d296; for flour see July 20, 1853, Mss1Ep734d291, October 1, 1856, Mss1Ep734d292; for sugar see July 20, 1853, January 6, 1854 Mss1Ep734d291; for molasses from Alfred Horner's business see ibid, August 29, 1859, September 17, 1860, Mss1Ep734d296, EFP, VHS.
[43] Ibid, Mss1Ep734d289, ibid.
[44] Ibid, December 22, 1857, Mss1Ep734d292, EFP, VHS.
[45] Ibid, February 12, 1858, Mss1Ep734d294, EFP, VHS.
[46] Ibid, April 13, 1857, Mss1Ep734d292, EFP, VHS.
[47] Ibid, August 29, 1859, Mss1Ep734d296, EFP, VHS. Martignons appear to be an edible plant.
[48] Elizabeth W. Eppes, Cookbook, Mss 1 Ep734 d 429, EFP, VHS. Eppes does mention purchasing brandy for brandied peaches well before his wife began her cookbook, see August 21, 1852, Mss1Ep734d290, EFP, VHS.
[49] James Blankenship, Julia Steele, et al., *Civil War City Point: 1864-1865 Period of Significance Landscape Documentation* (National Park Service: Petersburg National Battlefield), B-O (also available online https://www.nps.gov/parkhistory/online_books/pete/city_point_landscape.pdf).
[50] Richard Eppes, Diary, April 19, 1852, Mss1Ep734290, EFP, VHS.
[51] Richard Eppes, Diary, September 13, 1853, Mss1Ep734d291, EFP, VHS.
[52] Richard Eppes, Diary, December 11, 1859, Mss1Ep734d296, EFP, VHS.
[53] Richard Eppes, September 8, 1853, January 31, 1854, Mss1Ep734d291, Ibid, April 16, 1856, Mss1Ep734d292; Ibid, February 16, 1857, April 13, 1857, Mss1Ep734d292;
[54] Ibid, August 15, 1852, Mss1Ep734d290, ibid, February 1, 1854, Mss1Ep734d291; ibid, September 24, 1859, November 27, 1860, September 23, 1860, Mss1Ep734d296 EFP, VHS. It is important to note that tea time was a lighter meal served later in the evening after a large dinner (modern lunch) course in the afternoon.
[55] For port purchases see Richard Eppes, August 9, 1853, September 8, 1853, Mss1Ep734d291; Ibid, April 13, 1857, Mss1Ep734d292;
[56] Richard Eppes, Diary, 1854 inventory, Mss1Ep734d291, EFP, VHS.
[57] Ibid, April 25, 1861, Mss1Ep734d296, EFP, VHS.
[58] Eppes paid for a "bottle of porter" from a City Point storekeeper, February 9, 1860, Mss1Ep734d296, EFP. VHS. He also received "a keg of Philadelphia Ale," February 23, 1860, Mss1Ep734d296, EFP, VHS.

[59] Ibid, July 28, 1853.
[60] Ibid, for mint juleps see April 5, 21, 1853 and for hot toddy see ibid, October 23, 1853.
[61] Ibid, December 27, 1857 and December 29, 1857, Mss1Ep734d292.
[62] Richard Eppes, Diary, April 7, 1852, Mss1Ep734d290; Ibid, July 7, 1853, Mss1Ep734d291; Ibid, Diary, June 15, 1858, Mss1Ep734d294; Ibid, August 16, 1859, Mss1Ep734d296
[63] Richard Eppes, Diary, January 7, 1854, Mss1Ep734d291, EFP, VHS.
[64] Ibid, June 15, 1858, Mss1Ep734d294, EFP, VHS. There are many other references to Madison Ruffin purchasing food including, ibid, August 29, 1859, May 10 and 25, 1860, September 30, 1860, Mss1Ep734d296
[65] John Michael Vlach, *Back of the Big House: The Architecture of Plantation Slavery* (Chapel Hill: University of North Carolina Press, 1993), 79.
[66] Eppes, Diary, August 19, 1852, Mss1Ep734d290, EFP, VHS.
[67] Ibid, Diary, July 14, 1853, Mss1Ep734d291, EFP, VHS.
[68] Ibid, August 31, 1853.
[69] For Madison Ruffin's butter sales see August 22, 1852, Mss1Ep734d290; ibid, October 7, 1852, July 27, 1853,Mss1Ep734d291; for George Bolling's butter sales see Eppes, Diary, September 16, 18, 22, 29 1860, EFP, VHS.
[70] Ibid, January 18, 1858, Mss1Ep734d294, EFP, VHS.
[71] Ibid, February 3, 1858, Mss1Ep734d294, EFP, VHS.
[72] Ibid, December 25, 1852, Mss1Ep734d291, EFP, VHS.
[73] Ibid, January 5 and 6, 1860, Mss1Ep734d296, EFP, VHS. Eppes did at least once purchase ice from Petersburg ice dealer, John Justice, May 1, 1861, Mss1Ep734d296, EFP, VHS.
[74] The earliest mention of Richard Eppes' ice house is ibid, December 8, 1851, Mss1Ep734d289, EFP, VHS.
[75] Ibid, April 3, 1856, Mss1Ep734d292, EFP, VHS.
[76] Ibid, September 30, 1856, Mss1Ep734d292, ibid. Eppes had previously employed the same man to clean out wells at the Bermuda Hundred and Island farms, see August 28, 1856, Mss1Ep734d292, EFP, VHS. Oddly Eppes did not get his actual surname correct in his records until a final settlement, see Richard Eppes, Diary, November 13, 1856.
[77] Ibid, October 17, 1856, Mss1Ep734d292.
[78] Ibid, October 18, 1856.
[79] Ibid, October 20, 1856.
[80] Ibid, October 25, 1856.
[81] Ibid, November 10-12 1856.
[82] Ibid, November 13, 1856.
[83] Ibid, February 6, 1857. There was another well present in the stable yard (south of the visitor parking lot) which Eppes had filled up on November 30, 1857, see Mss1Ep734d292, ibid.
[84] For more on slave rations, see Gail W. Brown, *Structured Landscape and African-American Living Conditions on the Eppes Plantation* (National Park Service, 1999), 50-52.
[85] Ibid, *Code of Laws for Island Plantation,* Mss1Ep734d356, EFP, VHS.
[86] Ibid, Diary, October 17, 1857, Mss1Ep734d292, EFP, VHS.
[87] Ibid, January 1, 1859, Mss1Ep734d295, EFP, VHS.
[88] Gail W. Brown, *Structured Landscape and African-American Living Conditions on the Eppes Plantation* (National Park Service, 1999), 51.
[89] Ibid, 51-52.
[90] Richard Slaughter, December 27, 1936, *Federal Writers' Project: Slave Narrative Project, Vol. 17, Virginia, Berry-Wilson*. 1936. Manuscript/Mixed Material. Retrieved from the Library of Congress, https://www.loc.gov/item/mesn170/ (accessed February 05, 2017). Susan Slaughter married Paten Brooks on August 4, 1867, Ancestry.com. *Virginia, Select Marriages, 1785-1940* [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc, 2014. Susan Slaughter Brooks died June 14, 1892, Ancestry.com. *Virginia, Deaths and Burials Index, 1853-1917* [database on-line]. Provo, UT, USA: Ancestry.com Operations, Inc., 2011.

8. Field Notes

Appendix 8
Team Field Notes

JDF's Field Notes, Oct 2016

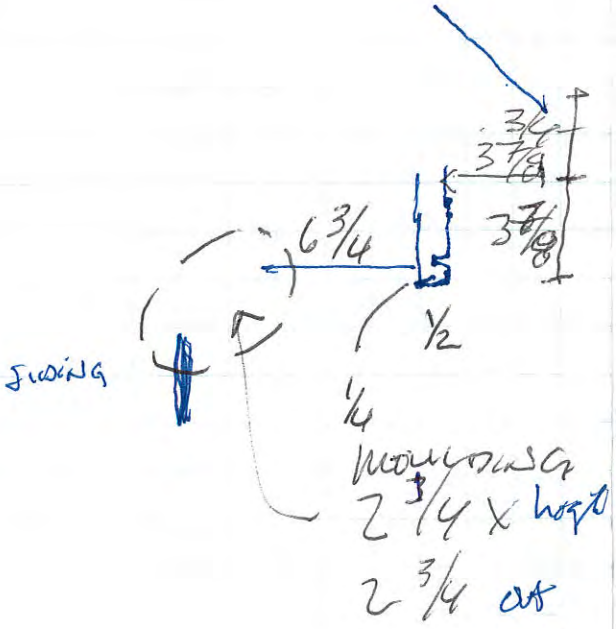
PAINT SAMPLES

DAIRY

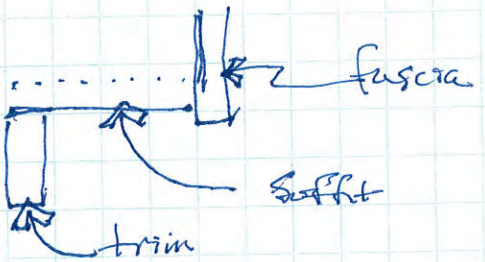
1. ~~EXT.~~ NW corner column: White
2. " NE Diagonal: White North wall ~~to~~
3. East Diagonal Red
4. EXT. East elev. lap siding bottom edge of 3RD from bottom. cream
5. Bottom of threshold of S. Door
6. N. Lap siding under edge 9th cream up

NEW SMOKEHOUSE

7. SE corner board (rotted) flat
8. " " " head
9. older looking board of lap siding 8th from bottom. fore.
10. Door Jamb casing
11. Underside of threshold
12. Top casing door
13. lower moulding, South Elev.
14. Upper " " "
15. " " " "
16. Soffit



OLD SMOKEHOUSE



INTERIOR

17. South cross beam
18. North "

EXTERIOR

19. Trim
20. Soffit
21. fascia
22. North elev. siding, high up at gable peak.

North rafter: powder post beetle to rot.

KITCHEN - LAUNDRY

EXTERIOR

Windows

23. West: North
24. " : South
25. East: North
26. " : South
27 Sill
28 Sill

Door

32 East, North door NOT LEAD ABATED
" " "
29 Siding in groove, E wall
30. " " "
31. NE corner molding.

Looks like green early

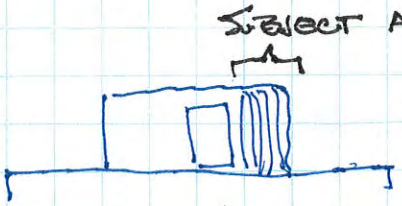
INTERIOR

34. East Elev., North door Brown
35. North Room 1st Floor, South wall wainscot
36. " " " " East "

EXTRAS

37. 1st Floor, S. Room.
Window casing, E window
38. 2nd, South room, door, S. face
39 " North ", W. elev. Base Board
40 Same as 39

K-L : SLOPE OF TRUCK COURSES OF CHIMNIES



Schematic location plan

NE

1	4.3%
2	2.1
3	1.6
4	2.0
5	~~3.0~~ 4.3
6	2.0
7	4.2
8	3.3
9	3.3
10	3.1

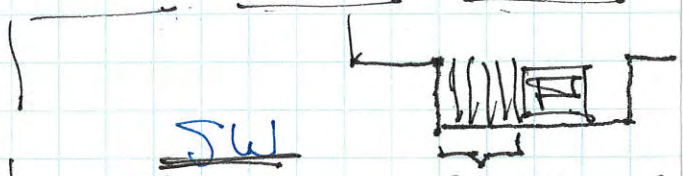
SLOPE TOWARD BULLDOZER

15 courses, 10 reached for measurement

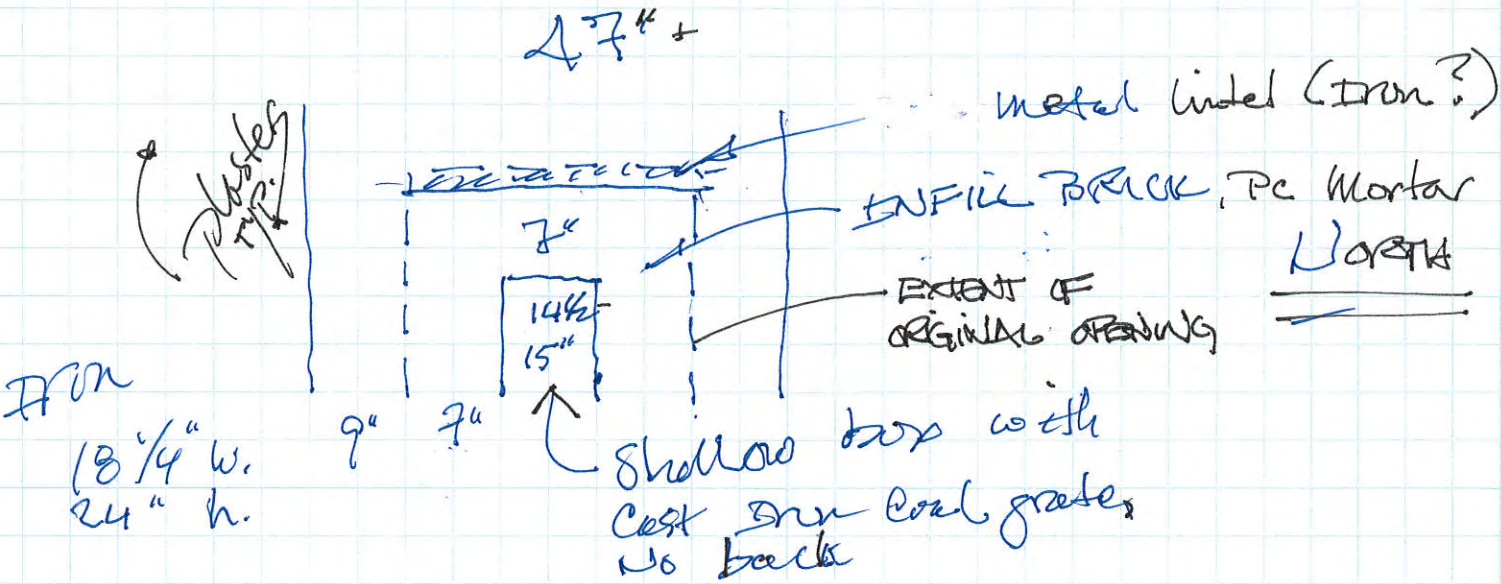
SW

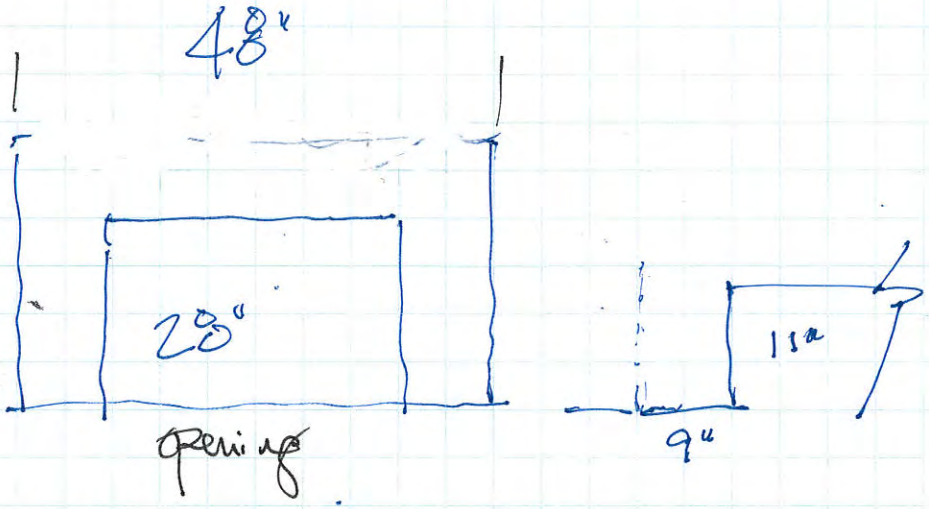
1	7.6
2	0.0 equiv
3	5.6
4	4.0
5	1.8
6	3.5
7	2.7
8	2.6
9	1.3
10	2.2

10 TOTAL



K-11 : 2ND STORY CHIMNEY/FIREPLACE ELEVATIONS





DW's Field Notes, Oct 2016

Atkinson-Noland & Associates, Inc.
Consulting Engineers
2619 Spruce Street P: (303) 444-3620
Boulder, Colorado 80302

BY _____ DATE _____ SUBJECT _____ SHEET NO. 1 OF _____

CHKD. BY _____ DATE _____ JOB NO. _____

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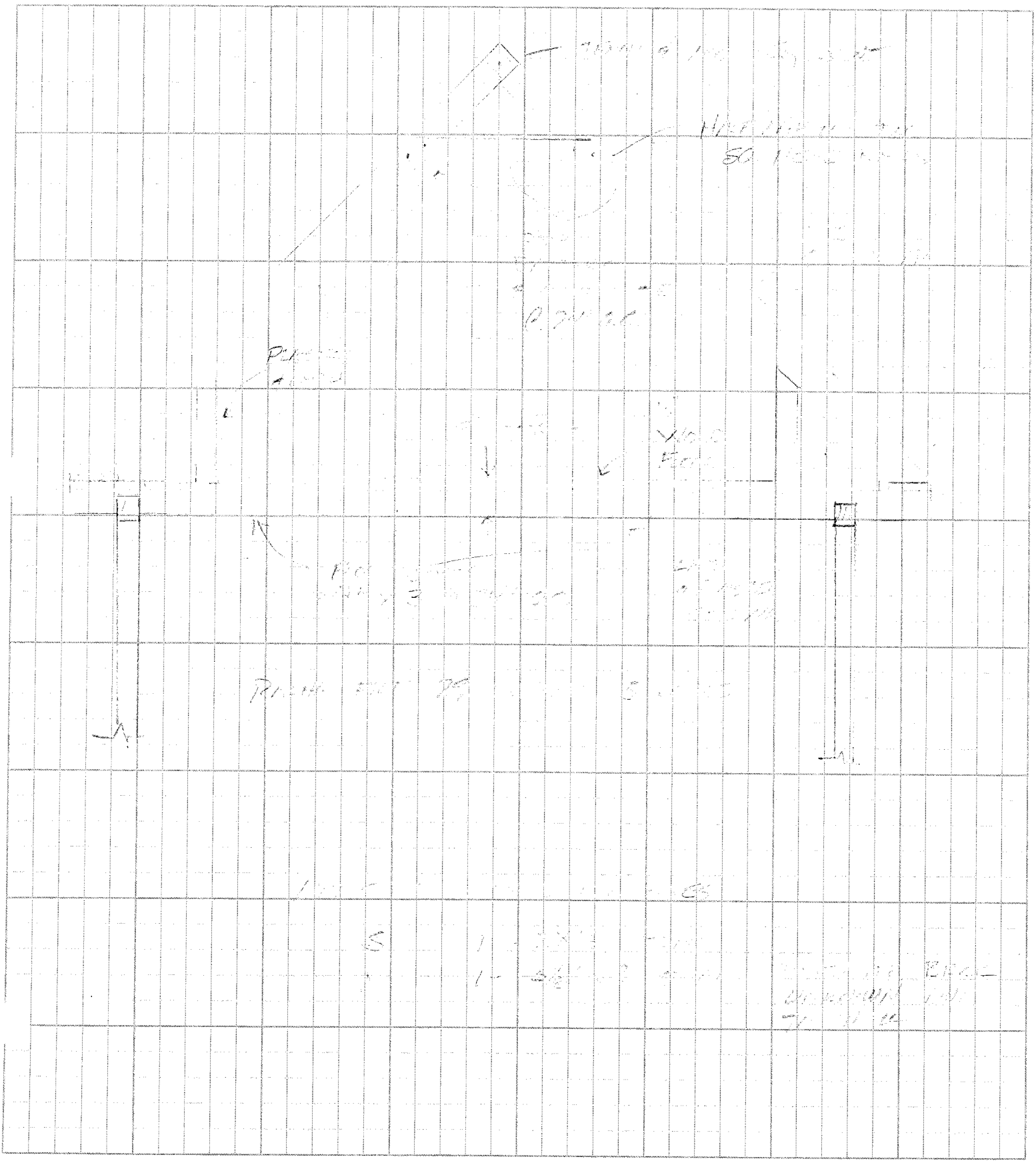
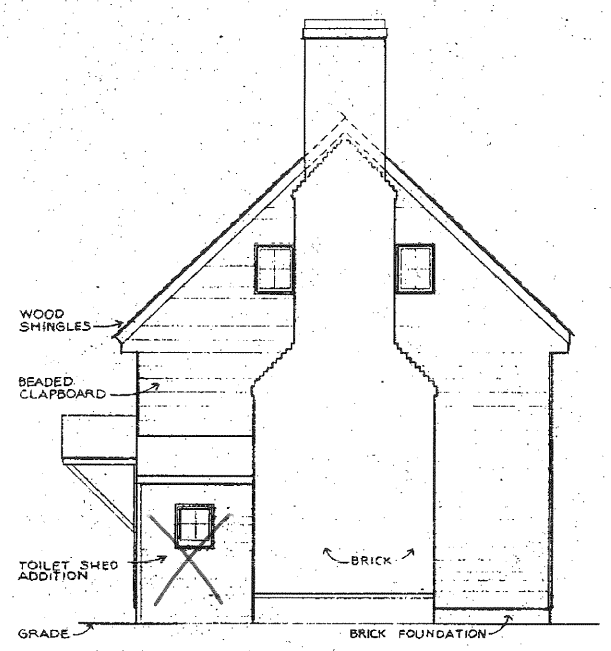
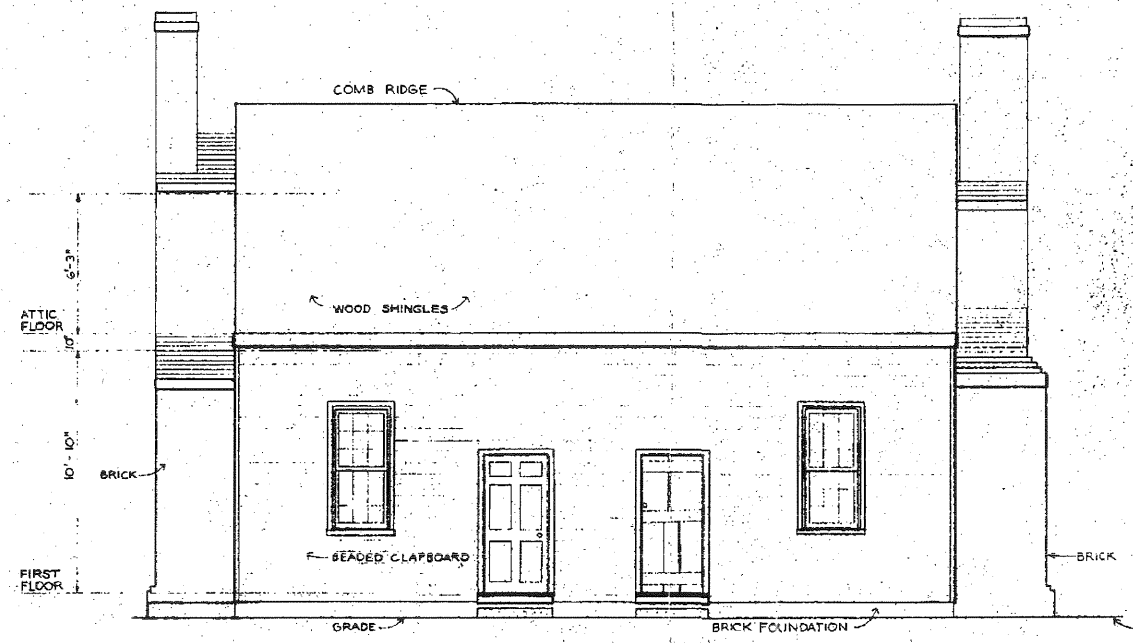
CHKD. BY _____ DATE _____ JOB NO. _____

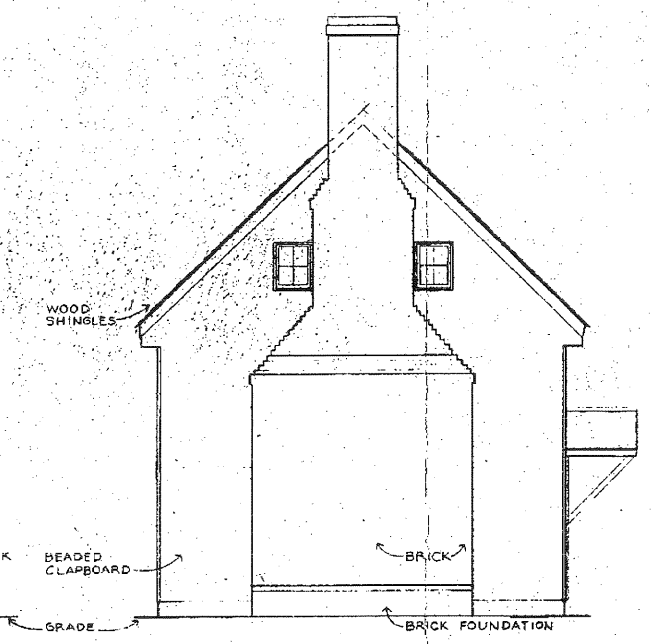




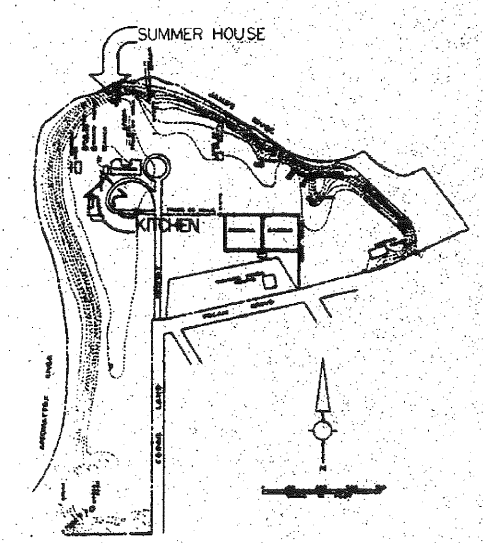
SOUTH ELEVATION



EAST ELEVATION

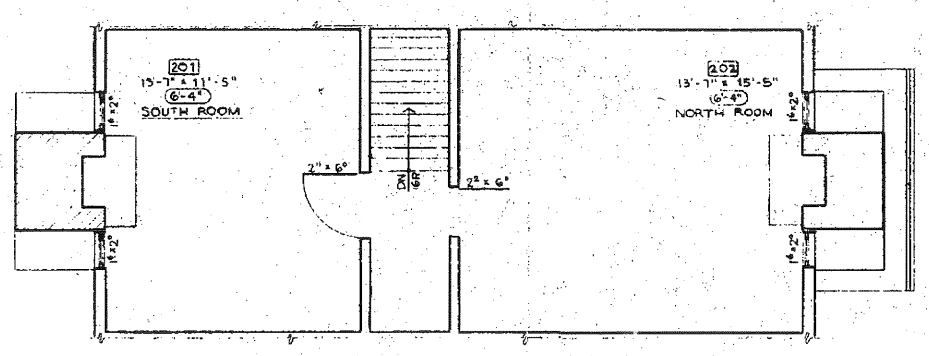


NORTH ELEVATION

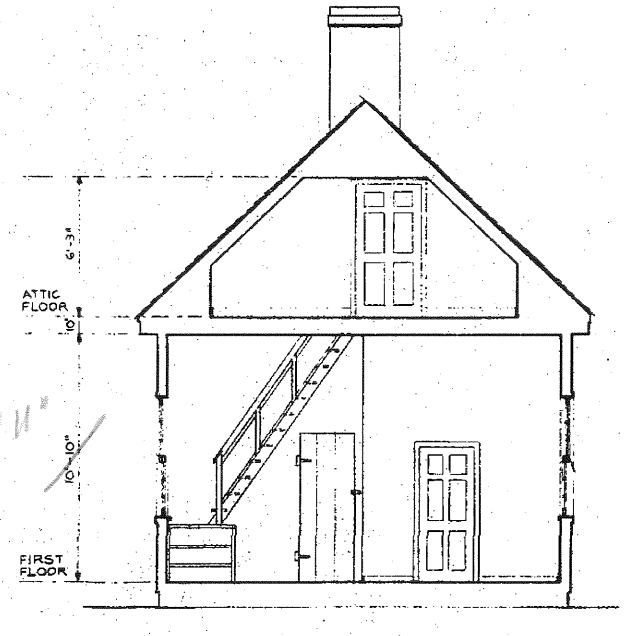


SITE PLAN

S. BRICK CHIMNEY
6⅜-8¾ l 2⅛-2½ h
4⅛ w 4¼ w
HEADER COURSE VARIANCE ON EXT
4, 9 COURSE

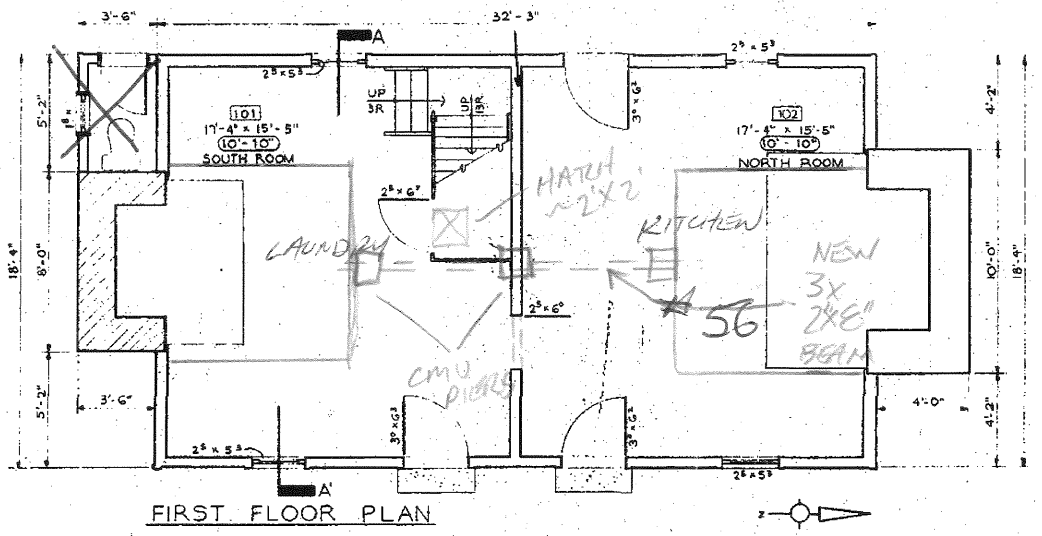


UPPER ATTIC FLOOR PLAN

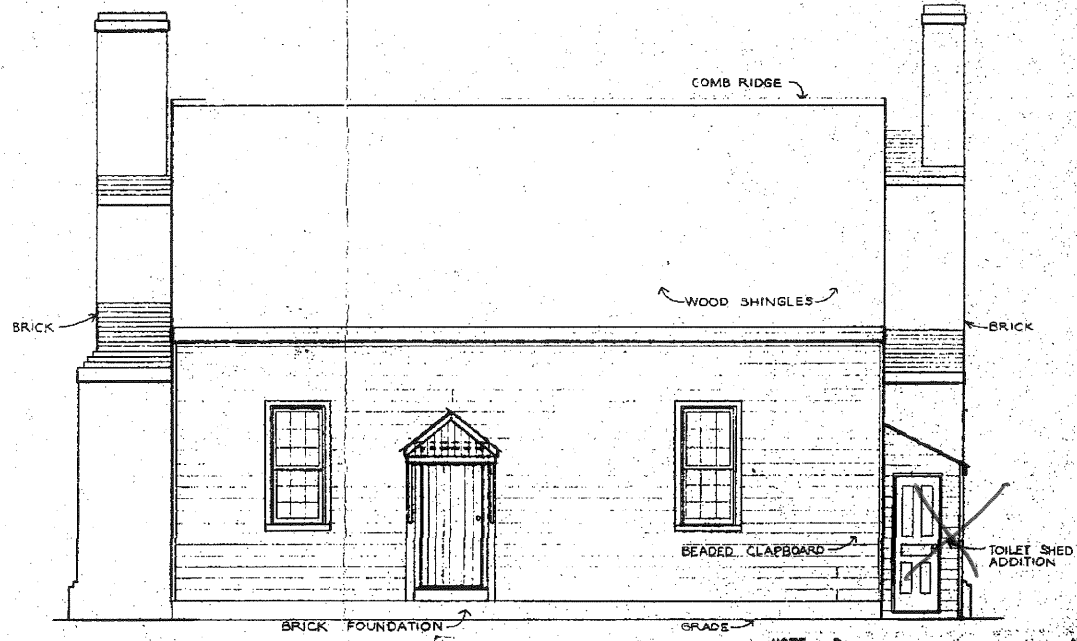


BUILDING SECTION A-A'

CHIMNEY
N BRICK 8¾-8⅞" l 2-2⅛" h 4-4½" w
HEADER COURSES MOST PREVALENT 7TH COURSE (SOMETIMES)



FIRST FLOOR PLAN



WEST ELEVATION

ON MICROFILM

NOTE: DRAWN FROM FIELD NOTES IN HARD. DRAWINGS WERE NOT FIELD CHECKED.

APPOMATTOX MANOR

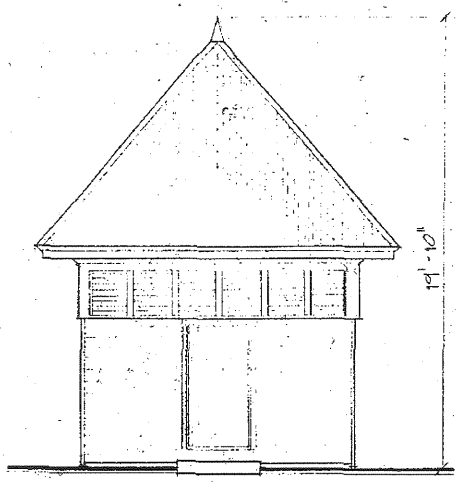
KITCHEN BUILDING

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

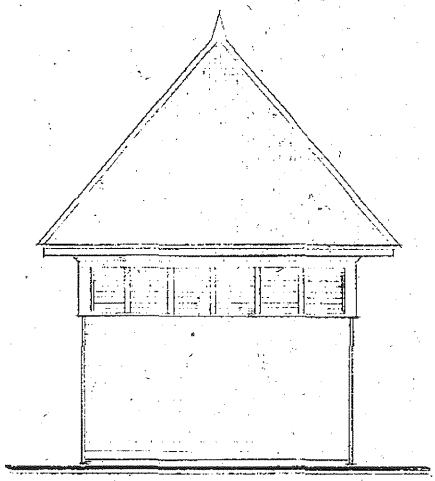
SURVEY DRAWING	TYPE OF DRAWING: KITCHEN BUILDING
U.S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE MID-ATLANTIC REGIONAL OFFICE Office of Planning & Resource Preservation Division of Resource Preservation 143 S. 3RD ST. PHILA. PA. 19106	LOCATION WITHIN PARK: APPOMATTOX MANOR, HOPEWELL, VIRGINIA NAME OF PARK: PETERSBURG NATIONAL BATTLEFIELD M.A.R.O. REGION — VIRGINIA STATE
PREPARED: EPPES DESIGNED; SOLON DRAWN; MAGAZINER CHECKED; 3-1-80 DATE	DRAWING NO. 325 80014 PKG NO. — SHEET 1 — OF 1

GPO-1974-678-710

KITCHEN — LAUNDRY

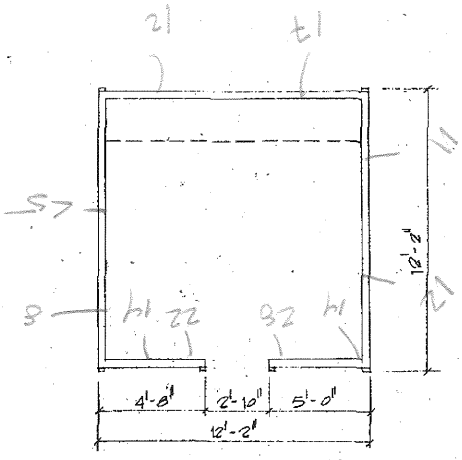


SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



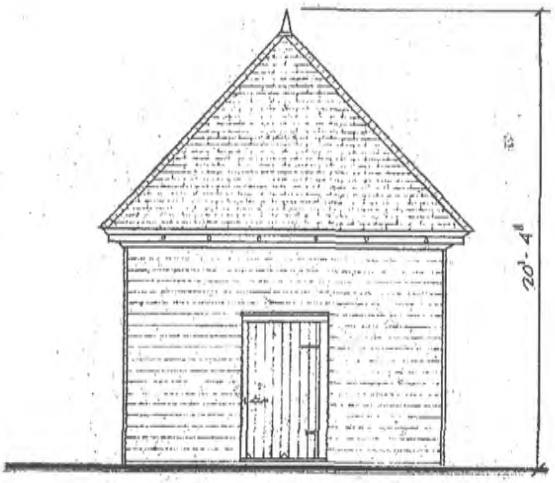
EAST ELEVATION
SCALE: 1/4" = 1'-0"

DAILY
MOISTURE METER
READINGS

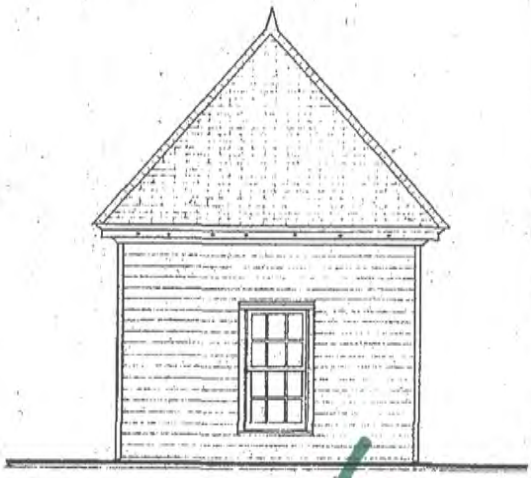


FLOOR PLAN
SCALE: 1/4" = 1'-0"

ALL MEASUREMENTS
IN TIMBER SILL
~ 1-2" ABOVE MASONRY END

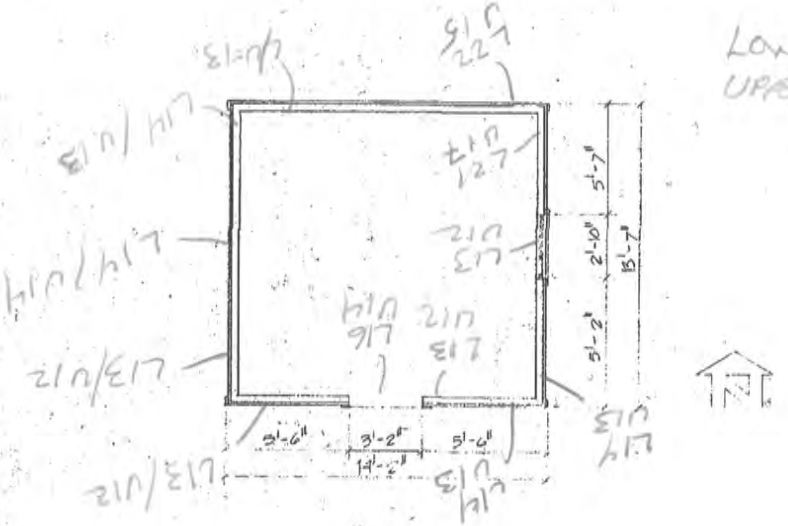


SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



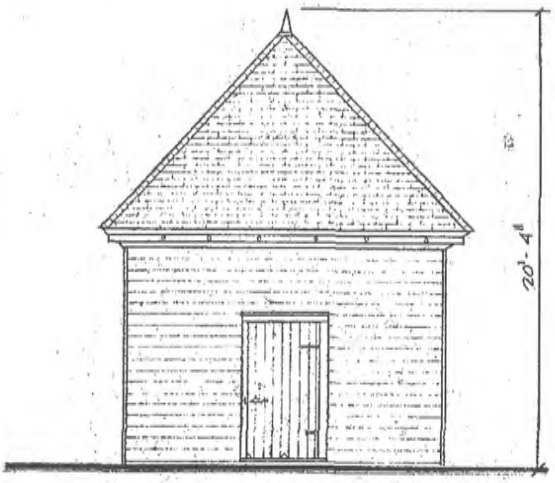
EAST ELEVATION
SCALE: 1/4" = 1'-0"

NEW SMOKE HOUSE

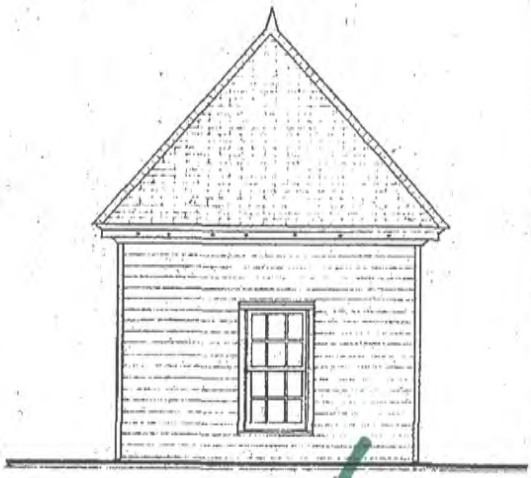


LOWER SILL = L
UPPER SILL = U

MOISTURE
METER READINGS

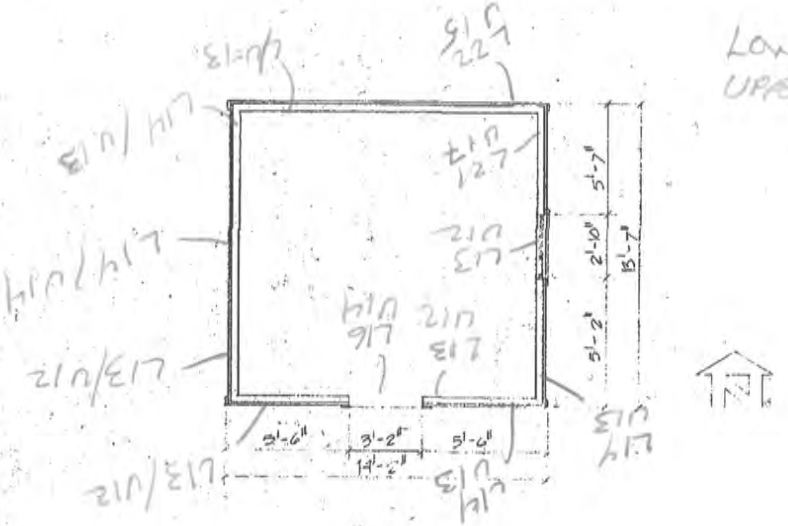


SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



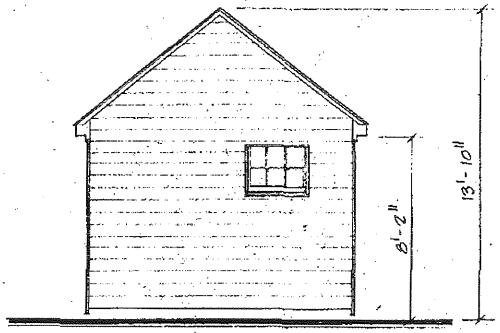
EAST ELEVATION
SCALE: 1/4" = 1'-0"

NEW SMOKE HOUSE

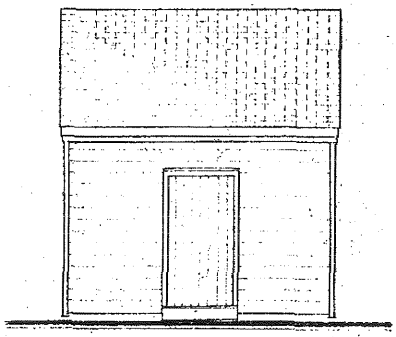


LOWER SILL = L
UPPER SILL = U

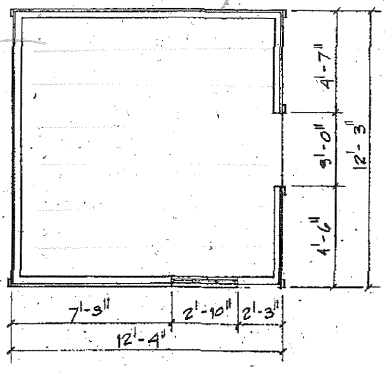
MOISTURE
METER READINGS



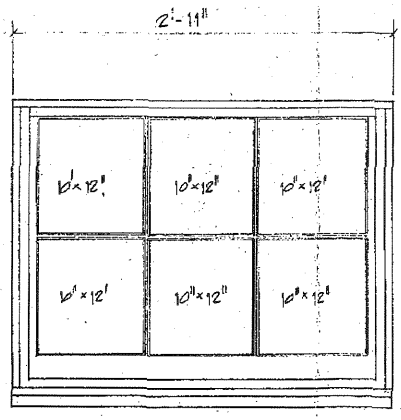
SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



EAST ELEVATION
SCALE: 1/4" = 1'-0"



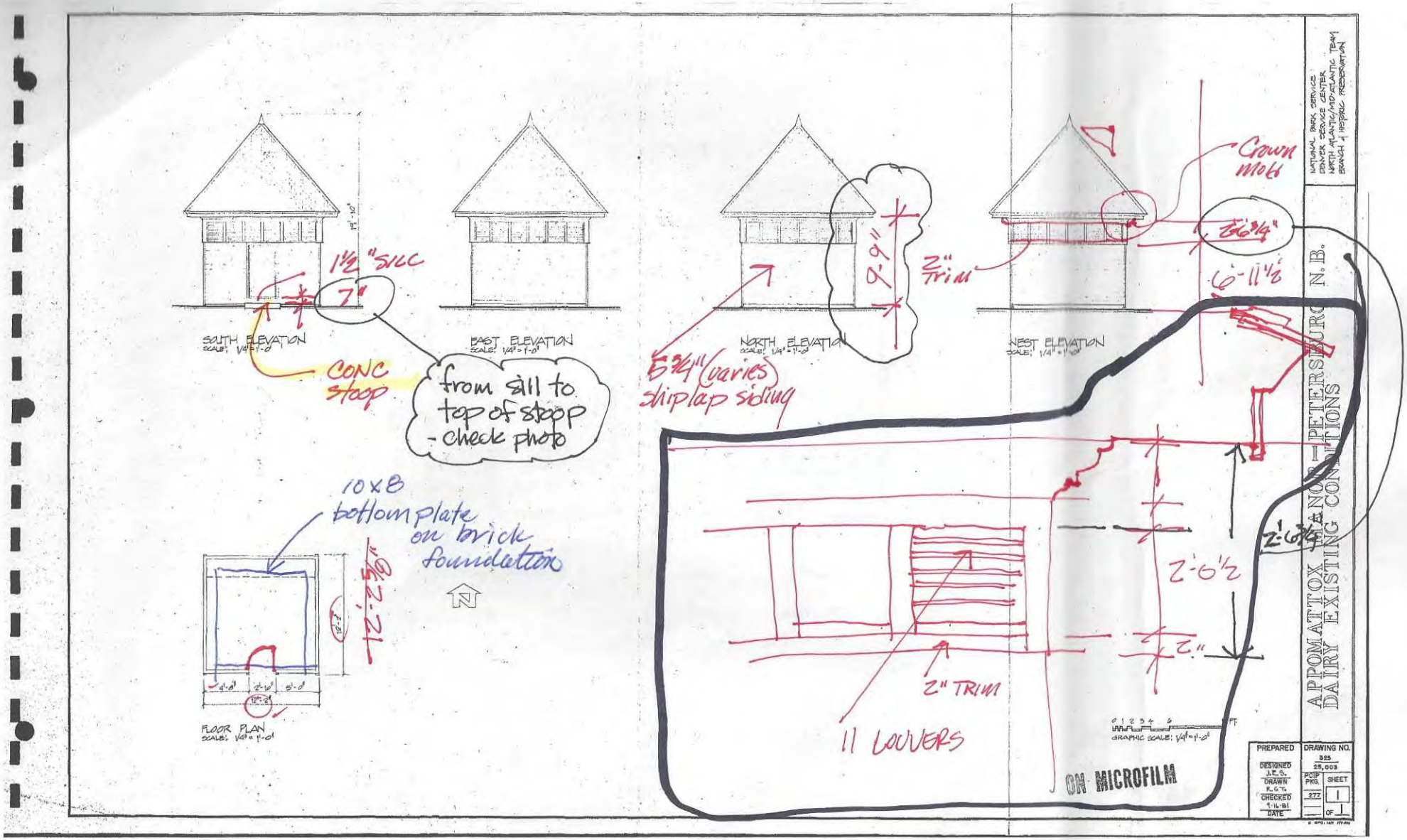
FLOOR PLAN
SCALE: 1/4" = 1'-0"



WINDOW ELEVATION
SCALE: 1½" = 1'-0"

DB’s Field Notes, Oct 2016

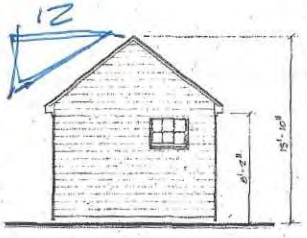
- See Sandy's drawing & diary.
- draw fdn plan.



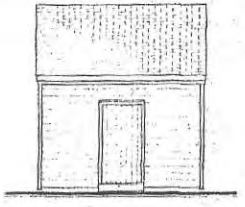
KITCHEN - LAUNDRY

APPO

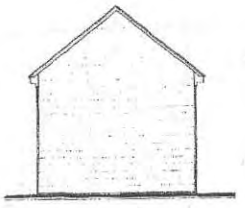
DEAN NOTES



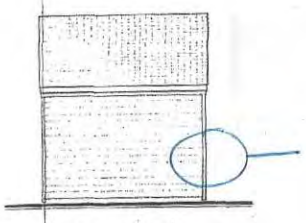
SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



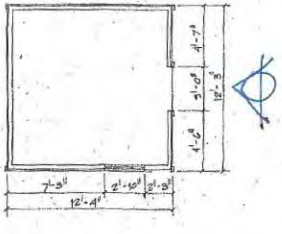
EAST ELEVATION
SCALE: 1/4" = 1'-0"



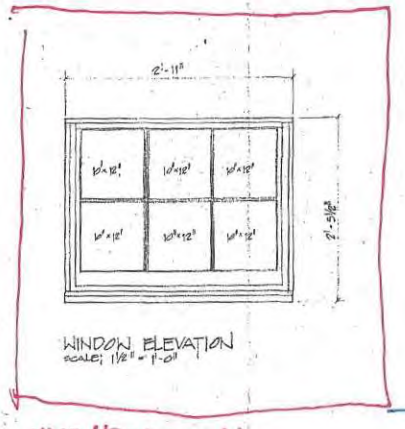
NORTH ELEVATION
SCALE: 1/4" = 1'-0"



WEST ELEVATION
SCALE: 1/4" = 1'-0"

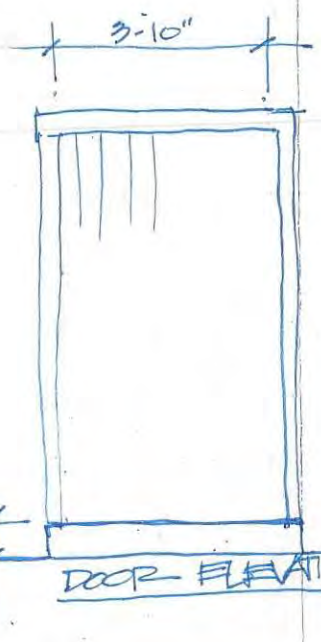


FLOOR PLAN
SCALE: 1/4" = 1'-0"

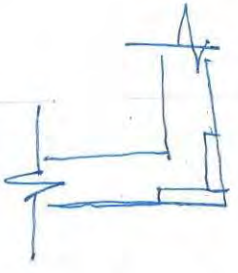


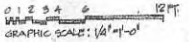
WINDOW ELEVATION
SCALE: 1 1/2" = 1'-0"

WINDOW 1:



DOOR ELEVATION





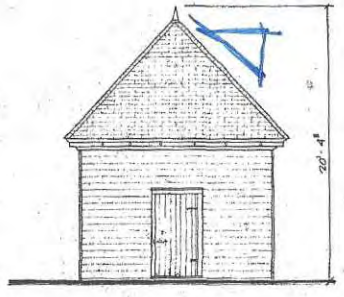
GRAPHIC SCALE: 1/4"=1'-0"

ON MICROFILM

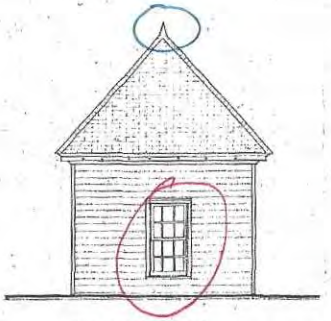
NATIONAL PARK SERVICE
DENVER SERVICE CENTER
NORTH ATLANTIC/MID-ATLANTIC TEAM
BRANCH OF HISTORIC PRESERVATION

APPOMATTOX MANOR—PETERSBURG N.B.
OLD SMOKEHOUSE EXISTING CONDITIONS

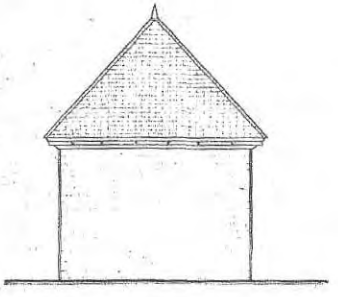
PREPARED	DRAWING NO.
DESIGNED S.E.G.	325 25,005
DRAWN R.G.T.	PCR PKG. 277
CHECKED 7-16-81 DATE	SHEET OF



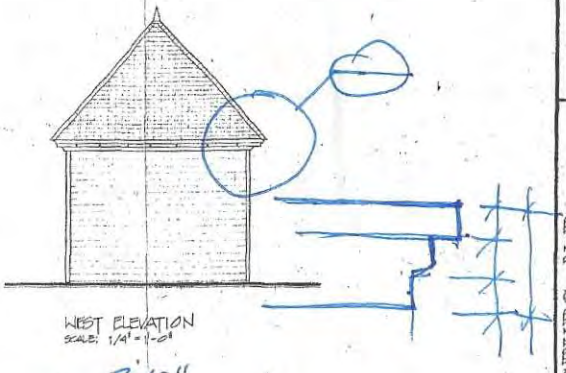
SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



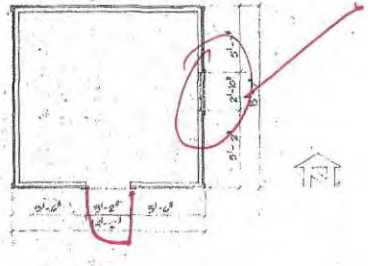
EAST ELEVATION
SCALE: 1/4" = 1'-0"



NORTH ELEVATION
SCALE: 1/4" = 1'-0"

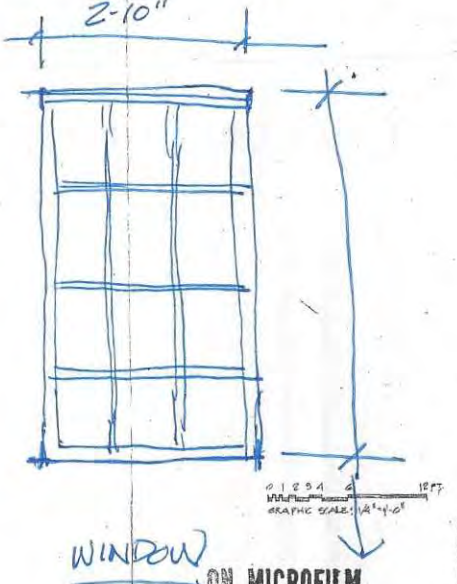


WEST ELEVATION
SCALE: 1/4" = 1'-0"



NO WINDOW (REMOVED)

DOOR



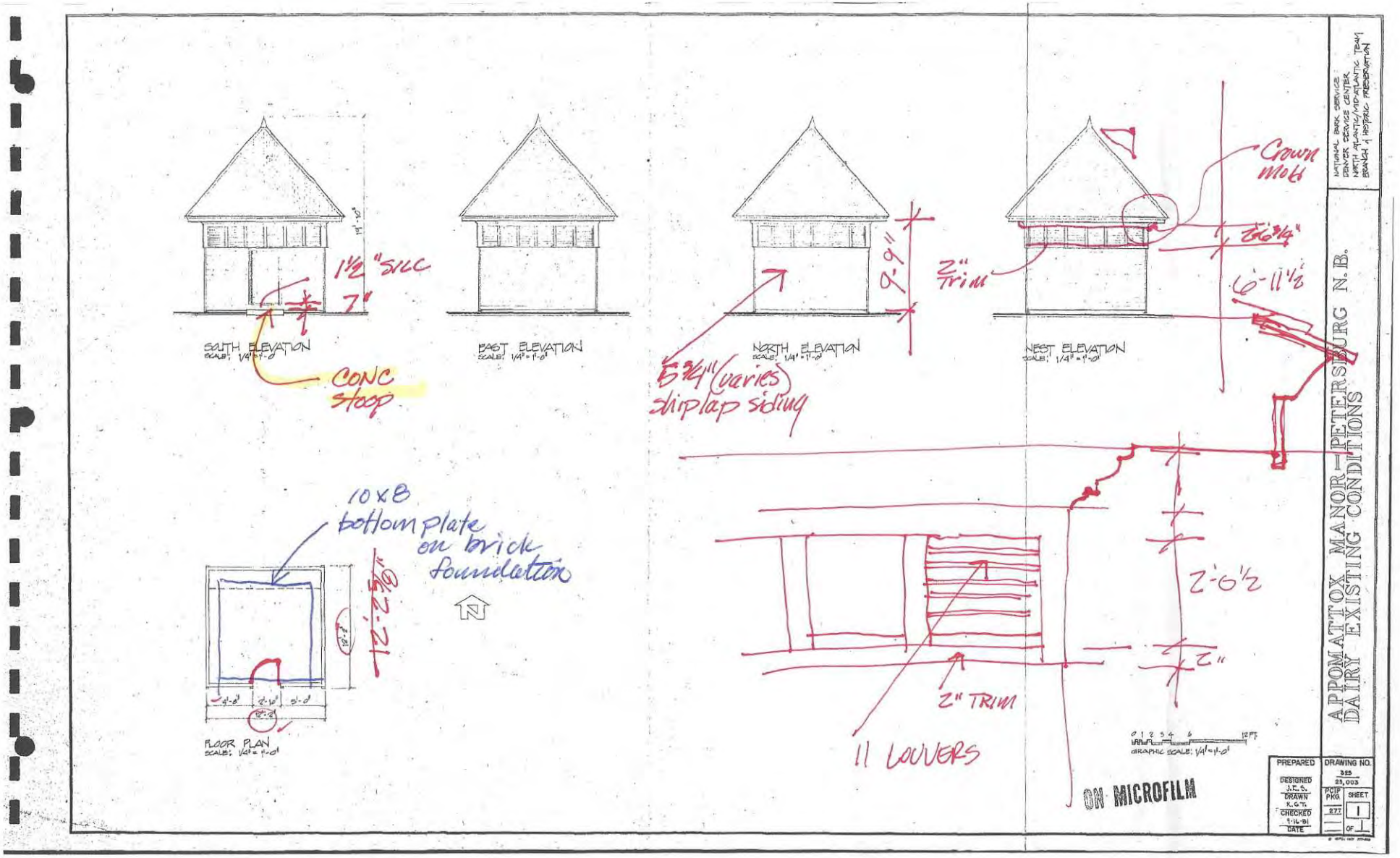
WINDOW ON MICROFILM

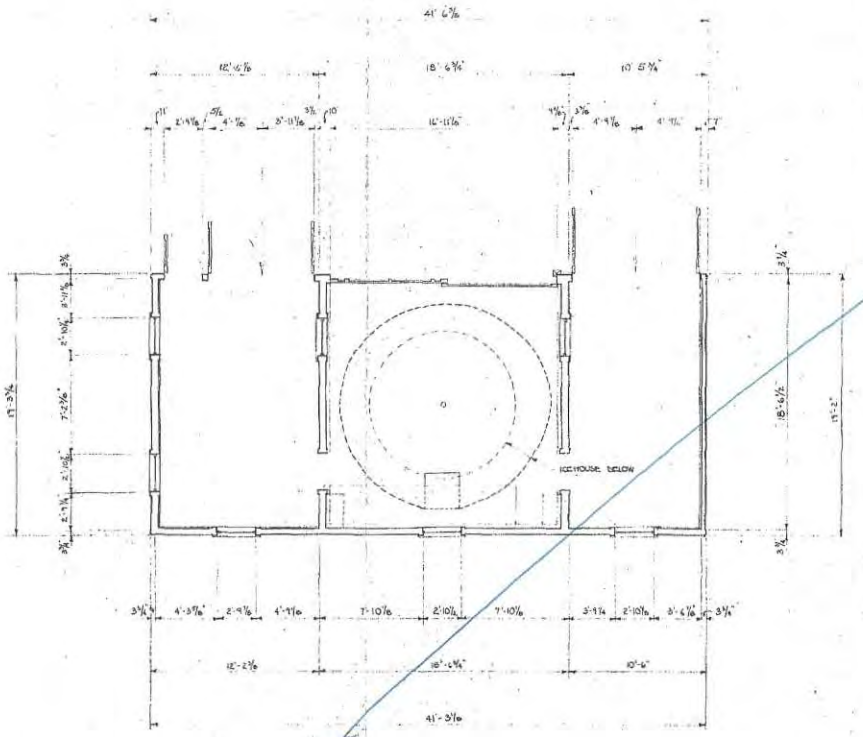
NATIONAL PARK SERVICE
DENVER SERVICE CENTER
NORTH ATLANTIC/MID-ATLANTIC TEAM
BRANCH of HISTORIC PRESERVATION

APPOMATTOX MANOR—PETERSBURG N.B.
SMOKEHOUSE EXISTING CONDITIONS

PREPARED	DRAWING NO.
DESIGNED G.T.S.	325 / 25,004
DRAWN K.K.T.	PCSP P/O 877
CHECKED	SHEET 1 OF 1
9-16-81 DATE	

- See Sandy's drawing & diary.
- draw fdn plan.





FLOOR PLAN
SCALE: 1/4" = 1'-0"

0 1 2 3 4 6 12FT.
GRAPHIC SCALE: 1/4" = 1'-0"

ON MICROFILM

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
NORTH ATLANTIC/MID-ATLANTIC TEAM
BRANCH of HISTORIC PRESERVATION

APPOMATTOX MANOR — PETERSBURG N.B.
CARRIAGE HOUSE EXISTING CONDITIONS

PREPARED	DRAWING NO.
R.G.T.	328
DESIGNED	25,002
R.G.T.	PKG
DRAWN	SHEET
CHECKED	1
9-16-81	OF 3
DATE	

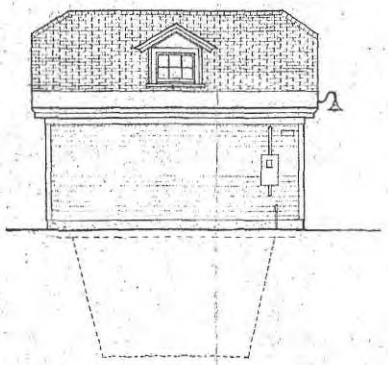
NATIONAL PARK SERVICE
DENVER SERVICE CENTER
NORTH ATLANTIC/MID-ATLANTIC TEAM
BRANCH of HISTORIC RESEARCH

APPOMATTOX MANOR — PETERSBURG N.B.
CARRIAGE HOUSE EXISTING CONDITIONS

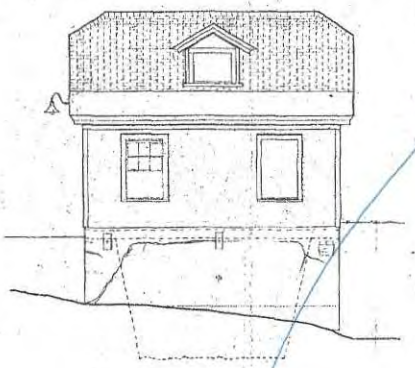
DRAWING NO. 388 80,032
SHEET 2 OF 3
PREPARED BY: K.E.T.
DESIGNED K.T.
DRAWN
CHECKED
DATE

ON MICROFILM

0 1 2 3 4 6 12 FT
GRAPHIC SCALE: 1/4" = 1'-0"



EAST ELEVATION
SCALE: 1/4" = 1'-0"



WEST ELEVATION
SCALE: 1/4" = 1'-0"

0 1 2 3 4 6 8 FT
GRAPHIC SCALE: 1/4" = 1'-0"

ON MICROFILM

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
NORTH ATLANTIC/MID ATLANTIC TEAM
BRANCH of HISTORIC PRESERVATION

APPOMATTOX MANOR - PETERSBURG N.B.
CARRIAGE HOUSE EXISTING CONDITIONS

PREPARED	DRAWING NO.
K.G.T.	325
DESIGNED	25,002
K.G.T.	PCIP PKG.
DRAWN	271
CHECKED	SHEET
4-16-91	3
DATE	OF 3

9. Digital Photographs

JDF’s Digital Photographs with Captions

	JDF2076: Dairy: North elevation.
	JDF2077: Dairy: East elevation.
	JDF2078: Dairy: South elevation.

	JDF2079: Dairy: West elevation, north half.
	JDF2080:Dairy: West elevation, oblique view.
	JDF2081: New smokehouse: North elevation.

	JDF2082: New Smokehouse: East elevation.
	JDF2083: New Smokehouse: South elevation.
	JDF2084: New Smokehouse: West elevation.

	JDF2085: Old Smokehouse: North elevation.
	JDF2086: Old Smokehouse: East elevation.
	JDF2087: Old Smokehouse: South elevation.

	JDF2088: Old Smokehouse: West elevation.
	JDF2089: Kitchen-Laundry: North elevation.
	JDF2090: Kitchen-Laundry: East elevation.

	JDF2091: Kitchen-Laundry: Southeast view.
	JDF2092: Kitchen-Laundry: Southwest view.
	JDF2093: Kitchen-Laundry: West elevation.

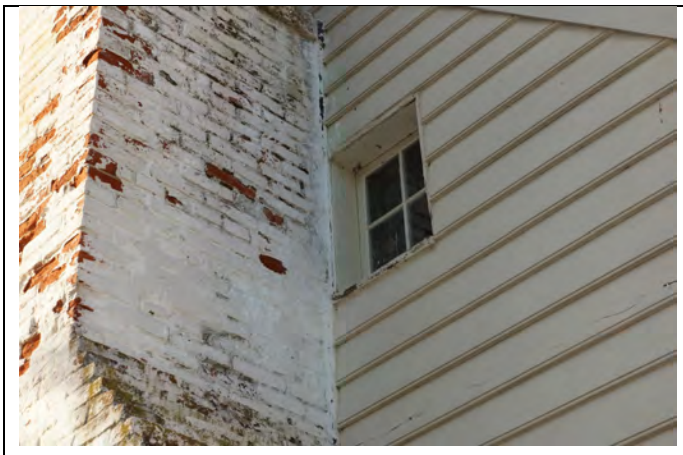
	JDF2094: Kitchen-Laundry: West elevation.
	JDF2095: Dairy: Door.
	JDF2096: New Smokehouse: Door.

	JDF2097: New Smokehouse: Interior face of door.
	JDF2098: Old Smokehouse: Door.
	JDF2099: Old Smokehouse: Interior face of door.

	JDF2100: Old Smokehouse: Window.
	JDF2101: DO NOT USE THIS PHOTO
	JDF2102: Old Smokehouse: Window interior face.

	JDF2103: Kitchen-Laundry: Northwest window.
	JDF2104: Kitchen-Laundry: Northeast window.
	JDF2105: Kitchen-Laundry: East elevation, north window.

	JDF2106: Kitchen-Laundry: East elevation, north door.
	JDF2107: Kitchen-Laundry: East elevation, south door.
	JDF2108: Kitchen-Laundry: East elevation, south window.

	JDF2109: Kitchen-Laundry: South elevation, southeast window.
	JDF2110: Kitchen-Laundry: South elevation, southwest window.
	JDF2111: Kitchen-Laundry: West elevation, south window.

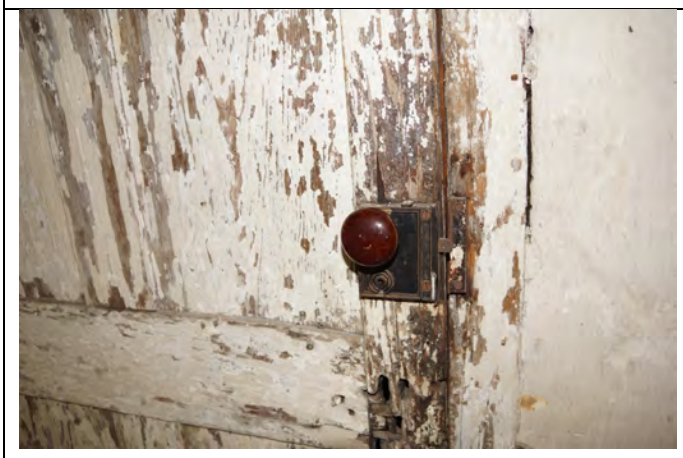
	JDF2112: Kitchen-Laundry: West elevation door.
	JDF2113: Kitchen-Laundry: West elevation, north window.
	JDF2114: Kitchen-Laundry: Northwest window exterior (taken from second floor).

	JDF2115: DO NOT USE THIS PHOTO
	JDF2116: Kitchen-Laundry: Interior of northwest window.
	JDF2117: Kitchen-Laundry: Northeast window, exterior.

	JDF2118: Kitchen-Laundry: Northeast window, interior.
	JDF2119: Kitchen-Laundry: Detail of northeast window, rotted sill, portion of rotten frame.
	JDF2120: Kitchen-Laundry: Southeast window, exterior.

	JDF2121: Kitchen-Laundry: Southeast window, interior.
	JDF2122: Kitchen-Laundry: Southwest window, exterior.
	JDF2123: Kitchen-Laundry: North room door, north face.

	JDF2124: Kitchen-Laundry: Hardware detail of door.
	JDF2125: Kitchen-Laundry: Catch for hardware detail of door.
	JDF2126: Kitchen-Laundry: North room door, south face.

	JDF2127: Kitchen-Laundry: South face of south room door.
	JDF2128: Kitchen-Laundry: Hardware for south room door.
	JDF2129: Kitchen-Laundry: North face of south room door.

	JDF2130: Kitchen-Laundry: Relationship of the two doors.
	JDF2131: Kitchen-Laundry: Unusual hardware of southeast casing of south door.
	JDF2132: Kitchen-Laundry: Metal straps of corners knob and tube.

	JDF2133: Kitchen-Laundry: First story, east elevation, north door.
	JDF2134: Kitchen-Laundry: First story, east elevation, south door.
	JDF2135: Kitchen-Laundry: West elevation's door's interior face.

	JDF2136: Kitchen-Laundry: East elevation, north window.
	JDF2137: Kitchen-Laundry: East elevation, south window.
	JDF2138: Kitchen-Laundry: West elevation, south window.

	JDF2139: Kitchen-Laundry: West elevation, north window.
	JDF2140: Kitchen-Laundry: South room, south elevation.
	JDF2141: Kitchen-Laundry: South room, west elevation.

	JDF2142: Kitchen-Laundry: South room, north elevation.
	JDF2143: Kitchen-Laundry: South room, east elevation.
	JDF2144: Kitchen-Laundry: South room, ceiling, east half.

	JDF2145: Kitchen-Laundry: South room, ceiling, west half.
	JDF2146: Kitchen-Laundry: South room, east half of floor.
	JDF2147: Kitchen-Laundry: South room, west half of floor.

	JDF2148: Kitchen-Laundry: Stairs up.
	JDF2149: Kitchen-Laundry: Stairs in progression.
	JDF2150: Kitchen-Laundry: Stairs in progression.

	JDF2151: Kitchen-Laundry: North room, looking at south elevation.
	JDF2152: Kitchen-Laundry: North room, west elevation.
	JDF2153: Kitchen-Laundry: North room, north elevation.

	JDF2154: Kitchen-Laundry: North room, east elevation.
	JDF2155: Kitchen-Laundry: North room, north half of ceiling.
	JDF2156: Kitchen-Laundry: North room, south half of ceiling.

	JDF2157: Kitchen-Laundry: Second floor, center section, east.
	JDF2158: Kitchen-Laundry: Second floor, center section, east wall to ceiling.
	JDF2159: Kitchen-Laundry: Second floor, ceiling over stairs.

	JDF2160: Kitchen-Laundry: Second floor, continued view of ceiling over stairs.
	JDF2161: Kitchen-Laundry: Second floor, center section, north wall, west.
	JDF2162: Kitchen-Laundry: Second floor, center section, north wall, east.

	JDF2163: Kitchen-Laundry: Second floor, center section, north wall, looking southeast.
	JDF2164: Kitchen-Laundry: Second floor, center section, south wall, west.
	JDF2165: Kitchen-Laundry: Second floor, south room, south elevation.

	JDF2166: Kitchen-Laundry: Second floor, south room, west elevation.
	JDF2167: Kitchen-Laundry: Second floor, south room, north elevation.
	JDF2168: Kitchen-Laundry: Second floor, south room, east elevation.

	JDF2169: Kitchen-Laundry: Roof structure of south room looking south.
	JDF2170: Kitchen-Laundry: Roof structure of south room looking north.
	JDF2171: Kitchen-Laundry: Second story, north room looking south at south elevation.

	JDF2172: Kitchen-Laundry: Second story, north room looking south at west elevation.
	JDF2173: Kitchen-Laundry: Second story, north room looking south at north elevation.
	JDF2174: Kitchen-Laundry: Second story, north room looking south at east elevation.

	JDF2175: Kitchen-Laundry: Second story, north room looking south at east elevation.
	JDF2176: Kitchen-Laundry: Second story, north room looking at north half of ceiling.
	JDF2177: Kitchen-Laundry: Second story, north room looking at south half of ceiling.

	JDF2178: Kitchen-Laundry: Second story, north room looking at south half of floor.
	JDF2179: Kitchen-Laundry: Second story, north room looking at north half of floor.
	JDF2180: Kitchen-Laundry: Second story, south room south half of floor.

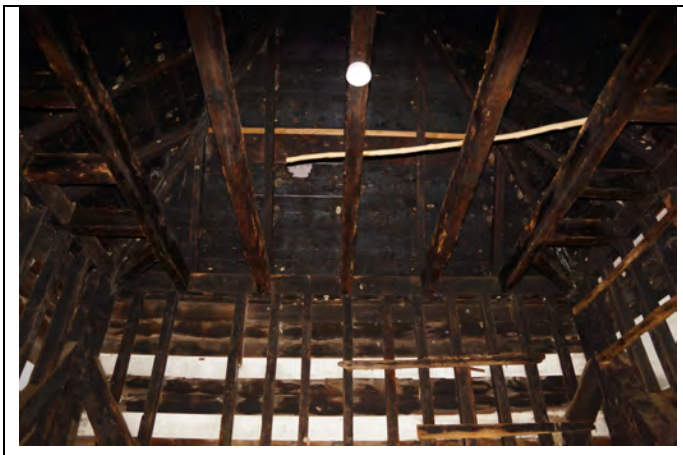
	JDF2181: Kitchen-Laundry: Second story, south room north half of floor.
	JDF2182: Dairy: South interior elevation.
	JDF2183: Dairy: West interior elevation.

	JDF2184: Dairy: North interior elevation.
	JDF2185: Dairy: East interior elevation.
	JDF2186: Dairy: Roof structure, north half.

	JDF2187: Dairy: Roof structure, south half.
	JDF2188: Dairy: Roof structure, looking straight up at peak.
	JDF2189: Dairy: South half of floor.

	JDF2190: Dairy: North half of floor.
	JDF2191: New Smokehouse: south interior elevation
	JDF2192: New Smokehouse: West interior elevation.

	JDF2193: New Smokehouse: North interior elevation.
	JDF2194: New Smokehouse: East interior elevation.
	JDF2195: New Smokehouse: South half of roof structure.

	JDF2196: New Smokehouse: North half of roof structure.
	JDF2197: New Smokehouse: Roof structure, looking straight up.
	JDF2198: New Smokehouse: North half of floor.

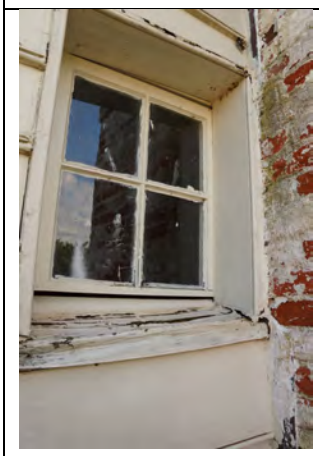
	JDF2199: New Smokehouse: South half of floor.
	JDF2200: Old Smokehouse: South interior elevation.
	JDF2201: Old Smokehouse: West interior elevation.

	JDF2202: Old Smokehouse: North interior elevation.
	JDF2203: Old Smokehouse: East interior elevation.
	JDF2204: Old Smokehouse: West roof structure.

	JDF2205: Old Smokehouse: East roof structure.
	JDF2206: Old Smokehouse: Roof structure looking straight up.
	JDF2207: Old Smokehouse: East floor.

	JDF2208: Old Smokehouse: West floor.
	JDF2209: Old Smokehouse: South window.
	JDF2210: Old Smokehouse: East door.

	JDF2211: Old Smokehouse Overall: Detail of removed/retained portion of original structure.
	JDF2212: Old Smokehouse: Close up of detail of removed/retained portion of original structure.
	JDF2213: Dairy shingle with dimensions in front of New Smokehouse.

	JDF2214:: Dairy shingle with dimensions in front of New Smokehouse.
	JDF2215: Kitchen-Laundry: Deterioration of window frame and sill, northeast window.
	JDF2216: Kitchen-Laundry: Detail of join of chimney with house.

	JDF2217: Kitchen-Laundry: Detail.
	JDF2218: Kitchen-Laundry: Detail.
	JDF2219: Dave Woodham.

	JDF2220: Dairy [??CONFIRM??]: Molding.
	JDF2221: Dairy [??CONFIRM??]: Molding.
	JDF2222: Condition: Example of minor end splits.

	JDF2223: Condition: Example of major end split.
	JDF2224: Kitchen-Laundry: Southeast, chimney has 10 courses of step back.
	JDF2225: Condition: Example of rot.

	JDF2226: Condition: Example of splits and rot.
	JDF2227: Kitchen-Laundry: Condition: Below threshold rot.
	JDF2228: Kitchen-Laundry: Condition: Center split and rot.

	JDF2229: Kitchen-Laundry: Southeast corner.
	JDF2230: Kitchen-Laundry: Southwest corner.
	JDF2231: Kitchen-Laundry: Southwest corner with light on chimney.

	JDF2232: Kitchen-Laundry: Condition: End split.
	JDF2233: Kitchen-Laundry: Condition: Corner board rot.
	JDF2234: New Smokehouse: Condition: Northeast corner board, rot spreads.

	JDF2235: New Smokehouse: Southeast corner: Detail of condition.
	JDF2236: New Smokehouse: Condition: Corner board rot.
	JDF2237: New Smokehouse: Condition: Corner board rot.

	JDF2238: New Smokehouse: Condition: Edge split.
	JDF2239: Old Smokehouse: South elevation rot, sprung plank, edge losses.
	JDF2240: Old Smokehouse: West elevation, center of weather board rot.

	JDF2241: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.
	JDF2242: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.
	JDF2243: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.

	JDF2244: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.
	JDF2245: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.
	JDF2246: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.

	JDF2247: Kitchen-Laundry: Chimney detail maximizing light at the end of the day.
	JDF2248:
	JDF2249: Kitchen-Laundry: First floor under structure.

	JDF2250: Kitchen-Laundry: First floor: View of west under structure, rotation is clockwise.
	JDF2251:
	JDF2252:

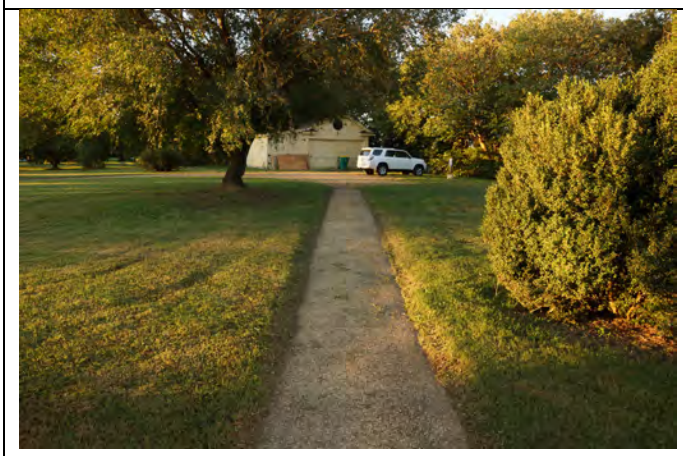
	JDF2253:
	JDF2254:
	JDF2255:

	JDF2256:
	JDF2257:
	JDF2258:

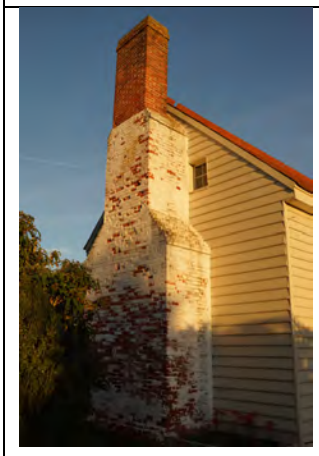
	JDF2259:
	JDF2260: Site: Landscape.
	JDF2261: Site: Cluster/setting.

	JDF2262: Site: Cluster/setting.
	JDF2263:
	JDF2264: Site: Concrete [??] site feature.

	JDF2265: Site: Barrel.
	JDF2266: Site: Step.
	JDF2267: Site: Vegetation.

	JDF2268: Site: Vegetation.
	JDF2269: Site: “Accessible” walk.
	JDF2270: Site: “Accessible” walk.

	JDF2271: Site: Alternative walk to front of building.
	JDF2272: Condition: Same siding issues for main house.
	JDF2273: Site: Front walk goes to stone paving.

	JDF2274: Kitchen-Laundry: Chimney joint.
	JDF2275: Kitchen-Laundry: South.
	JDF2276: Kitchen-Laundry: Downspout support bracket.

	JDF2277: Molding detail.
	JDF2278: Molding detail.
	JDF2279: Molding detail.

	JDF2280: Old Smokehouse: Powder post beetles at north gable end.
	JDF2281: Old Smokehouse: Powder post beetles at north gable end, missing cover board.
	JDF2282:

	JDF2283: Kitchen-Laundry: "Graffiti" at south elevation's north room of first floor.
	JDF2284: Kitchen-Laundry: East elevation, under threshold deterioration. Note flashing.
	JDF2285: Kitchen-Laundry: West elevation, north door.

	JDF2286: Kitchen-Laundry: West elevation, south door.

DW’s Digital Photograph Logs followed by Digital Photographs

DSCN	588	View up south chimney from firebox	Kitchen-Laundry	
DSCN	589	as above		
DSCN	590	as above		
DSCN	591	deleted		
DSCN	592	View up south chimney from firebox		
DSCN	593	as above		
DSCN	594	deleted		
DSCN	595	deleted		
DSCN	596	View up south chimney from firebox		
DSCN	597	Lintel S firebox		
DSCN	598	as above		
DSCN	599	as above		
DSCN	600	as above		
DSCN	601	View of S fireplae		
DSCN	602	View up north chimney from firebox		
DSCN	603	deleted		
DSCN	604	View up north chimney from firebox		
DSCN	605	as above		
DSCN	606	as above		
DSCN	607	Collar beam - top plate	Old Smokehouse	
DSCN	608	as above		
DSCN	609	as above		
DSCN	610	as above		
DSCN	611	as above		
DSCN	612	NE corner - gable end -top plate		
DSCN	613	as above		
DSCN	614	close up of above - out of focus		
DSCN	615	as above		
DSCN	616	removed corner post with mortise and peg		
DSCN	617	as above		
DSCN	652	Down braces at corner	New Smokehouse	
DSCN	653	interior wall with braces, sill and studs		
DSCN	654	as above		
DSCN	655	as above		
DSCN	656	as above		
DSCN	657	as above		
DSCN	658	as above		
DSCN	659	door opening		
DSCN	660	as above		
DSCN	661	door opening and corner		
DSCN	662	interior corner		
DSCN	663	wall		
DSCN	664	interior corner		
DSCN	665	collar beam and roof rafters		
DSCN	666	as above		

DSCN	667	as above		
DSCN	668	as above		
DSCN	669	as above		
DSCN	670	as above		
DSCN	671	as above		
DSCN	672	as above		
DSCN	673	as above		
DSCN	674	as above		
DSCN	675	interior corner		
DSCN	676	as above		
DSCN	677	interior wall		
DSCN	678	interior corner		
DSCN	679	interior wall with new studs at prev. window		
DSCN	680	interior corner		
DSCN	681	sill		
DSCN	682	collar beam - lookouts at corner		
DSCN	683	as above		
DSCN	684	as above		
DSCN	685	as above		
DSCN	686	as above		
DSCN	687	break in roof sheating		
DSCN	688	as above		
DSCN	689	splice in stud		
DSCN	690	as above		
DSCN	691	collar beam, studs and top plate	Dairy	
DSCN	692	as above		
DSCN	693	as above		
DSCN	694	as above		
DSCN	695	collar beam - lookouts at corner		
DSCN	696	as above		
DSCN	697	as above		
DSCN	698	Collar beam - top plate		
DSCN	699	lookout joinery in to collar beam		
DSCN	700	as above		
DSCN	701	lookout, false plate and rafters		
DSCN	702	rafter framing at center of roof		
DSCN	703	Down braces at corner		
DSCN	704	epoxy consolidation and some damage		
DSCN	705	as above		
DSCN	706	collar beam and roof rafters	Old Smokehouse	
DSCN	707	as above		
DSCN	708	as above		
DSCN	709	as above		
DSCN	710	as above		
DSCN	711	S elevation		

DSCN	712	top plate, false plate and rafters		
DSCN	713	interior sheathing		
DSCN	714	wood deterioration at sill	New Smokehouse	
DSCN	715	as above		
DSCN	716	as above		
DSCN	717	previous repair with steel rods		
DSCN	718	siding deterioration		
DSCN	719	framing at door		
DSCN	720	roof framing		
DSCN	721	as above		
DSCN	722	First floor framing from center of room to west four	Kitchen-Laundry	
DSCN	723	new centerspan framing running N-S under first floor		
DSCN	724	new centerspan framing running N-S at south termination		
DSCN	725	new centerspan framing towards north from closet hatch		
DSCN	726	plumb measurement at N elevation	Old Smokehouse	
DSCN	727	framing under floor		
DSCN	728	as above		
DSCN	729	as above		
DSCN	730	as above		
DSCN	731	kitchen-laundry from SE	Kitchen-Laundry	
DSCN	732	S elevation	Manor	
DSCN	733	SE elevation		
DSCN	734	replaced mortar at sample area - N chimney	Kitchen-Laundry	
DSCN	735	roof framing		
DSCN	736	as above		
DSCN	737	as above		
DSCN	738	as above		
DSCN	739	as above - mortise and tenon joint with peg		
DSCN	740	as above		
DSCN	741	as above		
DSCN	742	as above		
DSCN	743	area of void detected by SPR - N chimney		
DSCN	744	roof framing		
DSCN	745	as above		
DSCN	746	as above		
DSCN	747	as above		
DSCN	748	as above		
DSCN	749	as above		
DSCN	750	as above		
DSCN	751	as above		
DSCN	752	as above		
DSCN	753	as above		
DSCN	754	as above		
DSCN	755	as above		
DSCN	756	as above		

DSCN	757	as above		
DSCN	758	as above		
DSCN	759	as above		
DSCN	760	as above		
DSCN	761	as above		
DSCN	762	as above		
DSCN	763	as above		

DW’s Digital Photograph Logs followed by Digital Photographs

DSCN	588	View up south chimney from firebox	Kitchen-Laundry	
DSCN	589	as above		
DSCN	590	as above		
DSCN	591	deleted		
DSCN	592	View up south chimney from firebox		
DSCN	593	as above		
DSCN	594	deleted		
DSCN	595	deleted		
DSCN	596	View up south chimney from firebox		
DSCN	597	Lintel S firebox		
DSCN	598	as above		
DSCN	599	as above		
DSCN	600	as above		
DSCN	601	View of S fireplae		
DSCN	602	View up north chimney from firebox		
DSCN	603	deleted		
DSCN	604	View up north chimney from firebox		
DSCN	605	as above		
DSCN	606	as above		
DSCN	607	Collar beam - top plate	Old Smokehouse	
DSCN	608	as above		
DSCN	609	as above		
DSCN	610	as above		
DSCN	611	as above		
DSCN	612	NE corner - gable end -top plate		
DSCN	613	as above		
DSCN	614	close up of above - out of focus		
DSCN	615	as above		
DSCN	616	removed corner post with mortise and peg		
DSCN	617	as above		
DSCN	652	Down braces at corner	New Smokehouse	
DSCN	653	interior wall with braces, sill and studs		
DSCN	654	as above		
DSCN	655	as above		
DSCN	656	as above		
DSCN	657	as above		
DSCN	658	as above		
DSCN	659	door opening		
DSCN	660	as above		
DSCN	661	door opening and corner		
DSCN	662	interior corner		
DSCN	663	wall		
DSCN	664	interior corner		
DSCN	665	collar beam and roof rafters		
DSCN	666	as above		

DSCN	667	as above		
DSCN	668	as above		
DSCN	669	as above		
DSCN	670	as above		
DSCN	671	as above		
DSCN	672	as above		
DSCN	673	as above		
DSCN	674	as above		
DSCN	675	interior corner		
DSCN	676	as above		
DSCN	677	interior wall		
DSCN	678	interior corner		
DSCN	679	interior wall with new studs at prev. window		
DSCN	680	interior corner		
DSCN	681	sill		
DSCN	682	collar beam - lookouts at corner		
DSCN	683	as above		
DSCN	684	as above		
DSCN	685	as above		
DSCN	686	as above		
DSCN	687	break in roof sheating		
DSCN	688	as above		
DSCN	689	splice in stud		
DSCN	690	as above		
DSCN	691	collar beam, studs and top plate	Dairy	
DSCN	692	as above		
DSCN	693	as above		
DSCN	694	as above		
DSCN	695	collar beam - lookouts at corner		
DSCN	696	as above		
DSCN	697	as above		
DSCN	698	Collar beam - top plate		
DSCN	699	lookout joinery in to collar beam		
DSCN	700	as above		
DSCN	701	lookout, false plate and rafters		
DSCN	702	rafter framing at center of roof		
DSCN	703	Down braces at corner		
DSCN	704	epoxy consolidation and some damage		
DSCN	705	as above		
DSCN	706	collar beam and roof rafters	Old Smokehouse	
DSCN	707	as above		
DSCN	708	as above		
DSCN	709	as above		
DSCN	710	as above		
DSCN	711	S elevation		

DSCN	712	top plate, false plate and rafters		
DSCN	713	interior sheathing		
DSCN	714	wood deterioration at sill	New Smokehouse	
DSCN	715	as above		
DSCN	716	as above		
DSCN	717	previous repair with steel rods		
DSCN	718	siding deterioration		
DSCN	719	framing at door		
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DSCN	735	roof framing		
DSCN	736	as above		
DSCN	737	as above		
DSCN	738	as above		
DSCN	739	as above - mortise and tenon joint with peg		
DSCN	740	as above		
DSCN	741	as above		
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DSCN	743	area of void detected by SPR - N chimney		
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DSCN	745	as above		
DSCN	746	as above		
DSCN	747	as above		
DSCN	748	as above		
DSCN	749	as above		
DSCN	750	as above		
DSCN	751	as above		
DSCN	752	as above		
DSCN	753	as above		
DSCN	754	as above		
DSCN	755	as above		
DSCN	756	as above		

DSCN	757	as above		
DSCN	758	as above		
DSCN	759	as above		
DSCN	760	as above		
DSCN	761	as above		
DSCN	762	as above		
DSCN	763	as above		

DSCN0588

DSCN0589

DSCN0590

DSCN0592

DSCN0593

DSCN0596

DSCN0597

DSCN0598

DSCN0599

DSCN0600

DSCN0601

DSCN0602

DSCN0604

DSCN0605

DSCN0606

DSCN0607

DSCN0608

DSCN0609

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DSCN0611

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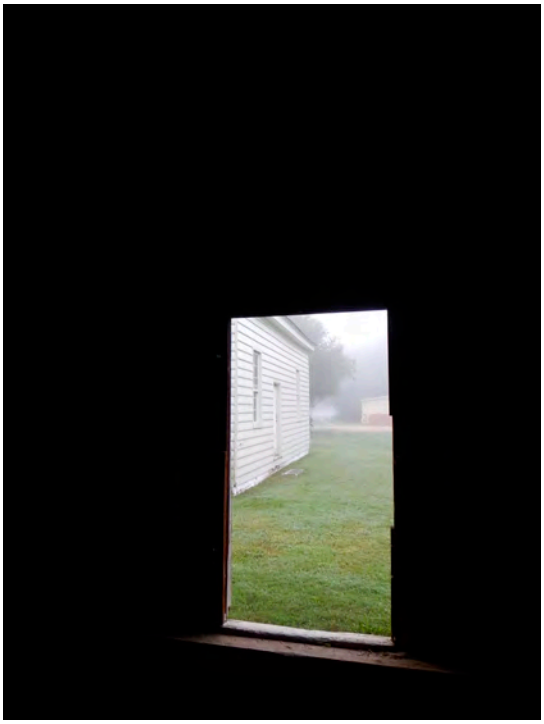

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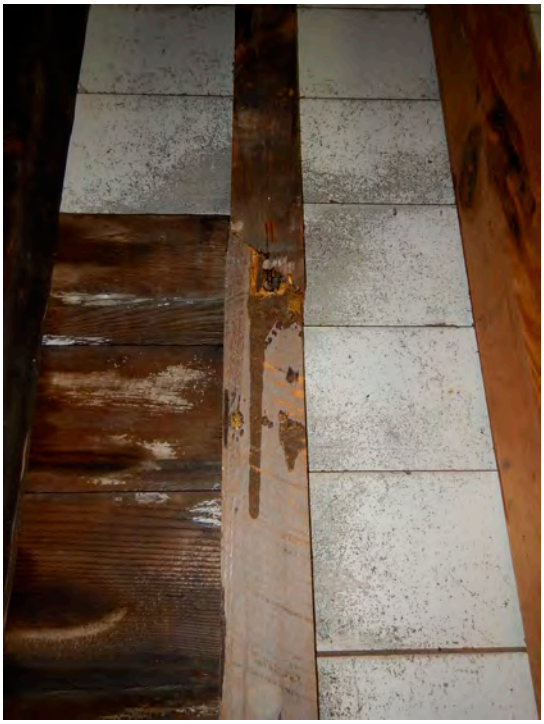

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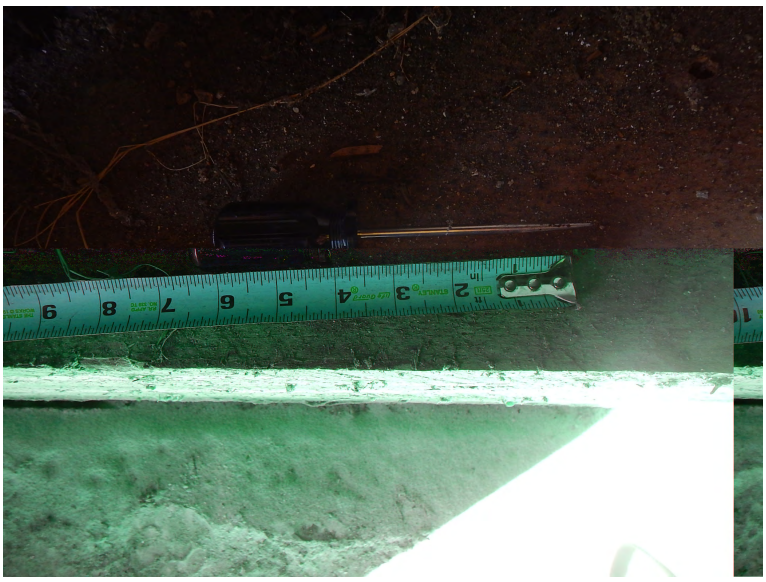

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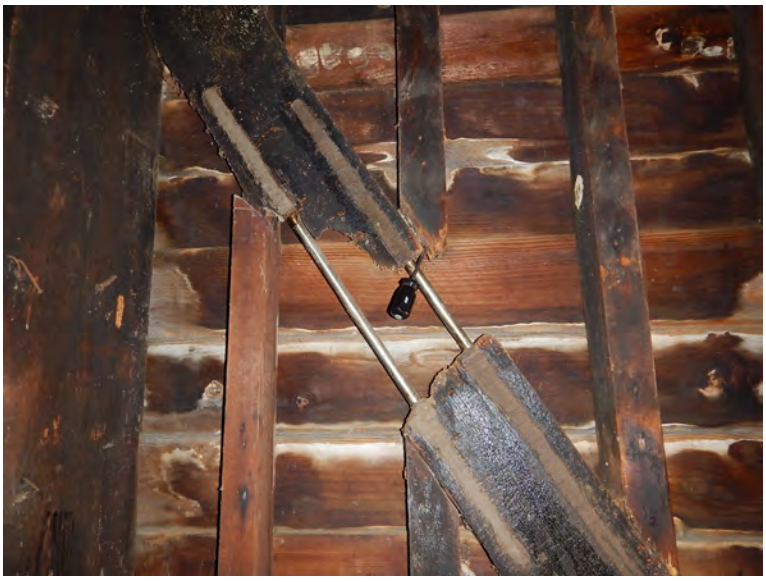

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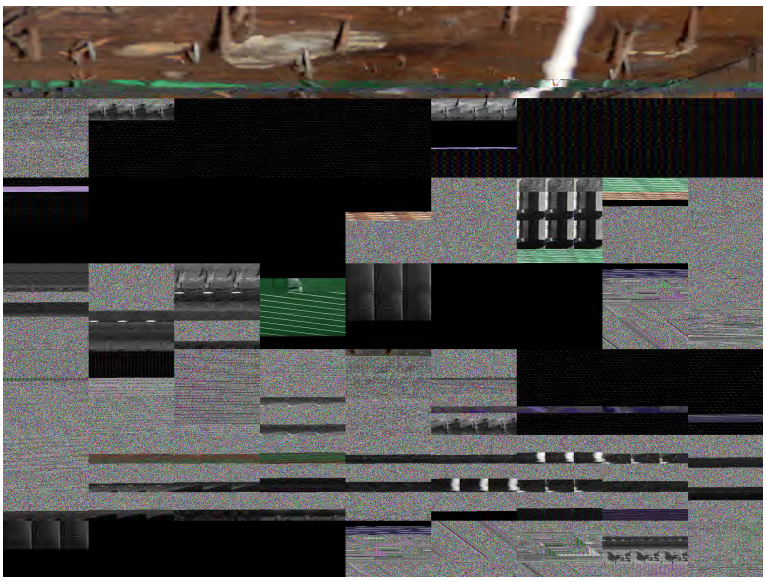

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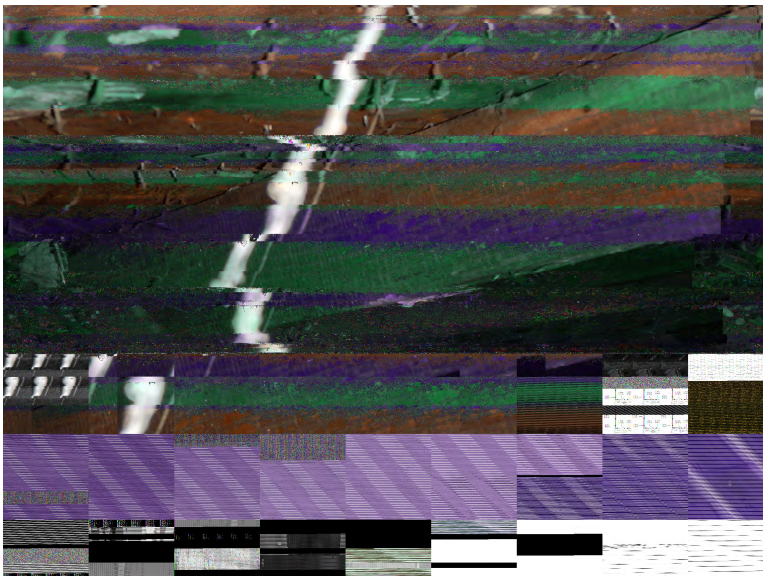

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