historic structure report
and
historic furnishing study

HISTORICAL AND ARCHITECTURAL DATA

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HOPEWELL VILLAGE

THE BLACKSMITH SHOP, WHEELWRIGHT-CARPENTER SHOP,
AND CHARCOAL HOUSE

NATIONAL HISTORIC SITE / PENNSYLVANIA

HISTORIC STRUCTURE REPORT

THE BLACKSMITH SHOP AND WHEELWRIGHT-CARPENTER SHOP

AND

HISTORIC FURNISHING STUDY

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HOPEWELL VILLAGE NATIONAL HISTORIC SITE

PENNSYLVANIA

by

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HISTORICAL DATA

HISTORIC STRUCTURE REPORT

THE BLACKSMITH SHOP AND WHEELWRIGHT-CARPENTER SHOP

AND

HISTORIC FURNISHING STUDY

THE BLACKSMITH SHOP, WHEELWRIGHT-CARPENTER SHOP,

AND CHARCOAL HOUSE

by

John Albright

PREFACE

Since its incorporation into the National Park System, Hopewell Village National Historic Site has been the subject of numerous research studies. Because standards have changed over the years it has become increasingly necessary to consolidate some of the research already accomplished, to add any new data available, and to present the sum total in a format representing current activity standards, although with only minor exceptions, the historical facts and conclusions in the original studies remain valid today. To some extent this is a duplication of effort, although duplication of some of the more lengthy studies has been avoided, whenever possible.

To a great extent this project, Package 106 of Fiscal Year 1974, is a consolidation of some of the excellent research into primary sources conducted in the fields of archeology, history, and historical architecture at Hopewell Village since 1938. Those National Park Service reports and studies most frequently used by the author are the following (full citations in bibliography):

1. Apple, Russell A., "Documentation For The Historical Base Maps, Hopewell Village National Historic Site," June, 1956.

2. Fairbairn, Charlotte J., "Abstracts of Title, 1737-1873, Hopewell Furnace Lands Courthouse Research and Abstracts," 1963. (This data formed the basis of Fairbairn's "Hopewell Village Lands Traced Back to Penns," Historical Review of Berks County, (Winter, 1963-1964).

3. Gale, Howard, "Report on the Furnishings and Equipment and Methods Used in the Blacksmith Shop," 1941.

4. Heydinger, Earl J., "Historic Structures Report, Part I, Blacksmith Shop, Building No. 6, Historical Data Section, Hopewell Village National Historic Site," 1965.

5. Heydinger, Earl J, "Historic Structures Report, Part II, Wheelwright Shop, Building #35, Historical Data Section, Hopewell Village National Historic Site," 1964.

6. Heydinger, Earl J., "Historic Structures Report, Part II, Charcoal House, Building 9," 1965.

7. Motz, J. C. Fischer, assisted by Howard Gale, "Report on the Archeological Investigation of the Blacksmith Shop, Hopewell Village National Historic Site," 1940.

8. Souder, Norman M., "Historic Structures Report, Part I, Architectural Data Section on the Blacksmith Shop, Hopewell Village National Historic Site," 1965.

This report contains two different types of studies. The blacksmith shop is the subject of an historic structure report, type 35, including both historical and architectural data. The wheelwright shop is the subject of anhistoric structure report, type 35, containing historical data only. The blacksmith shop, wheelwright shop, and charcoal house are also the subjects of an historic furnishing study, type 34.

Working at Hopewell Village National Historic Site was made easier by many factors. The extensive collection of source material, the careful indexing of the material, and the cooperation of Superintendent Wallace Elms and his staff all combined to make this research project a most rewarding one. I extend my most hearty thanks to the park staff.

The staffs at Cornwall Furnace State Historic Site, the Pennsylvania State Museum at Harrisburg, and the U. S. Army Military History Research Collection, Carlisle Barracks, Pennsylvania, all provided a great deal of help and assistance during the search for comparative furnishings data.

INTRODUCTION

Hopewell Village National Historic Site is located in the iron- and limestone-rich rolling hills of eastern Pennsylvania, about 12 miles from the Morgantown exit of the Pennsylvania Turnpike. Founded about 1771, Hopewell Furnace, as the town was originally called, was a community centered around a charcoal furnace, the common type of furnace in eastern Pennsylvania. Hopewell Furnace produced iron for about 112 years: ca. 1771-1883.

Charcoal was produced from the hardwood forests surrounding the furnace and ore and limestone were brought by wagon from nearby mines and quarries. From the ore, limestone (used as a flux in the smelting process), and charcoal came iron. Bars of pig iron were sent to forges nearby for conversion to wrought iron. Stove plates cast at Hopewell were shipped to nearby towns and cities for assembly in stoves that were later sold.

The village associated with the furnace was, to a limited degree, a self-sustaining one. Orchards and farms produced a significant amount of the food consumed by the workers who lived in tenant homes at the furnace site. The blacksmith shop, too, served the needs of the community, repairing and fabricating wrought-iron products.

This study concerns three of the furnace's ancillary buildings: the blacksmith shop, wheelwright shop, and charcoal house.

The blacksmith shop is currently standing, is partially furnished, and is a major visitor attraction. The wheelwright shop (which served many additional purposes) was torn down prior to 1900. The charcoal house, a storage building for charcoal, is standing and is partially furnished.

I. ADMINISTRATIVE DATA

A. Name and Number of Structures

Building Name	Number
Wheelwright Shop	35
Blacksmith Shop	6
Charcoal House	9

These three buildings will be classified as structures of the 3rd Order of Significance in the National Register and in the List of Classified Structures forms currently being prepared.

B. Proposed Use of Structures

As outlined in Package 106 of Fiscal Year 1974, the restoration for all three buildings is to reflect their 1820 to 1840 period appearance and furnishings. The blacksmith shop, Historic Building 6, will be restored as a blacksmith shop. The charcoal house, Historic Building 9, will be furnished more completely than it is at present. Reconstruction of the wheelwright shop, Historic Building 35, is recommended in Package 106. At present, only the pit of the wheelwright shop remains.

C. Cooperative Agreements

There are no cooperative agreements in force concerning the buildings.

II. OWNERSHIP OF HOPEWELL VILLAGE

The early history of Hopewell Furnace was filled with land ownership controversies,[1] in which Hopewell Furnace and its associated buildings were considered as a whole. The phrase "Messuage Furnace and appurtenances commonly called Hopewell Furnace,"[2] for example, appears on a 1788 deed. The ownership sequence of the blacksmith shop and the wheelwright shop, therefore, is that of Hopewell Village as a whole, the two buildings being "appurtenances" to the "Messuage Furnace."[3]

A March 25, 1769 deed for a 33-acre tract sold to Mark Bird by Owen Hugh for £76 10s. included the land on which the furnace and village complex would be built. The land was subject to a half-penny sterling quitrent to the colony's proprietors.[4] About two years later, as Bird continued to develop the site, controversies involving the furnace began to develop. Bird brought water to power his waterwheel via a partially stonelined ditch known as the west headrace over land that was not his. The resulting suits and difficulties caused Bird to begin construction of a dam on French Creek to ensure a flow of water on his own land to turn the waterwheel which powered the compressors for the air blast into the furnace.

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1. Joseph E. Walker, Hopewell Village: A Social and Economic History of an Iron-Making Community (Philadelphia: University of Pennsylvania Press, 1966), pp. 19-37 (hereafter cited as Walker, Hopewell Village), discusses this aspect of Hopewell's early history.

2. Charlotte J. Fairbairn, "Hopewell Village Lands Traced Back to Penns," Historical Review of Berks County /Pennsylvania/ (Winter, 1963-1964), p. 143 (hereafter cited as Fairbairn, "Hopewell Village Lands"), citing deed dated Dec. 3, 1788, Berks County Deed Book A, 2:402. Both Walker and Fairbairn (then an historian at Hopewell Village NHS) trace the ownership of the lands on which the blacksmith shop and wheelwright shop were built. Fairbairn's work, based on data in the park files and on courthouse searches, is more detailed than Walker's. Her chain of title study, on file at Hopewell Village NHS, is not duplicated here.

3. "Messuage," of French origin, defines a central building with adjoining buildings, presumably of related purpose. The tax records, likewise, are scant on historical information, and provide no structural data on any of the buildings considered in this report.

4. Walker, Hopewell Village, p. 21; Fairbairn, "Hopewell Village Lands," p. 140, citing Berks County Deed Book A, 6:237.

By 1784, Hopewell Furnace and its owner, Mark Bird, fell into financial difficulties, apparently caught up in the general economic depression following the War of Independence.[5] Floods in the area two years later added to Bird's financial problems not only at Hopewell, but elsewhere in nearby counties. He and his partner, James Wilson (the beginning date of their partnership is not known), who was a signer of the Declaration of Independence, Mark Bird's brother-in-law, and a prominent Pennsylvania lawyer, mortgaged the partnership's holdings for "200,000 fine Spanish milled Silver Dollars," on March 29, 1785.[6] The Bank of North America discounted part of the mortgage, and, when Wilson and Bird failed to meet their obligations, the mortgage was foreclosed. The partners then satisfied the obligation by releasing Hopewell lands to John Nixon on November 30, 1786.[7] The wealthy Philadelphia merchant waited less than two years before putting Hopewell Furnace up for sale on April 22, 1788.[8] On August 27, 1788, James Old (two-thirds interest) and Cadwallader Morris (one-third interest) purchased Hopewell Estate,[9] the final survey completed and the deed transfer executed on December 30, 1788. This deed again cited "all that Messauge Furnace and appurtenances commonly called Hopewell Furnace and of the several tracts of land contiguous" to the extent of 3,328 acres for payment of £11,048 8s.[10] The partnership of Morris and

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5. Walker, Hopewell Village, pp. 29-30.

6. Walker, Hopewell Village, p. 30, citing mortgage dated Mar. 29, 1785, Berks County Surveyor, General Draughts and Miscellaneous Old Papers, 1700 to Early 1800, Prothonotary's Office, Berks County Courthouse, Reading, Pennsylvania. This mortgage probably included all of Bird's holdings, not just Hopewell.

7. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Nov. 30, 1786, Deed Poll, Berks County Deed Book A, p. 504.

8. Fairbairn, "Hopewell Village Lands," p. 140, citing Pennsylvania Gazette, Apr. 2, 1788, files Berks County Historical Society, Reading, Pennsylvania.

9. Fairbairn, "Hopewell Village Lands," p. 140, citing indenture dated Aug. 27, 1788, Berks County Deed Book 12, pp. 288-89.

10. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Dec. 30, 1788, Berks County Deed Book A, 11:402.

Olds remained intact until January 27, 1790, when Benjamin Morris purchased his brother Cadwallader's one-third interest for £542 5s.[11] Within fifteen months, Morris bought Old's interest for £12,000 and became sole owner of Hopewell Furnace.[12]

Exactly two years later, on December 31, 1793, Morris and James Old exchanged the property again, but this time the price had risen to £20,000.[13] Hopewell Furnace, for the moment, was valuable. Morris, Old, and Mark Bird's earlier partner, James Wilson, then began an almost dizzying exchange of the Hopewell property. The various transactions of passing Hopewell Furnace and property back and forth reflect both the periodic failures of the operation and the furnace's obvious business potential, evident even in times of depression. Frequent floods on French Creek added to the rise and fall of property values at Hopewell. On February 6, 1794, Old sold to James Wilson the same land for the same price, £20,000.[14] Two weeks later Wilson mortgaged the property to Old for six payments of £4,000 each.[15] Wilson then immediately leased the property to three men, John René Barde, John Lewis Barde, and Paul Henry Mallet Prevost, reserving for his own use the house and some 30 acres of land. The lessees were, in turn, to furnish pig iron for Wilson's Birdsboro forge.[16]

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11. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Jan. 27, 1790, Berks County Deed Book A, 11:548.

12. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Dec. 31, 1793, Berks County Deed Book 13, p. 480.

13. Ibid.

14. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Feb. 6, 1794, Berks County Deed Book 13, p. 485.

15. Fairbairn, "Hopewell Village Lands," p. 140, citing mortgage dated Feb. 20, 1794, Berks County Mortgage Book F, p. 6.

16. Walker, Hopewell Village, pp. 35-36, citing Hopewell Document 7950501A, the lease agreement.

(Hopewell Village NHS documents are numbered according to the date of the document. The reference "8260121" designates an item drawn up in the year 1826 /"826"/, in the month of January /"01"/, on the twenty-first day of the month /"21"/. A letter following the number, such as "A," "B," etc. is used to differentiate documents written on the same day.)

Wilson's financial fortunes took a deep plunge in 1795 when Hay Creek flooded and inundated his Birdsboro forge, about four miles away. Shortly thereafter, his holdings--except for Hopewell Furnace--were sold off piece by piece. Wilson's Hopewell property reverted to the mortgage holder, James Old, as the result of a suit on November 9, 1799, in which Benjamin Morris claimed payment on an earlier James Old purchase of Hopewell Furnace. This complicated matter was resolved on November 9, 1799, at a sheriff's sale, when Benjamin Morris, the highest bidder, purchased the property for £2,525. He thus owned the property outright, with no liens or mortgages.[17] He was then free to sell Hopewell Furnace, which he promptly did.

On August 21, 1800, transferal of the deed to Daniel Buckley and his two brothers-in-law, Thomas Brooke and Mathew Brooke, Jr., was recorded.[18] The furnace was to remain with the Buckley and Brooke families

> who would nourish it through many lean years and at last reap a rich reward from its prosperous period of production. Hopewell remained in the possession of descendants of these men until the property was sold to the United States Government in the 1930's.[19]

Hopewell Furnace and its lands remained under Buckley-Brooke-Brooke control from 1800 to 1821, its longest period of ownership without transferal of any kind.[20] In 1821 Mathew Brooke died, and in August

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17. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Nov. 9, 1799, Old Book #2, Prothonotary's Office, Berks County Courthouse, p. 162.

18. Fairbairn, "Hopewell Village Lands," p. 140, citing deed dated Aug. 21, 1800, Berks County Deed Book 17, p. 219.

19. Walker, Hopewell Village, p. 37.

20. The period was not without lawsuits and claims against the property. One such lengthy lawsuit, Leasee of John Penn and Richard Penn Esqr v. Mathew Brooke, known as the "Penn Claims Case," involved the woodlands surrounding Hopewell, and dragged on from 1808 to 1815. These claims and suits did not involve the blacksmith or wheelwright shops. See Walker, Hopewell Village, pp. 44-54.

of 1824 the remaining two partners, Daniel Buckley and Thomas Brooke, settled with Mathew Brooke's children, with the children and the two partners each gaining one-half interest.[21]

This arrangement continued for three years, until 1827, when Daniel Buckley died, leaving his interest in the property to his children. In 1830 Thomas Brooke died, leaving his share to his children.[22] Then, in 1852, Clement Brooke, who had long served as ironmaster, and who owned one-quarter interest, bought the one-quarter interest of his brother (Charles Brooke), and also the one-half interest owned by Mathew Brooke Buckley.[23] Again, briefly, Hopewell Furnace had one owner, though possibly the whole transaction was designed to squeeze out Charles Brooke.[24] Almost as soon as Clement Brooke became sole owner, he resold one-half interest to Mathew Brooke Buckley.[25] In January 1856 Mathew died, passing on one-third of his one-half share to his wife, Mary, and the rest to his son, Edward S. Buckley.[26] Clement Brooke willed his one-half interest to his daughter, Maria T. Clingan, on May 14, 1861.[27] On Mary Buckley's death, her son sold their combined one-half interest to Maria Clingan's children--Charles B. and Alan Hunter Clingan, and A. Louise Clingan Brooke.[28] By 1905 A. Louise Clingan Brooke owned all the property.[29] She, in turn, sold it thirty years later to the Federal Government.[30]

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21. Fairbairn, "Hopewell Village Lands," p. 142, citing Breve de Partition, Appearances Docket, /Berks County Courthouse/ Court of Common Pleas, August 1824 Term, p. 210.

22. "Brief Title of Hopewell Property," Hopewell Document 8730407.

23. Fairbairn, "Hopewell Village Lands," p. 142, citing Berks County Deed Book 59, p. 529.

24. Walker, Hopewell Village, p. 62. Walker suggests the entire deal was aimed at squeezing out Charles Brooke.

25. Ibid., citing Deed of Sale, Dec. 6, 1853, Hopewell Document 8531206.

26. Fairbairn, "Hopewell Village Lands," p. 142, citing will dated Jan. 17, 1856, Chester County Will Book 35, p. 165.

27. Fairbairn, "Hopewell Village Lands," citing will dated May 14, 1861, Berks County Will Book 45, p. 371.

28. Walker, Hopewell Village, p. 67, citing deed dated Mar. 21, 1895, Berks County Deed Book 209, p. 22.

29. Fairbairn, "Hopewell Village Lands," p. 143, citing deed dated Sept. 18, 1905, Berks County Deed Book 332, p. 140.

30. Fairbairn, "Hopewell Village Lands," p. 143, citing deed dated Aug. 13, 1935, Berks County Deed Book 768, p. 642.

III. THE BLACKSMITH SHOP (HISTORIC STRUCTURE REPORT)

A. Construction Date

No exact date for the construction of the blacksmith shop has yet been discovered. Archeological investigation, however, has provided approximate dates for the erection and subsequent repairs and modifications made to the structure.

A blacksmith shop would have been vital to the smooth operation of the furnace. The furnace's horses and oxen would have required shoeing, and inevitably, there would have been tools and equipment associated with the furnace that needed to be manufactured or repaired. Hopewell's mines, too, would have required tools.

If 1771 was the beginning date of furnace operations at Hopewell, the construction of a blacksmith shop probably began soon after. Construction did begin after the furnace began operating, however, because the foundation rests on slag, produced in the iron-making process.[1] Could this slag have come from a furnace operating on or near the site predating the 1771 initiation of the present furnace? While this possibility must be considered, two factors mitigate against such a possibility. First, is the paucity of data on the possible 1740-era furnace operated by Mark Bird, founder of Hopewell. It is quite probable that the 1740 furnace was not located on what is now Hopewell lands, and therefore slag would not have been dumped on the site of the blacksmith shop. Second, as J. C. Fisher Motz explains it:

> that the /slag/ deposit in question came from the Furnace is indicated by the presence, in the lowest level, of a broken iron spoke from the wheel of a furnace type buggy, and by the dates ascribed to the lower levels on the basis of trash encountered (after 1770).[2]

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1. J. C. Fischer Motz, "Report on the Archeological Investigation of the Blacksmith Shop, Hopewell Village National Historic Site" (Birdsboro, Pennsylvania: Hopewell Village NHS, 1940), p. 5 (hereafter cited as Motz, "Report on the Archeological Investigation of the Blacksmith Shop"), files Hopewell Village NHS.

2. Ibid.

A post-1771 construction date for the building, then, appears firm enough. Motz in his "Report on the Archeological Investigation of the Blacksmith Shop," refines the date somewhat, as he discusses dating the building by evaluation of trash deposits. He notes that

> Yet another consideration, and one to be remembered whenever dates are given in this report on the basis of trash, is that the stratum under consideration may not actually cover the full range of years given. Hence, while the only positive statement to be made is that the shop was built between 1770 and 1800; it is possible, or even probable, that the earlier date is nearer correct.[3]

B. Physical Description

The physical materials of the building have not been changed since construction. Alterations detected by examination and archeology indicate that the same materials have been used with only minor exceptions. The height of the building walls and roof have changed and will be discussed in detail in later portions of this study.

The four-sided building is constructed of rubble fieldstone, stuccoed on the outside, with some plaster on the interior. The dimensions are 20 feet 4 inches by 25 feet 3 inches. The walls vary in thickness from 1 foot 6 inches to 2 feet.[4] The roof is of red clay tile placed on oak lath. The oak lath, in turn, rests on log pole, hand-hewn rafters.[5] The floor is dirt. The blacksmith's forge is of fieldstone, as is the chimney, with the exception of a small portion made of firebrick.

As the surrounding ground levels have been changed by the waste slag discarded from the furnace, the walls, floor, and roof line of the blacksmith shop have also changed. The structural details and general history of the building are discussed next.

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3. Ibid.

4. Norman M. Souder, "Historic Structures Report, Part I, Blacksmith Shop, Architectural Data, Hopewell Village National Historic Site" (Washington, D.C.: National Park Service, July 1965), p. 1.

5. Ibid., p. 2.

C. Historical Periods

Two staff members at Hopewell Village, working in the early 1940s, established a dating system for the blacksmith shop. Originally, the system was developed by Archeologist J. C. Fischer Motz, and was based on significant changes in the building executed in response to the fact that, as the furnace produced slag, the discarded slag raised the ground level around the blacksmith shop which, by comparison, was sinking in the ground. Howard Gale, an historian at the park, refined Motz's system somewhat, correlating the archeological evidence with historical dates. The resulting periods are as follows:

First Period: ca. 1772-1800 (initial construction)
Second Period: ca. 1800-1849 (1800--Brooke-Buckley period of ownership)
Third Period: ca. 1849-1883 (introduction of anthracite furnace)
Fourth Period: ca. 1883-1940 (shutdown of furnace)

This classification system provides a framework for discussing both the structure and the furnishings of the blacksmith shop. In addition, the second period, 1800-1849, fits in nicely with the restoration dates set up for the rest of the park. The system will be used in this report for the furnishing and historic structure chapters as well.

D. Historic Grade and Subsequent Changes

The key causes of the many changes produced in the blacksmith shop were water and slag. The shop building lies on the floodplain of French Creek, and the water table, in the 1770s, lay close to the surface. Any building built on this plain would risk damp and cold floors--exactly the problem of the blacksmith shop from its beginning to the present. The water table problem was exacerbated by the continued dumping of slag in the immediate area.

Slag, the by-product of ironmaking, consists of hard and rock-like conglomerates of lime, charcoal, carbon, and partially melted iron ore. It is produced in significant quantities during the ironmaking process, and must be disposed of. The natural site for depositing the material is the closest one at hand, and thus slag deposits began to form in the immediate area of any iron furnace from the first day of ironmaking. The deposition of the slag at Hopewell Furnace produced profound effects on the blacksmith shop.

An early effect was the minor rechannelling of French Creek. Initially a small island lay in the creek, but after slag connected it to the bank, the former island served to bear the southeast corner

of the blacksmith shop.[6] Combined with this minor rechannelling was the gradual raising of the bed of French Creek as load after load of slag added to the level of the ground surrounding the furnace. The blacksmith shop, of course, remained stable as the slag raised the surrounding ground. In comparison to the ground outside the walls, however, the shop sank lower into the ground outside the walls with the gradual accretion of slag. As the ground and the bed of French Creek rose, the water table rose with it, dampening the shop's floor, and the only solution available was to raise the walls and floors of the shop, modifying windows, doors, and the forge in the process. This is what happened twice at Hopewell Village's blacksmith shop, once ca. 1800 and again in 1849, with other and less major modifications taking place at various other times.

The blacksmith shop seen today has walls settled deep into the ground--ground consisting mostly of slag topped by windblown and water-deposited soils. The eaves are those constructed early in the nineteenth century.

E. Early History and First Modifications

The foundations of the shop rested on slag, probably laid on the surface with a foundation trench cut only on the former tiny island at the southeastern corner of the building.[7] A red clay tile roof covered the fieldstone building. Presumably, the rafters looked then as the ones restored in 1950 look today--adzed logs supporting oak or other hardwood lath. The floor, as at present, was dirt with some clay and a few smooth stones present. The door was located on the extreme north end of the east wall. A window pierced the west wall. Near the end of the first period, 1795 to 1800, two attempts at combating dampness were made. The floor was plastered and a large stove plate, presumably mis-cast and unmarketable, was laid in front of the forge for the blacksmith or apprentice to stand on.[8]

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6. Motz, "Report on the Archeological Investigation of the Blacksmith Shop," p. 17.

7. Ibid.

8. Ibid. Plastered floors surfaced in this manner to combat dampness were not uncommon in the late eighteenth century. Such flooring was found occasionally in Tidewater, Virginia, during the same period. Earlier uses included plaster floors laid by the Pueblo Indians primarily to combat dust. Later examples are noted in Theo Ellis, "The Mexican Method of Making Hard Lime Floors," Transactions of the American Society of Civil Engineers, II, 1873.

F. Second Period: 1800-1849

When the Brooke-Buckley partnership took over Hopewell at the turn of the century,[9] they refurbished much of the large estate, including the blacksmith shop. The walls were raised two feet. The door sill was raised eight inches by the addition of a new sill. The old ash cleanout on the forge was closed. A new forge was built of local stone on the site of the old one, since the floor, too, had been raised about one and one-half feet. The first period floor had been sunken, in relation to the door sill, while the second was more nearly flush. In addition,

> the forge flue was given a horizontal reach so that the chimney might rise along the inside of the west wall to project through the roof nearer the eaves thus eliminating a nasty drip into the fire during wet weather, and at the same time allowing more room for /the/ crane and /the/ bellows lever. A 6" iron pipe in the west wall masonry gave access to this horizontal reach of the flue and made cleaning possible.[10]

Traces of residue show that during this second period the interior walls were plastered, and that a flood--the overflow from French Creek--deposited a layer of mud on the floor.[11]

G. Third Period: 1849-1883

As the furnace continued making iron during the 1800 to 1849 period, it continued making slag, and the slag inevitably continued to raise the level of the ground surrounding the shop. As the land rose, so did the moisture, and again the blacksmith shop became damp, seeming to sink somewhat into the ground as it had just prior to its rebuilding ca. 1800. This routine phenomenon by itself would have been cause enough to raise the eave line again and make other needed window and door modifications, but another factor entered when the ironmaster, Clement Brooke, decided, in 1849, to build an anthracite furnace.[12] This would require an efficient blacksmith shop in which the necessary iron pieces could be fabricated.

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9. Fairbairn, "Hopewell Village Lands," citing deed dated Aug. 21, 1800, Berks County Deed Book 17, p. 219. August 21, 1800, was the legal transfer date.

10. Motz, "Report on the Archeological Investigation of the Blacksmith Shop," p. 18.

11. Ibid.

12. Dennis C. Kurjack, Hopewell Village National Historic Site, Pennsylvania, National Park Service Historical Handbook Series, no. 8 (Washington, D.C.: National Park Service, 1954), p. 42.

The renovation of the shop in 1849 was extensive. Slag was dumped on the floor to a depth of just over one foot and leveled off to produce a well-drained floor above the water table. A third forge--the present one--was built on top of the second period forge. It stood 2 feet 2 inches above the new slag floor. To allow the blacksmith to work on the many long rods the new furnace would require, a hole was cut in the wall opposite the fire so that the rods could be fed in and worked.

The existing door and some windows were closed with fieldstone and mortar, although the window on the west wall above the forge was retained. A new door was cut into the existing east and north walls, the doors existing today. The walls were elevated two feet, adding to the two foot extension of the second period renovation. The raising of the eave lines caused a flaring of the roof which somewhat flattened its pitch. The red tile roof was retained. (Rearrangements of the interior of the shop, and its equipment, will be discussed in the furnishings section of the report.)

H. Fourth Period: 1883-1950

The 1849-era renovation is essentially the shop seen today. However some repairs and two renovations have been performed since then. The window in the west wall was made smaller, the jamb of the east door was repaired, and new doors were hung on the third period door frames.[13] The final two feet of wall height, added about 1849, were removed.

In 1935, Hopewell village was purchased by the Federal Government, and quickly became a Civilian Conservation Corps site. The CCC partially renovated the blacksmith shop, replacing an 1870 shingle roof[14] with sheathing and tar paper. The old forge saw fire again when a CCC blacksmith operated the shop for a year, ca. 1936, then again while a blacksmith manufactured hardware for restoration work at the village.[15] No major work was accomplished again until 1949 and 1950 when a thirteen-pole rafter system was erected to bear the load of tile shingles gathered from three nearby sources, one of them an

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13. Motz, "Report on the Archeological Investigation of the Blacksmith Shop," p. 18.

14. Ibid.

15. James Cass, "Completion Report on the Restoration of the Blacksmith Shop, Hopewell Village National Historic Site," (Birdsboro, Pennsylvania: Hopewell Village NHS, Sept. 28, 1950), p. iv.

old blacksmith shop. A more accurate roof slope resulted from the removal of the 1849 addition of one level of the eave line.[16]

Thus the blacksmith shop appears much as it did following the 1849 renovation, just after the 1820-1840 period set as the focus for Hopewell Village restoration.

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16. Ibid., p. v. The Cass report contains illustrations showing the 1949-1950 restoration in detail.

RECAPITULATION OF BUILDING CONSTRUCTION AND MODIFICATIONS (all dates approximate)

1771-1773	blacksmith shop constructed, foundation laid on slag
1795-1800	floor plastered and stove plate laid in front of the forge
1800	walls raised two feet; door sill raised eight inches (new sill); new forge built on old forge; old ash cleanout closed; floor raised 18"; new reach on flue of forge; interior wall plastered
1849	floor raised about one foot with slag; third forge built on second forge; hole cut opposite the fire; existing door closed; one window closed; new east and north doors cut into walls; walls again raised two feet; interior equipment rearranged
1879	shingle roof replaced tile roof
1935	CCC replaced shingle roof with tar paper roof
1949-1950	NPS tile roof replaced tar paper roof; 1849 wall exterior removed, 1800 pitched slope replaced on roof

I. Historical Occupancy: 1820-1840

The records of Hopewell Furnace reflect the daily business life of the village. The transactions at the furnace store and payments into and out of the furnace books are noted almost daily. An examination of the records noting payments to workers provides fairly accurate data on the furnace's employees, including the blacksmith.

The closest date prior to the restoration period, 1820-1840, showing a blacksmith at Hopewell is the entry in the account book of January 1, 1818, noting that Humphrey Hugh received his pay for 8 months 14 days at $200.00 per year.[17] Presumably blacksmith Hugh remained until mid-1821, when Thomas Delzell's name appears. Delzell's payments spanned August 21, 1821 to March 25, 1822.[18]

The next entry pertaining to a blacksmith in an account book is on May 29, 1823,[19] for $76.00, about four month's work. This infers that M. Shafer, the blacksmith paid in May of 1823, had worked at Hopewell Furnace since February of that year. Shafer remained as blacksmith until October 28, 1823.[20] The account book reveals Shafer's professional--and possibly his personal--decline. In August he lost some time from work, perhaps for reasons which appeared in an October entry:

> "October 4 . . . at Rickett's applebutter stirring & was not fit to work."[21]

Just what "not fit to work" meant is clarified in the October 24 notation, "had whisky at shop."[22] The incident signalled the end for Shafer's time at Hopewell. His last workday was October 28, 1823.[23]

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17. SM 8, p. 147b. "S.M." refers to "source material," meaning the 84 ledgers or journals in the files of Hopewell Village NHS. Most of the source materials have been laminated, and paginated with pencil on the laminations. Page numbers are usually available. In some cases, only the date can be given along with the SM number.

18. SM 6, p. 331.

19. SM 11, p. 121.

20. SM 11, Oct. 28, 1823.

21. SM 11, Oct. 4, 1823.

22. SM 11, Oct. 24, 1823.

23. SM 11, p. 121.

Starting with a half day's work on October 30, 1823, David Jenkins began blacksmithing for Hopewell Furnace, and, with minor interruptions, continued until well into the 1840s. David Jenkins apparently worked steadily until at least July 8, 1823, when his charges at the company store for such supplies as coal, flour, molasses, coffee, clothes, suspenders, and "provisions" were balanced against his salary due.[24] Jenkins's name appears frequently throughout the 1820s and 1830s, indicating his regular and consistent employment at the blacksmith shop.[25] Apparently he remained the regular blacksmith for the 1823-1840 period. Other blacksmith's names, however, do appear from time to time. Probably they indicate periods when an unusually heavy work-load demanded that other blacksmiths, from nearby communities, be given Hopewell Furnace work. "Wm Patton" was owed $15.25 for blacksmithing in a February 1, 1826 account book.[26] William Mack received $1.50 and James Dands, Jr., $3.00 in November of 1827. The small amounts suggest their work was minor--possibly a specific fabrication or repair.[27]

William Koplin's name, however, also appeared in the Time Book at the furnace. Obviously, he was a Hopewell Furnace employee for at least the period from August 1 to December 17, 1835, possibly at a blacksmith shop at Hopewell Mine.[28]

David Jenkins's name again appears in mid-1836, his work at that time having spanned the preceding three months.[29] If, indeed, he had left Hopewell Furnace, it had not been for long. Jenkins remained at Hopewell at least into late 1840, an entry mentioning him appearing on November 10, 1840.[30]

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24. Ibid., p. 220.

25. Ibid., p. 365. An entry for Apr. 1, 1826, is an example.

26. SM 12, p. 119a.

27. Ibid., p. 186b.

28. SM 21, p. 152a.

29. Ibid., p. 177a, June 1, 1836.

30. SM 28, p. 46b.

IV. THE BLACKSMITH SHOP (HISTORIC FURNISHING STUDY)

Hopewell Furnace's blacksmith shop served the needs of the immediate community--Hopewell Village--and the requirements of the furnace, its mines, and charcoal producers. Surely it was as busy a shop as any, and possibly a far more active one than most. Whether the aura of "honest sweat", as portrayed in Longfellow's "Village Blacksmith," hung over the shop is, however, open to question. Other nostalgic qualities fail to appear as well. For example, no archeological evidence provides a location for the immense pile of horsehoes and scrap iron that numerous writers on the subject have commonly associated with blacksmith shops. The shop's location at a blast furnace might well have negated any possibility of a pile of scrap iron developing. In short, there is little to support the somewhat romantic view of the blacksmith and his shop that seems to have become a secure part of American literature. The blacksmith shop at Hopewell Furnace formed its busy routine amidst other busy routines, and provided, in the process, a vital, yet limited service to both industry and home.

Some of the furnishings of the shop survive today. The workbench appears to be original, the bellows, anvil, crane, and drill press also date from early to mid-nineteenth century. The forge dates from ca. 1849, and while that puts the major items of a typical 1840 blacksmith shop into the Hopewell Furnace one, the myriad tools of the blacksmith are only sparsely represented by tools and working materials definitely and specifically associated with Hopewell Village. A discussion of these Hopewell-associated tools follows, succeeded by a narrative of typical blacksmith furnishings needed to round out the list of materials for restoring the shop.

A. Hopewell-Associated Furnishings Items

"A" is for anvil, at one and the same time alphabetically and historically at the head of any blacksmith shop furnishings list. Hopewell Furnace may well have cast its own anvils in 1825. Two 105-pound anvils were sold by the furnace to "Wm McConohy" on July 19, 1825,[1] yet the manufacture of anvils was not a major Hopewell Furnace activity. The forge head at Cornwall Furnace[2] bearing the inscription "Hopewell" shows that items of anvil size and consistency were cast at the furnace. Earlier mention of anvils do not carry any suggestion

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1. SM 12, p. 59b.

2. Cornwall Furnace State Historical Park, Cornwall, Pennsylvania.

of origin. An 1800 survey laconically notes "bellows, anvil and sundry tools," all valued at £7 10s.[3]

The shop's bellows required releathering in 1806[4] and 1816[5] but the citations provide no other data on them. In 1819, a bellows was purchased for $28.50, yet this mention, too, is somewhat cryptic and provides no more specific data.[6] A Jesse Stillwagon provided this bellows on February 8, 1819. An 1836 entry, however, notes that a 36-inch bellows was purchased by ironmaster Clement Brooke for $25.00.[7] The 36" item measured the same as the bellows currently on hand. (The measurement refers to the width of the bellows, since it is the width that determines the general capacity of the "lung" of the instrument.)

Another inventory, this one taken in 1820, mentioned "smith tools, Bar Iron & Sheet Iron--$130.00."[8] No further definition of "smith tools" is made.

A partial list of "smith tools" was donated to Hopewell Village by the nephew of Enoch Squibb, a smith associated with Hopewell Furnace in 1838. Sylvester Squibb's donation included:

1 Dipper
1 Forge Shovel
1 Wheel Rim Saw
11 Assorted tongs
1 Bit
1 Hammerhead
1 Wrought Iron stand
for smoothing iron.[9]

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3. Earl A. Heydinger, "Historic Structures Report, Part I, Blacksmith Shop, Building No. 6, Historical Data Section, Hopewell Village NHS" (Elverson, Pennsylvania: Hopewell Village NHS, 1965), pp. 1-2, citing Hopewell Document 8000320.

4. SM 4, p. 155a.

5. SM 7, May 22, 1816.

6. SM a, p. 134.

7. Hopewell Document 8331025.

8. Hopewell Document 8200307A.

9. Inventory, Accession 36, Apr. 11, 1941, Sylvester Squibb, donor, Lemuel A. Garrison, park superintendent, files Hopewell Village NHS.

Remaining Hopewell-associated blacksmith shop furnishings material was obtained archeologically. Howard Gale, in his detailed study on furnishings, equipment, and methods used in the blacksmith's shop at Hopewell Village, divides the furnishings by using J. C. Fischer Motz's "four periods." Gale assigns very few items to the first period, since Motz's excavations produced few at first period levels. Gale notes a "portion of a bolt and a hand made iron staple" in the first period, and, for late first and early second period assigns "a gate hook, handled hot cutter head, iron bar, section of a wagon tongue." In his commentary on the first period, Gale reports

> the handled hot cutter head is hand made of fibrous iron, indicating that the smith made some of his tools and also other small items or tools.[10]

He then lists those objects discovered archeologically and, by archeological determination, assigned to the second period, 1800-1849:

hand anvil
rectangular punch
flattening hammer ("flatter")
section of an iron rasp
small forge hoe
small hardy
half of a die
head of a handled punch
portion of a bit
harness buckle
cold chisel
half round file
section of a scythe blade
fragment of a curry comb
head of a handled cutter
oval hand punch
two /plow/ coulters.[11]

As in the first period material, this second period represents a mixture of blacksmith tools and materials as well as items manufactured and repaired at the shop.

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10. Howard Gale, "Report on the Furnishings and Equipment and Methods Used in the Blacksmith Shop" (Birdsboro, Pennsylvania: Hopewell Village NHS, 1941), p. 2.

11. Ibid., p. 3.

Items in the shop associated with late second or early third period include "a head of a handled cold cutter, and a hand made drill."[12] Their relevance to the furnishings period, 1820 to 1840, however, merits consideration, since tools of the type were in use during that period.

Gale comments on the second period items, noting that

> with the exceptions of the portion of iron rasp, and the half-round file, the artifacts mentioned are hand made, and indicate that the smith not only made tools for his own use, but also made items for agricultural purposes. The different types of work accomplished, as indicated by the tools and coulters are definitely not typical of a particular period, inasmuch as the same activities were also engaged in during later /and earlier/ periods.[13]

Other necessary furnishings for the shop in the 1820 to 1840 period are not mentioned in the records of Hopewell, but probably because they were fabricated locally and not purchased. The workbench, crane, and drill fit into this category.

Next to the anvil and its mount, the workbench was the most important item in the shop, and architectural evidence provides its location during the second period, 1800-1849. Archeologist Motz explains.

> It is interesting to note that interior plaster is to be seen everywhere down to the second period floor, but not below it. Also significant is the fact that this plaster coat rolls around the jambs of the second period doorway and window in the east wall rather than across the masonry with which they were closed at the end of the second period. It so happens, however, that a space under the old east window has been left unplastered. This space is of peculiar shape and was determined when the plaster was applied as the smooth, unfractured edges testify. If it be assumed that several inches have rotted /or were cut/ from the legs of the present blacksmith's bench, and that it once stood under the old east window on the second period floor, then a perfect explanation for the unplastered patch is had, for the dimensions of the bench are those of the plaster

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12. Ibid.

13. Ibid.

edges. Hence, during the second period the present bench stood under the old east window. Later the shop was plastered, and at the end of the second period the old east window and doorway were closed with masonry.[14]

B. Comparative Data on Tools

Lists of blacksmith tools are legion, and furnishing a blacksmith shop utilizing comparative data is not a difficult task. Typical books on blacksmithing, and descriptions of tools associated with such books, however, are often quite vague in relation to dates. Even though hand tools such as hammers, saws, and chisels changed little from the mid-eighteenth to the mid-nineteenth century so that approximate dating is not as serious a problem as it might otherwise be, such dating can be quite misleading in some instances.

All accounts of blacksmith's tools list tongs, hammers, chisels, and the various anvil tools such as swages, fullers, and hardies. A Shelburne Museum publication Blacksmiths' and Farriers' Tools at Shelburne Museum discusses the tools on hand at the restored mid-nineteenth century shop. A consolidated list from that publication follows:

Hammers

Blacksmith Hand Hammer,
usually about 2 pounds
Light Blacksmith's Sledge
or Striking Hammer
Rivetting Hammers
Farrier's Sharpening Hammers
Farrier's Fitting Hammer
Double Faced Hammer
Double Face Sledge
Carpenter's Claw Hammers
Flatters (smoothing hammer)
Rectangular Set Hammer

Punches

Round Punch
Square Punch

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14. Motz, "Report on the Archeological Investigation of the Blacksmith Shop," p. 16.

Fore Punch
Countersink

Chisels

Cold Chisel
Hot Chisel
Hot Creasers
Top Cutter
Bottom Cutter
Cold Paring Chisel
Flat Chisel
Cape Chisel

Anvil Tools

Swages (numerous kinds)
Hardies (numerous kinds)
Fullers (numerous kinds)

Tongs

Tire Pulling Tongs
Farrier's Horseshoeing Tongs
Pick-up Tongs
Blacksmith Straight Lip Tongs
Flat Tongs
Curved Lip Tongs
Double Box Tongs
Pincer Tongs
Nail Tongs

Miscellaneous

Files
Rasps
Saws
Some woodworking tools[15]

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15. H. R. Bradey Smith, Blacksmiths' and Farriers' Tools at Shelburne Museum: A History of their Development From Forge to Factory. Museum Pamphlet Series, no. 7 (Shelburne, Vermont: The Shelburne Museum, Inc., 1966), pp. 70-148 (hereafter cited as Smith, Blacksmiths' and Farriers' Tools).

Farrier's Tool Box

Flat Lip Tongs
Round Lip Tongs
Farrier's Hammer
Farrier's Pincer
Cutting Nippers
Horseshoer's Steel Buffer
Rasp
Blacksmith's Hammer
Horseshoe Nails, Assorted[16]

Another, and briefer, collection of blacksmith tools is illustrated in Eric Sloane's A Museum of Early American Tools. As in the Shelburne Museum list of tools, this list contains a few tools from allied trades, in this case the farrier's trade:

Hammers

Peeved Hammers
Small Sledge Hammer
Swage (grooved) Hammers

Tongs

Flat Bit
Crooked Bit
Hammer Tongs
Hoop Tongs
Round Bit
Square Bit

Farrier's Tools

Hoof Knives
Farrier's Long Chisel
Farrier's Short Chisel
Hoof-parer[17]

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16. Ibid., p. 164.

17. Eric Sloane, A Museum of Early American Tools (New York: Funk and Wagnalls, A Division of Reader's Digest Books, Inc., 1964), pp. 90-91.

C. Harner Donation

A donation of 60 blacksmith tools was made on October 13, 1959, by John Z. Harner, of Boyertown, Pennsylvania. Harner, himself a blacksmith, donated tools that had once been used in his own shop. As blacksmith tools from an operating blacksmith shop near Hopewell, the collection provides strong comparative data for furnishing the latter structure. The Harner donation was as follows:

1 Ring Horn, Cast
1 Iron ladle and handle, wrought
1 Iron ladle and handle, cast
1 Coal drag poker
1 Flux spoon
34 Assorted smithy tongs, handmade
1 Tongs, small, ice type
3 Box wrenches
1 Pipe wrench
1 cutting hammer head
14 assorted dies, bolt nut, leading
1 hexagonal wrench, modern[18]

18. Letter and inventory from Supt. Joseph R. Prentice to Mr. John Harner, Oct. 13, 1959, files Hopewell Village NHS.

V. THE WHEELWRIGHT SHOP, OR UTILITY BUILDING (HISTORIC STRUCTURE REPORT)

The wheelwright shop remains visually only an image on two photographs and physically only in the wheelwright's pit that rests alone near the slag pile at the village. Despite considerable interest in it over the years, little evidence has been found concerning its complete function, date of construction, or exact location. Much of the evidence that does exist is shadowlike, with more form than substance, suggesting but not confirming.

Fortunately, however, some of the evidence is quite specific: the photographs and the wheelwright pit.

A. Historic Photographs

The Stokes photograph (Illustration 1), taken in 1887, shows the wheelwright shop and its relation to the furnace complex. It also provides detailed information on the exterior construction of the building. The original exterior was board and batten. It appears to have been the only covering for a period long enough for the wood to weather somewhat. The lath and stucco appear to cover weathered, not new, siding, suggesting their installation after the original construction.

The wide door--obviously large enough for a wagon to pass through--shows clearly on the east side. On the south, two windows are evident, one in the south wall below the eave line, the other above it, possibly a window for an attic loft. A window on the west wall is framed by the lower south wall window.

The other photograph of the wheelwright shop is the Bull photograph, 1890 (Illustration 2). It shows the west window framed by the gap of the wide entrance shorn of its doors. The board and batten construction of the building, and the addition of the lath and stucco appear clearly in this view. The wood shingled roof, resting on lath, which is in turn supported by random width rafters, also shows in the Bull photograph.[1]

B. Wheelwright Pit

Aside from the photographs, the other specific and undisputed evidence concerning the building is the existence of a stone wheelwright

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1. Stokes and Bull photographs are in files of Hopewell Village NHS.

pit, discovered during archeological investigations in the area. The pit measures approximately 9 feet by 4-1/2 feet and points generally north and south. A center slit, about 14 inches wide by 18 inches deep, defines the fieldstone structure in no uncertain terms as a wheelwright's pit, giving the name to the building. Yet the building's exact location in relation to the pit, and function for the furnishings period 1820 to 1840, remain uncertain.

C. Interviews Concerning the Wheelwright Shop

Much of the data on the building comes from interviews, taken in the mid- to late 1930s and early 1940s by National Park Service historians. A key interview concerning the building proved to be Historian Roy Appleman's conversation with Harker Long, the last manager at Hopewell. Appleman's notes refer to "Wheelwright-Carpenter Shop," and record the building was

> torn down after 1896. Not quite as far back as blacksmith shop from road; 20 by 15 feet; attic. Workbench at west side; vise, wood jaws, etc., shaving horse, /and/ a wood stove. Inside lath and plaster. Pit in floor where wheel placed, hub on legs, to fill with spokes (at north). Door on east side at end of bench. Tool chest and various tools. Window on west and north and south extending lengthwise, and not up and down.[2]

Long's description of the building seems borne out by the Stokes and Bull photographs. And there is no reason not to accept his recall of the obvious wheelwright and carpenter's furnishings. Long's evidence and the presence of the wheelwright pit combine to establish the function of the building--at least during Long's tenure after mid-nineteenth century--as a wheelwright shop. Other evidence, however, attributes additional functions to the building.

Like Harker Long, Mr. and Mrs. Charles Sheridan Care had been longtime residents of Hopewell Village. Their interview, conducted by Howard Gale (who prepared the blacksmith shop furnishings and methods study), uncovered another function of the building. Gale reports on the interview:

> Wheelwright Shop:
> This building was about twenty-five feet long and thirty feet wide, stated Mr. Care, and was located between the Furnace

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2. Personal interview, Harker A. Long with Roy Appleman, 1935, Hopewell Village NHS.

and Blacksmith Shop. The structure was of logs, lathed and plastered with a shingle roof. The loft of this building provided the sleeping quarters for the moulders, during the prosperous days of the Furnace. These men secured their meals at the Mansion House, and, as Mr. Care added, were well fed.[3]

D. Building Uses

With the evidence thus presented, the building might well have been a wheelwright shop with an attic loft used as a moulders' sleeping room. Carpentry tasks could have been accomplished there also. A dormitory for the moulders located quite close to the furnace apparently was not uncommon. Cornwall Furnace's moulders' dormitory was on the second floor of the cast house, the same building housing the furnace itself.

Inferential evidence, carefully considered, has led one writer to speculate the wheelwright shop might have served also as a building in which castings were cleaned of the bits of blackened moulding sand adhering to the iron following moulding. In addition, it could have served as the building for packing the castings and storing patterns.[4]

E. Dating the Structure

As with the blacksmith shop, firm data on construction of the wheelwright shop has not been discovered. Unlike the blacksmith shop, however, there is little archeological evidence available on which to base an approximate construction date. Interviews indicate that the moulders slept in the attic loft. Since moulding ended in 1845, the building would have existed before then. Other data may refer to the wheelwright shop. An 1829 entry in the Hopewell records cites "plastering the moulder's sleeping room,"[5] while an 1835 notation is "plastering the warehouse."[6] The 1887 and 1890 photographs prove the building's existence at that time, of course.

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3. Personal interview, Mr. and Mrs. Charles Sheridan Care, Birdsboro, Pennsylvania, with Howard Gale, Feb. 24, 1941, files Hopewell Village NHS.

4. Earl J. Heydinger, "Historic Structures Report, Part II, The Wheelwright Shop, Building 35, Historical Data" (Elverson, Pennsylvania: Hopewell Village NHS, 1964), p. 6 (hereafter cited as Heydinger, "Historic Structures Report, Wheelwright Shop").

5. Ibid., p. 1, citing SM 14, p. 45a, Jan. 16, 1829.

6. Heydinger, "Historic Structures Report, Wheelwright Shop," citing SM 21, Mar. 22, 1836.

The date of destruction of the building is slightly better known. Harker Long recalled that the building lasted until "after 1896."[7] No firm dates for construction or demolition, however, are yet known.

F. Function of the Building

The exact function, or functions, of the building during the 1820 to 1840 restoration period (assuming it existed at that time) is not known. While Harker Long, at Hopewell from 1867 on,[8] recalled it as a wheelwright shop, as did the Cares in their interview, no written data on a resident wheelwright during the 1820 to 1840 period has been found.[9] Indeed,

> every located wheelwrighting account found to date is entered in the Records as 'per account' a bill rendered not as pay to a resident employee.[10]

The purchase of mine boxes and wheelbarrows frequently occurred during the 1820 to 1840 period, as seen in the charcoal house furnishings study. Had a wheelwright been at Hopewell, the wheelbarrows would have been manufactured there, and not purchased, since carts and wheelbarrows were a routine wheelwright shop product.[11] Historian Heydinger notes that

> among the regular quarterly Journal accounts NO entries for payment to a pre-1840 resident wheelwright has been found to date. Teamsters, laborers, farm hands, a hostler and a gardner are regular 'resident' entries.[12]

He notes that references to resident wheelwrights appear in 1876, but not in the 1820 to 1840 period.[13]

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7. Personal interview, Harker A. Long with Roy Appleman, 1935, Hopewell Village NHS.

8. Heydinger, "Historic Structures Report, Wheelwright Shop," p. 2.

9. Ibid.

10. Ibid.

11. Citations for wheelbarrow purchases are noted in the charcoal house furnishings section.

12. Heydinger, "Historic Structures Report, Wheelwright Shop," p. 2.

13. Ibid.

G. Summary

The blend of historical and archeological fact, and logical assumptions from the known facts, fail to produce enough definitive data to establish an 1820 to 1840 wheelwright shop. Almost certainly, in fact, the building was not a wheelwright shop during the planned restoration period. It could well have served as a part-time wheelwright shop, however, with working space for an itinerant wheelwright or carpenter. It might well have served as the moulders' sleeping room, a utility shop, and a cleaning and storage shed simultaneously, but this is speculation based almost entirely on interviews.

The wheelwright shop's existence during the post-1840 period, Harker Long's time at Hopewell, is hardly in doubt. Long's recall of the workbench, pit, and tool chest is too complete to doubt. Yet the information--assuming it exists--on any 1820 to 1840 function continues to remain elusive. However speculative it might be, in order to even consider reconstruction or furnishing of the building, as suggested in the current development program for the park, it is necessary to arrive at a conjectural use of the building based on available data.

The photographs of the building in its later years support the Long and Care interviews claiming the building had a loft or attic in which the moulders slept. The upper window shown in the two photographs could well have ventilated and lighted such a room. The wheelwright pit remaining today establishes that wheelwrighting took place there. Probably the companion trade to wheelwrighting--carpentry--also was practiced there, at least for minor construction and repair. Finally, remaining room in the structure could well have housed additional cleaning and packing facilities for the thousands of stove plates and other items that the furnace produced. The building's location, close to the cleaning room of the cast house, argues strongly for that purpose.

Thus, a conjectural threefold use for the building is probable. It housed the moulders awaiting the sound of the casting bell, served as the wheelwright-carpenter shop, and provided additional cleaning and packing facilities for the casting cleaners. In essence, it was a utility building, and such a title describes the broader use that it probably had as opposed to the more restrictive title of "wheelwright shop."

VI. THE WHEELWRIGHT SHOP, OR UTILITY BUILDING (HISTORIC FURNISHING STUDY)

The wheelwright shop ("Utility Building") does not exist. Its exact function, or functions, is not known. Its dimensions and even location remain vague. Accordingly, the furnishings for the building cannot be determined with any certainty. The furnishings must be based on an assumption of functions, and, in the absence of any firm furnishings data, must be considered completely conjectural.

The probable function of the structure during the 1820 to 1840 period was as a utility building in which casts were cleaned, stored, and boxed for shipment, and in which occasional carpentry and wheelwrighting were performed. The furnishings suggestions which follow--completely conjectural--assume that the building's function was as noted above.

A. Cast-Cleaning Operations

Cast cleaning, and the associated packing of the cleaned castings, must have taken place in the south half of the shop, since, as stated in chapter V, the wheelwrighting and carpentry areas were located in the north end of the building. Cast cleaning appears frequently in the records of Hopewell Furnace, and judging from the number of entries, employed many cleaners. The work was performed by unskilled labor. Often Hopewell Furnace employee family members cleaned castings to augment the family income.

The furnishing needs for cleaning the castings, however, were minimal. Possibly a shelf along the inside wall, and roughly parallel to it a number of sturdy tables, would suffice. The cleaners would stand or utilize stools along the shelf and at the tables. Cleaning of the charcoal dust and blackened sand would be accomplished with a stiff bristle or fiber brush. Nearby, possibly associated with each table and at intervals on the floor along the shelf, would be packing boxes and crates ready to receive the new castings.

Charcoal dust and scorched, blackened sand would lie on any horizontal surface. Possibly coal lamps would provide some illumination, augmenting the natural light.

B. Wheelwright-Carpentry Shop

Furnishings data on the wheelwright shop portion of the utility building is somewhat more than conjectural, but much less than authoritative.

Harker Long's interview with Historian Roy Appleman took place in 1935, and Long was an old man at the time, recalling his life at Hopewell from 1867 on. Thus the description of the wheelwright shop he provided is, at best, 27 years too modern. Yet the data remains of real value not only because it is the only wheelwright information available for Hopewell, but because the tools of the trade did not change greatly from the early nineteenth to the late nineteenth century. Long's description, then, retains considerable value. As stated earlier, he recalled that the shop was

> torn down after 1896. Not quite as far back as blacksmith shop from road; 20 by 15 feet; attic. Workbench at west side; vise, wood jaws, etc., shaving horse, [and] a wood stove. Inside lath and plaster. Pit in floor where wheel placed, hub on legs, to fill with spokes (at north). Door on east side at end of bench. Tool chest and various tools. Window on west and north and south. . . .[1]

Long's recollection of the shop was partially verified by another interview made a few years later. Sally Boone, also once a resident at Hopewell, recalled the wheelwright shop containing a "large wooden vise operated with wooden screws."[2] This vise was no doubt a wheelwright vise with high upright jaws, possibly 8 to 14 inches long. The wheelwright's vise had to have great length in order to hold the spokes and felloes for shaping.

Long mentions a tool box and tools, but does not identify any of the implements. Thus comparative furnishings data must suffice for furnishing the wheelwright-carpentry shop.

C. Wheelwright and Carpentry Tools

The wheelwright and carpenter shared most of their tools. Thus a carpenter's assortment of hammers, chisels, planes, and saws would be part of any wheelwright shop. The wheelwright, however, required various additional tools and simple machines for his more specialized trade.

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1. Personal interview, Harker A. Long with Roy Appleman, 1935, Hopewell Village NHS, p. 7.

2. Russell A. Apple, "Documentation For the Historical Base Maps, Hopewell Village National Historic Site" (Birdsboro, Pennsylvania: Hopewell Village NHS, June 1965), pp. II-106.

Source materials for identifying specific wheelwright tools are not numerous. While the blacksmith and his shop have become so entrenched in American folklore as to be a major focus for nostalgia, the blacksmith's counterpart, the wheelwright, is almost unknown in literature. Why the craftsman who built such famous vehicles as the conestoga wagon and the prairie schooner should be so neglected is not clear. But neglected he is.

The sources for the list of wheelwright tools that follow are among the few that deal with the wheelwright craft. Of them, only two specifically concern the wheelwright. Thus the discussion and list of wheelwright's tools that follows is only a consolidation of what <u>might</u> have been in the wheelwright shop and must be considered as such.

The strongest source for comparative wheelwrighting data is Paul Kube, "A Study of the Gruber Wagon Works at Mount Pleasant, Pennsylvania, Berks County." This work examines the history and technology of a wagon works in the same county as Hopewell Village. The Gruber brothers wagon works was considerably larger than Hopewell's shop ever could have been, and was somewhat more modern. However, many of the tools--especially hand tools--they used were typical and could well have been the kinds used at Hopewell.

Kube discusses the wheelwright's tools in general, noting that

> the Gruber wagon works was well equipped with hand tools of the wheelwright. They were stored or hung within easy reach of the worker. The space beneath the benches, the drawers in the benches, and nails and pegs on the walls and ceiling about the benches all were full of tools. Beneath the bench larger tools such as spoke dogs, hub jigs, and dowel cutters were stored. The drawers of the benches were neatly filled with smaller tools such as plane blades, try squares, drill bits, wood chisels and other various tools. The bare unpainted walls were full of pegs, nails, racks and shelves which contained chisels, scratch awls, drill braces, saws, hub boring tools and various types of patterns as illustrated by Figure 1.[3]

Kube then discusses specialized wheelwrighting tools. The list following, and accompanying comments, are taken from his discussion. (Page numbers for illustrations refer to Kube's study.)

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3. Paul A. Kube, "A Study of the Gruber Wagon Works at Mt. Pleasant Pennsylvania, Berks County" (M.A. Thesis, Millersville State College, Pennsylvania, 1968), pp. 6-7 (hereafter cited as Kube, "Gruber Wagon Works").

Bow Saw (illustrated p. 8)	(used to cut an irregular shape in wood--also known as Hotzapfel, frame saw, turning saw, sweep saw)
Axe (illustrated p. 10)	(used on large timbers and beams)
Basilled Axe	(sharpened on one side, with bent handle to more easily hew a straight line on a beam)
Frow	(a thick backed, dull-bladed steel knife about 15 inches long)
Wheelwright's Reamer (illustrated p. 14)	(hand tool, 36 inches long, with truncated cone at one end and "T" handle at the other--used to ream hubs)
Hub-boring tool (illustrated p. 15)	(used to bore the first hole in the hub)
Spoke Dog (illustrated p. 17)	(used to pry spokes into line for fitting into felloes)
Dowel Cutter (illustrated p. 19)	(cut dowels used to fasten felloes together)
Wedge Cutting Block (illustrated p. 20)	(Made from oak--for cutting triangular-shaped wedges)
Spoke Tenoning Tool (illustrated p. 21)	(used to trim and cut the spoke to tightly fit into the felloe)
Mortising Chisel	(also known as a "bruzz"--it is a three-cornered chisel used to clean mortices)
Wheelwright's Bench Vise (illustrated p. 24)	(similar to carpenter's vise, but 8 to 10 inches higher)

Drawknife	(a common wheelwright's tool: same as carpenter's drawknife)
Spoke Shave	(smaller blade than drawknife)
Bench Rest (illustrated p. 26)	(opposite end from a vise--supported other end of board held high by wheelwright's vise)
Wheel Block (illustrated p. 27)	(also known as wheel stool--it held the wheel being worked on)[4]

Kube includes other tools used in both the blacksmith and wheelwright crafts at the Gruber Wagon Works. At Hopewell Furnace the blacksmith and wheelwright shops were close together, and the following tools could have been located in either building.

The Wagon Jack (illustrated p. 32)	(lifted the wagon to permit the removal of a wheel)
Wheel Stool (illustrated p. 34)	(used to hold the wooden wheel for application of the tire)[5]

Another source of data on wheelwright and associated carpenter and blacksmith tools is Eric Sloane, A Museum of Early American Tools. A consolidated list of tools from Sloane's book follows, the page numbers noting where the tools are illustrated.

Flat-Sided Broad Axe	(pp. 14-15)
Saw Horses	(pp. 36-37)
Drawknife	(p. 38)
Chisels	(pp. 53-54)
Gouges	(pp. 53-54)
Planes	(pp. 56-57)
Rabet Planes	(pp. 60-61)
Saws	(pp. 66-69)
Wheelwright Reamer	(p. 75)
Wagon Jacks	(pp. 88-89)
Wheelwright's Pit	(p. 96)
Lathe	(p. 96)

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4. Ibid., pp. 8-29.

5. Ibid.

Wheelwright's Benches	(p. 97)
Hub Cradle	(p. 97)
Traveler	(p. 97)
Spoke Dog	(p. 97)
Wing Compass	(p. 97)[6]

Other than the tools and working devices noted in the Kube and Sloane lists, and in the Harker Long interview, the only other furnishings for the wheelright shop in the utility building would be working materials. These would include timbers and planks for wagon bodies and spokes and felloes ready to be trimmed and fitted as needed. Scrap pieces of wood for general carpenter repair use would also be present.

D. The Moulders' Sleeping Room

The sleeping room for the moulders would have been only sparsely furnished. The moulders probably lived elsewhere and would have used the sleeping room only to rest while awaiting the call that the iron was ready to cast. Wooden single bunk beds with hay-filled mattresses or pallets, a rude wooden table, and possibly a candle or two would comprise the furnishings of this room.

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6. Sloane, A Museum of Early American Tools, pages as noted above. Much of the data in the Sloane and Kube studies on tools appears in two other works. These two books, because of their detailed treatment of the subject and firsthand information on tools and techniques of wheelwrighting, merit careful study. George Sturt's The Wheelwright Shop is the only book extant on the subject. Sturt was an English wheelwright in the late nineteenth century, and his work, detailed and carefully written, is a memoir and study of the trade in one package. Henry Mercer's Ancient Carpenter's Tools contains numerous illustrations of carpenter's tools as well as a comparison of ancient and medieval tools to those found in eighteenth- and nineteenth-century America. Full citations for both works appear in the Bibliography.

VII. THE CHARCOAL HOUSE (HISTORIC FURNISHING STUDY)

"If a manager expects workmen to do their duty, he should be careful to furnish them with good tools. Bad or imperfect tools augment the difficulty of keeping a furnace; and where disturbances happen, they give rise to much trouble and vexation. Ringers, crow and hand bars, cinder hooks, shovels, sledges, &c. ought not only to be in good condition, but in sufficient number."[1]

The charcoal house for each of the many charcoal furnaces in eastern Pennsylvania generally stood in the same relative position, on top of the bluff against which a typical charcoal furnace was built. It served to protect the charcoal from the weather and near it lay piles of iron ore and the flux--usually limestone--that blended the ore and charcoal together to produce iron. The walkway connecting the charcoal house to the shelter, aptly called "the bridge," was usually covered, allowing the charcoal, flux, and ore to be carried from the vicinity of the charcoal house to the top of the furnace stack into which the mix was dumped.

Its function essentially one of storage, the furnishings for any charcoal house would be few. Essentially they would include charcoal, baskets for carrying charcoal, mine boxes, wheelbarrows to deliver charcoal and ore to the furnace, charcoal rakes, shovels, collier's ladders, riddles, and sledges.[2]

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1. Frederick Overman, The Manufacture of Iron, In All Its Various Branches. Including a Description of Wood-Cutting, Coal Digging, and The Burning of Charcoal and Coke; The Digging and Roasting of Iron Ore; The Building and Management of Blast Furnaces, Working By Charcoal, Coke or Anthracite; The Refining of Iron, and the Conversion of the Crude Iron Into Wrought Iron By Charcoal Forges and Puddling Furnaces. Also a Description of Forge Hammers, Rolling Mills, Blast Machines, Hot Blast, Etc., Etc., To Which Is Added An Essay On the Manufacture of Steel. 3d ed. (Philadelphia: Henry C. Bayad, successor to Edward L. Carey, 1854), p. 187 (hereafter cited as Overman, The Manufacture of Iron).

2. Earl J. Heydinger, "Historic Structures Report, Part II, Charcoal House, Building 9 /furnishings section/," (Elverson, Pennsylvania: Hopewell Village NHS, 1965), p. 4 (hereafter cited as Heydinger, "Historic Structures Report, Charcoal House [furnishings]").

Charcoal, naturally, would comprise the major furnishing item. Hopewell Furnace's charcoal, locally produced, is already stored in the charcoal house. Manufactured in the historical manner, the charcoal appears to meet fully the requirements of historical accuracy. Items associated with the charcoal merit more discussion.

A. Charcoal Wagon

The charcoal was delivered by charcoal wagon. This large conestoga-like wagon was common to charcoal furnaces throughout Pennsylvania and nearby New Jersey and Maryland. The floorboards had iron rings or horseshoes attached to the rear, forming large eyelets. When the wagon arrived at the coaling shed, the teamster unhitched the team of horses or mules, took them to the rear, connected the harness to the floorboards and pulled them out, dumping the charcoal out on the ground. After a suitable period in the open-sided cooling shed, during which it could be checked for any lingering combustion, the charcoal was transferred to the charcoal house. The charcoal wagon at Hopewell appears to be an accurate type.

B. Charcoal Tools

During the making of the charcoal, various tools were used. The most common tools associated with charcoal making and use, the collier's shovel and collier's rakes, are well represented in Hopewell Furnace records. Collier's rakes, 12 in number, and each costing 25 cents, are noted in 1817,[3] and 19 rakes at a somewhat higher price, $4.50 total, are noted in 1823.[4] A dozen rakes are mentioned in an 1825 notation,[5] and three dozen in 1828.[6] The collier's rakes, wooden, of simple utilitarian design, currently in the collections at Hopewell Village, appear to represent typical rakes of the period in use at charcoal furnaces. The mid-nineteenth century master of the subject, Frederick Overman, noted that

> Iron rakes, for drawing coal, are commonly in use; but they are very destructive to charcoal, and should be avoided in the /coal/ yard. Wooden rakes are preferable.[7]

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3. SM 8, p. 107a, July 8, 1817.

4. SM 11, p. 72, Mar. 19, 1823.

5. SM 12, p. 52b, June 17, 1825.

6. SM 14, p. 11a, Jan. 10, 1828.

7. Overman, The Manufacture of Iron, p. 171.

Wooden charcoal rakes discussed by Overman are illustrated in his Treatise on Metallurgy[8] and are shown here in Illustration 4. The rakes in use at Hopewell Village are of the same type.

Collier's shovels, a common item in and about the charcoal house, appear in the Hopewell Furnace records.[9] These hand tools, with wide and flat blades, generally short shafts, and D-shaped handles, are also illustrated in Overman's work, and are shown in Illustration 4 of this report.

C. Charcoal Baskets

From a numerical point of view, however, the charcoal baskets were the most important item in and around the charcoal house. These baskets, in use at virtually every charcoal furnace in the area, were shallow oval-shaped split wood baskets. The baskets at Cornwall Furnace State Historical Park, quite similar to the baskets at Hopewell Village, average 30 inches in length, 20 inches in width, and 5 inches in depth. The design of the baskets is shown in Illustration 5.

Charcoal baskets appear frequently in Hopewell Furnace records, attesting to their very moderate price, availability, and use in large numbers. Sample entries in the records include an 1827 entry for 48 baskets at 30 cents apiece and 12 baskets at 15 cents each.[10] An 1823 entry in a Hopewell Furnace account book reads "3 doz coal basket and 2 doz Mine Baskets rec sometime last Spring-$12.71 1/2 cents."[11]

A figure for the total amount of baskets required at Hopewell was determined by basing the number of one-basket charges for a full day at 360. A twelve-hour shift in the charcoal house would then be required to fill 180 baskets. A manageable figure would be half that,

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8. Frederick Overman, A Treatise on Metallurgy; Comprising Mining, and General and Particular Metallurgical Operations, With A Description of Charcoal, Coke and Anthracite Furnaces, Blast Machines, Hot Blast, Forge Hammers, Rolling Mills, Etc., Etc., With Three Hundred and Seventy-Seven Wood Engravings (New York: D. Appleton and Company, 1854), fig. 162, p. 359 (hereafter cited as Overman, A Treatise on Metallurgy).

9. Heydinger, "Historic Structures Report, Charcoal House /furnishings/," citing SM 9, Mar. 17, 1818, p. 13b, and SM 9, Mar. 15, 1819, p. 148a.

10. SM 59, p. 20a, Mar. 28, 1827.

11. SM 12, p. 19a, Jan. 31, 1825.

90, since the furnace would be charged a few baskets at a time. Ninety baskets, possibly half of them filled and the rest stacked and ready for filling, is a realistic number.[12]

Some of the baskets would have been loaded in wheeled charcoal barrows (see Illustration 4). An 1800 inventory suggests two wheelbarrows on hand, with additional barrows purchased in 1817 (3), 1825 (5), 1829 (3), and 1831 (3).[13] Occasional mention of wheelbarrows occurs during the 1830s, an 1836 entry noting a $4.50 purchase of a wheelbarrow,[14] and an 1832 entry noting another.[15] Charcoal wheelbarrows at the charcoal house, in regular service, then probably numbered about five.

D. Ore Boxes and Wheelbarrows

Wheelbarrows (coal barrows) carried the charcoal-filled baskets the fifty feet across the bridge to the furnace top, where the charges were dumped, on order, into the opening. Other wheelbarrows carried flux and ore to the charge house (the shelter atop the furnace). Whether they carried ore and flux already in mine boxes or in bulk is not known for certain, but probably the boxes were filled at the piles of ore lining the bridge house and near the charcoal house. One researcher suggested that since

> Hopewell charged about four tons of ore daily into the furnace, sufficient mine boxes should be displayed to contain the night charge made up by the day filler-and a supply of boxes for use and reuse by the day man. A maximum of 100 pounds of ore per box would require forty boxes for night use. Ore boxes might be arranged four each . . . on three conventional wheelbarrows and the remaining twenty eight stacked full of ore ready to be transferred onto a wheelbarrow. Two of the box loaded wheelbarrows might be under the connecting shed awaiting movement into the bridge house and the third in the bridge house.

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12. The computation of 360 charges is found in Heydinger, "Historic Structures Report, Charcoal House /furnishings/," p. 5.

13. Ibid., pp. 6-7.

14. SM 21, p. 170, Mar. 25, 1836.

15. SM 21, p. 33, June 1, 1832.

> Ten or twelve additional boxes might be sufficient to demonstrate day use and reuse needs. Thus a total of fifty-two boxes might be appropriate. The ore in the boxes should be approximately the size specified by Overman /Treatise on Metallurgy, p. 491/, that of a hen's egg. The boxes might be constructed on the pattern illustrated by the same iron authority.[16]

Mine boxes, like charcoal baskets, frequently appear in Hopewell Furnace account books. Often the mine boxes appear on the same purchase as coal baskets, tending to affirm their joint use since they were purchased at the same time from the same account. An 1833 account notes 48 coal baskets and 40 mine boxes delivered to the furnace between September 30, 1830, and April 9, 1832, and lists 12 mine boxes and 24 coal baskets delivered from June 6, 1832, to September 20, 1832.[17]

Overman, in his Treatise on Metallurgy, illustrates mine boxes and their size, using a four-inch handle as a measurement guide, resulting in a 20-inch box, 6 inches at the bottom widening to 8 inches at the top, with an 8 inch depth.[18] These boxes would be used to carry both ore and flux. (Comparative data on ore boxes has not been discovered yet, since the single restored furnace available nearby for comparison utilized ore-buggies, as did Hopewell Furnace, but only after 1840.)

E. Miscellaneous Items

"Riddles" apparently were in use at Hopewell Furnace, probably in the vicinity of the charcoal house. A riddle, a large sieve, is included

> in the 1800 Inventory on the line below the seventeen mine baskets /and/ suggests that ore was sifted before charging at Hopewell. Later purchases do not differentiate between those /riddles/ used by the moulders and those on the furnace bank /near the charcoal house/. Hence a wire riddle is appropriate as a charcoal house furnishing. However, both size and shape are presently unknown.[19]

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16. Heydinger, "Historic Structures Report, Charcoal House /furnishings/," p. 6.

17. SM 21, p. 61b, Apr. 24, 1833.

18. Overman, A Treatise on Metallurgy, p. 359.

19. Heydinger, "Historic Structures Report, Charcoal House /furnishings/," p. 8.

Sledges were used at Hopewell Village, and appear in the records from time to time. Horse-drawn, low to the ground, they possibly carried ore and flux to the piles around the connecting shed and bridge house. Probably they carried wood to the charcoal stacks. A June 1819 citation in a Hopewell account book does not list a size.[20] Ladders laid across the piles of charcoal, as in Illustration 4, would also be present.

Lighting at Hopewell's charcoal house came from oil lamps, at least in the later nineteenth century.[21] Long's recollection appears to agree generally with lighting at Cornwall Furnace. There, cast-iron "miner's lamps," shaped like long-spouted cylindrical teapots, were used. This style lamp is also seen in nearby museums.

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20. SM 10, p. 35, June 9, 1819.

21. Personal interview, Harker A. Long with Roy Appleman, 1935, Hopewell Village NHS.

VIII. THE BLACKSMITH SHOP: FLOOR PLAN AND FURNISHINGS INVENTORY

A. Floor Plan

The floor plan of the blacksmith shop as it now exists appears to adequately reflect both the current interpretive use of the structure and a proper arrangement of tools, furniture, and equipment for the shop. Indeed, given the need to separate the visitor from the shop, little can be changed. Even if the area currently separated by the wrought-iron fence were to become available, little could be put into the space. The location of tool racks, bench, vises and quenching tub are determined by the location of the forge, and the present arrangement of the shop is about as convenient as the blacksmith could have hoped for. All the major work areas are close at hand.

The quenching tub[1] is at the corner formed by the north wall and the forge. Hot iron could be immediately quenched by the blacksmith turning from the anvil. The anvil is close to the forge, and handy to the tool rack and tongs and to the crane and bellows handle. The workbench, against the east wall, is convenient to the blacksmith standing in front of the anvil. The north end of the workbench could support iron being drilled by the beam-type press overhead. The two tool racks, one parallel to the drill press beam and the other on the north wall, have to be in these locations to remain within easy reach of the smith.

B. Inventory of Tools

A physical inventory of tools on display at the blacksmith shop revealed that the bulk of the tools on hand are of wrought iron and are handmade. The handmade tools appear to be of the style illustrated in studies of nineteenth century shops. Those few modern tools on hand--3 hammers and 8 tongs--are not included in this inventory.

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1. The quenching tub is nonhistoric, because according to an interview on file at Hopewell Village conducted with Thomas Hoffman, it was made "from an old brine cask and installed in the NW corner next to the forge," apparently the location requested by a blacksmith for the Civilian Conservation Corps crew at the park.

Farrier's Tool Box

21-1/4 x 11 x 18 inches tall,
with horseshoe nail container.
Farrier's Butteris
15-1/2 inches long,
wood knob handle
3 wrought-iron knives,
7-1/2, 7, and 8 inches,
flattened each end

Swage Block

multiple openings, square,
13-3/4 x 13-3/4 inches

Tongs (on Tong and Hammer Rack)

Hollow Bit	17-3/4 inches
V-Bit	22-1/8 inches
Pick-up	25-1/8 inches
Narrow Hollow Bit	23-3/4 inches
Small V-Shaped Bit	17-5/8 inches
Oval Hollow Bit (shows number A726)	19-1/8 inches
Wide T-Shaped Bit	18-5/8 inches
Hoop Bit (shows number A726/C959)	22-1/2 inches
Pick-up Bit	18-7/8 inches
Round Head Bit	18-1/8 inches

Tongs (on forge)

Flat Bit	18-1/2 inches
Small Flat Bit	16-3/4 inches
Pointed Bit	19-5/8 inches

Tongs (on north wall tool rack)

Puller Tongs	12-1/2 inches
Irregular (flat bottom, double curved top)	19-3/4 inches
Truncated Hour-Glass Shaped Bit (shows number A726/C960)	24-1/4 inches

Large Tongs, Open Bit	32 inches

Tongs (on side of quenching tub)

Hollow Bit	18-3/4 inches
Flat Bit	20-3/8 inches
Pointed Bit	18-3/4 inches

Anvil
- 33-1/4 inches (length)
- 11-1/2 inches (width)
- 14 inches (height)

Hammers

Cone Top "Drift" Hammer	11-5/8 inches head 7-3/16 inches
Swage Hammer	15-15/16 inches
head	3-1/2 inches
Small Flatter	19-3/8 inches
head	4-1/4 inches
Large Flatter	15-3/4 inches
head	4-5/8 inches
(Number A726/C--1)	
Small Swage Hammer	12-1/4 inches
head	4-7/16 inches

Traveler 13-3/4 inches
Wheel diameter 7-1/2 inches

Fireplace Tools

Coal and Ash Shovel	26 inches
Right Angle Rake	28 inches
Flattened Curved Rake	21-1/2 inches
Flattened Rake	26 inches

Vises

Vise, 36 inches, 6 inches wide at bit
Vise, 33 inches, 4-3/8 inches wide at bit.
Opens to 3-1/2 inches

Miscellaneous

2 hinged candle holders
1 star-shaped candle holder
8 swages
3 hardies

3 wrought-iron hooks
1 heavy T-handled hook
horseshoes
scrap iron
flat iron
hoop iron
iron rods
uncompleted hardware
    pieces, wrought iron
36" bellows
crane
drill press, pressure beam type, incomplete

C. Care of Furnishings

The tools at the shop should be examined and treated to prevent rust and any other problems associated with metal objects. The moisture in and around the blacksmith shop is high, and the uniform rust coating on the tools attests to the humidity in the shop.

The wood portions of the furnishings--the quenching tub, drill press, bellows, workbench, and toolrack--should be checked for deterioration. Following restoration, if needed, they can serve without modification. The leather portions of the bellows should be checked and treated as necessary on a frequent basis. Any special preservative measures should be outlined for routine maintenance.

D. Augmentation of Furnishings on Hand

While the blacksmith shop presently contains a large inventory of tools, some augmentation of the present collection needs to be accomplished. Augers, drill bits for the press, metal punches, and chisels are presently lacking in the collection and should be acquired. The drill press should be fully restored.

E. Utilization of Previous Studies

Two detailed studies, on file at Hopewell Village National Historic Site, merit serious consideration. The descriptions of artifacts recovered archeologically contained in J. C. Fischer Motz, "Report on the Archeological Investigation of the Blacksmith Shop," and the examination of the building itself in the report, can be invaluable for any additional furnishing of the structure.

Howard Gale's "Report on the Furnishings and Equipment and Methods Used in the Blacksmith Shop," a careful and thorough report, has obvious value in the furnishing and operation of the shop.

IX. SUGGESTIONS FOR ADDITIONAL RESEARCH AND RECOMMENDATIONS

During the conduct of the research on the blacksmith shop, wheelwright shop, and charcoal house for this study, it became evident that additional work should be planned for Hopewell Village National Historic Site, and carried out as soon as possible. Hopewell Village, a major historical resource, deserves careful historical study so that its full potential can be achieved.

A. Historical Studies Plan

The great collection of primary source materials collected over the years at Hopewell Village has served as the basis of many reports, studies, and miscellaneous research documents. The archeological investigations at the park, and the architectural studies, have also enriched the collection.

Yet the very concentration of reports and primary documents--carefully assembled over the years--has not been the subject of an overall evaluation. An Historical Studies Plan, which would contain an evaluation of the research studies already accomplished, and, with the park management's participation, a guide for additional research and study to better utilize the historical resource, would be of great benefit. Research which needs to be accomplished could be identified, and subjects which merit further study presented, so that all could be specifically programmed for completion on an orderly basis.

B. Historic Resources Management Plan

The physical plant at Hopewell Village is impressive and unique among historic American villages. Its numerous historical structures, related both to industrial and community life, and its pastoral setting within the boundaries of French Creek State Park, combine to create an unusually rich historic park. Its size and its unusual structures, such as the furnace, headraces, and air pistons, demand administration, preservation, and interpretation under a carefully constructed central scheme. This can best be achieved by an Historic Resources Management Plan, in which park management and the research historian can evaluate the resources at Hopewell Village and plan for the fullest realization of their impressive potential. The Historic Resources Management Plan should be prepared as soon as possible.

C. Interpretation of Blacksmith Shop

The gradual rise of the grade level, as outlined in chapter II of this report, prevents the complete and accurate restoration of the blacksmith shop structure. While in a pure restoration frame of reference this is unfortunate, it can provide a unique opportunity for interpretation around the blacksmith shop. Many of the shop's phases of development can be visually recognized. Blocked-in former windows, now almost at grade level, and the three hearths at the forge are examples of this. These could be interpreted and the park visitors told the story of the necessary changes to the shop resulting in its present condition. This history of a building that changed as the furnace produced more and more slag could be told in simple terms, for the story is immediately apparent. Such an interpretive approach could provide the park visitor with an architectural and historical theme not frequently found.

D. Ironmaster's House

The Ironmaster's House--"the Big House"--is among the prime assets of a richly endowed historical site. The necessary historic structure report and furnishing study should be completed as soon as possible, so that the physical deterioration now evident can be halted and underdeveloped interpretive value utilized more fully. Aside from the vitally needed overall studies--an historic resources management plan and an historical studies management plan--examination of this building is the paramount research need at Hopewell Village.

E. Wheelwright Shop

Although the addition of a wheelwright shop to the industrial community would be a real asset in that it would provide a more complete industrial complex, too little of the building is currently known to properly construct, furnish, and interpret it. Reconstruction, given the data now available, would not appear to meet the standards in the Administrative Policies For Historical Areas of the National Park System (Revised 1973). Reconstruction should await more complete historical data. Until more data on the shop is found, the remains of the wheelwright pit can suffice for interpretation of wheelwrighting at Hopewell Village, and the functions associated with it. Yet the building should not be forgotten. Despite the current paucity of data on it, the Wheelwright Shop-Utility Building was once there, could not have helped but serve an important purpose, or numerous purposes, and without it, the industrial portion of the village is incomplete. Future planning and study should be undertaken, possibly on a routine basis, in order to accumulate more and more data that has, to date, proved so elusive. When the necessary information has

been located, and the extant buildings put into good condition as required, then reconstruction of the Wheelwright Shop-Utility Building might be considered.

F. Physical Facilities

Hopewell Village National Historic Site continues to grow in popularity with the public every year, as does its neighbor, French Creek State Park. As the long-range effects of the energy crisis begin to manifest themselves, it is probable that French Creek State Park and Hopewell Village National Historic Site, being within "one tank of gas" radius from Philadelphia, Wilmington, Reading, Harrisburg, and Camden urban areas, might experience a greater visitor load than normal park visitor increase noted over the preceding few years would indicate.

With these considerations in mind, the development of physical facilities to handle increased visitor loads and preserve and enhance the fragile historic resource should be reconsidered. This should, of course, be part of the recommended Historic Resources Management Plan. Services to the visitor; impact of visitation, restoration, and interpretation; and the nebulous question of carrying capacity all merit restudy in relation to potential major visitor increase which the park might well shortly experience.

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This excellent general work makes good use of illustrations. It includes a select bibliography and discussions of blacksmithing tools, furnishings, and techniques.

Source Materials at Hopewell Village

SM. This Source Material--journals, ledgers, and account books from Hopewell Furnace Number 84--is numbered from SM 1 on. These books are on file at Hopewell Village NHS and serve as the core of the extensive collection there.

"Hopewell Documents" in the collection refer to the notes, letters, inventories, and other miscellaneous data on file and are keyed to a system of numbering based on the date.

ILLUSTRATIONS

Illustration 1. The "Stokes" photograph, 1887.

The wheelwright shop (Utility Building) is in the foreground. Construction details and the probable attic window show clearly.

HOPE file no. P-1887-1.

Illustration 2. The "Bull" photograph, 1890.

The wheelwright shop is the center structure, the blacksmith shop is the structure in the left of the picture.

HOPE file no. P-1890-2.

Illustration 3. Charcoal house furnishings.

Figure 218 of Overman's Treatise on Metallurgy showing mine boxes of the 1840 to 1850 period.

Illustration 4. Charcoal house furnishings.

Figure 26 of Overman's Treatise on Metallurgy showing charcoal rake, wheelbarrow, shovel, and charcoal ladder of the 1840 to 1850 period.

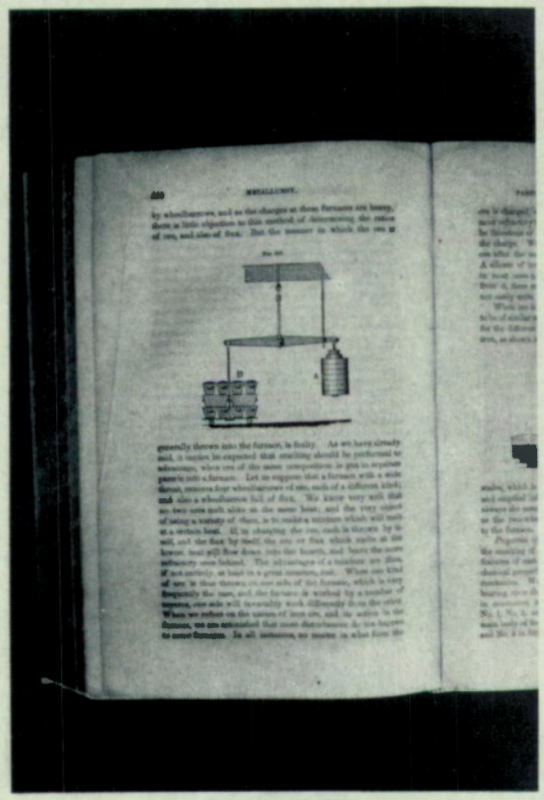


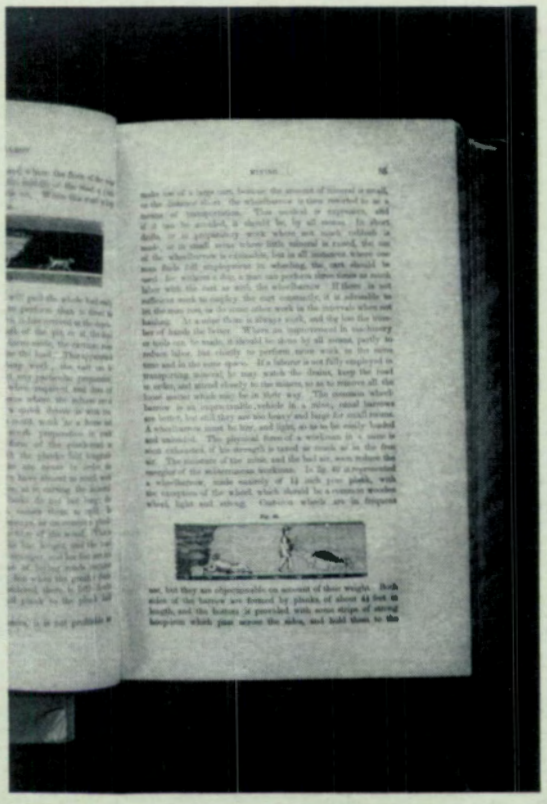
Illustration 5. Charcoal house furnishings.

Charcoal barrow with charcoal baskets.

HOPE file no. 72-9.

Illustration 6. Charcoal house furnishings.

Figure 43 of Overman's Treatise on Metallurgy, showing a typical wheelbarrow of the 1840 to 1850 period.



WATER. 95

make use of a large cart, because the amount of labour is small, as the labour is so. The wheelbarrow is then resorted to as a means of transportation. Time needed is expensive, and if it can be avoided, it should be, by all means. In short, drills, or in preparatory work where not much subsoil is made, or in small areas where little labour is needed, the use of the wheelbarrow is reasonable, but in all instances where one man finds full employment in wheeling, the cart should be used. In subsoil drainage, a man can perform three times as much labor with the cart as with the wheelbarrow. If there is not sufficient work to employ the cart constantly, it is advisable to let the man run, or to some other work in the intervals when not hauling. In a case there is always work, and the less the number of hands the better. Where an improvement in machinery is quite can be made, it should be done by all means, partly to reduce labor, but chiefly to perform more work in the same time and in the same space. If a labourer is not fully employed in transporting material, he may watch the drains, keep the road in order, and attend closely to the minors so as to remove all the lower matter which may be in their way. The common wheelbarrow is an unpromitable vehicle in a novel, canal harrows are better, but still they are too heavy and large for small streams. A wheelbarrow must be low, and light, so as to be easily loaded and unloaded. The physical form of a wheelbarrow is a matter of much consideration, if his strength is taxed as much as in the first war. The minerals of the arms, and the hod are, were reduce the weight of the wheelbarrow, made necessary of 12 inch pine planks, with the exception of the wheel, which should be a common wooden wheel, light and strong. Cumbrous wheels are in frequent

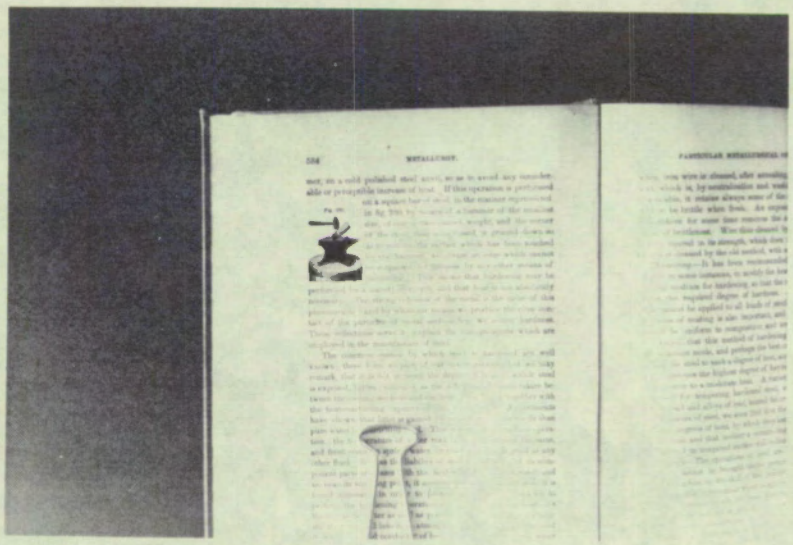
use, but they are objectionable on account of their weight. Both sides of the barrow are formed by planks, of about 4½ feet in length, and the bottom is provided with some strips of strong hoop-iron which pass across the sides, and hold them to the

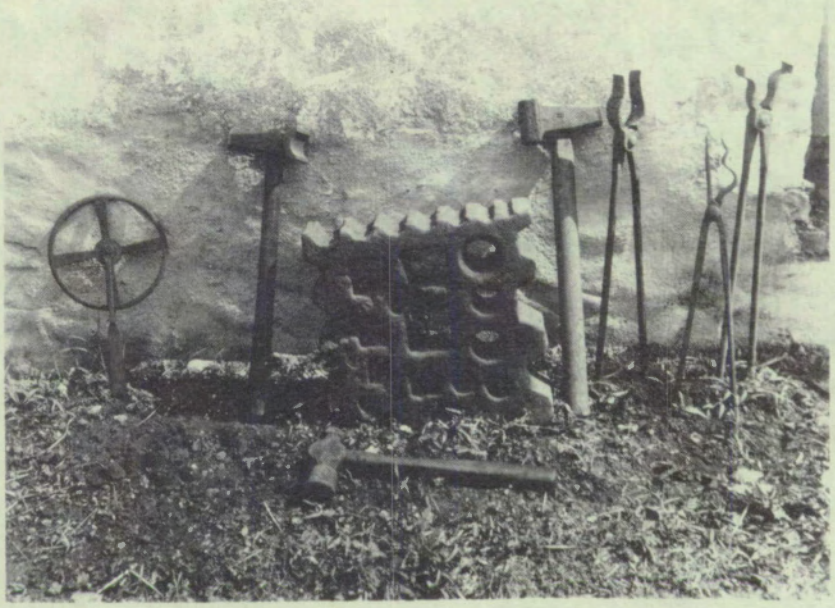
Illustration 7. Blacksmith shop furnishings.

Figure 280 of Overman's Treatise on Metallurgy, showing a blacksmith's hammer and anvil of the 1840 to 1850 period.

Illustration 8. Blacksmith shop furnishings.

Furnishings on hand at Hopewell Village blacksmith shop. From left to right: traveler, swage hammer, swage block, swage hammer, and tongs. The ball peen hammer in the foreground is nonhistoric.





ARCHITECTURAL DATA

HISTORIC STRUCTURE REPORT

BLACKSMITH SHOP

by

Norman M. Souder
with revisions by
Ralph Pedersen

INTRODUCTION

The blacksmith shop was an important part of the iron furnace operation at Hopewell. During the years of iron production the shop was the scene of constant activity involved not only in providing shoes for the many teams of horses and mules used for hauling ore from the mines and finished iron products to market, but also in repairing tools and in fabricating wrought-iron hardware used on the Hopewell buildings. Utilitarian objects such as tools and various eating utensils were also forged here. A blacksmith was constantly employed during the active furnace years.

The blacksmith shop is completely furnished at the present time and is the scene of blacksmithing demonstrations when an experienced blacksmith is available. These demonstrations are given on the annual Hopewell Village Establishment Day and in living history displays which run daily during July and August.

While the building is one of the few in the village relatively untouched by progress and defacing alterations, it has been subject to rather unusual changes which caused it to rise with the change in the groundwater level. The changes brought about by the rising water table will be dealt with in the text of this report.

A set of measured drawings by R. D. Hehr of Reading, Pa., dated December 2, 1940, is included as part of this report and serves to illustrate the condition of the blacksmith shop as it was when Hopewell Village became a national historic site.

As part of the record and as a comparison to the above drawings, a series of photographs are included showing the building as it is today and the attempts at restoration which occured prior to acquisition of the structure by the National Park Service.

Also included are a set of drawings showing the proposed restoration. It should be noted that, due to the existing level of the water table in the area, a restoration to the original condition cannot be undertaken. The proposed restoration will be within the 1840 restoration date set for Hopewell Village and will reflect the change in the course of French Creek to its present channel south of the blacksmith shop.

Norman M. Souder
Architect

I. BRIEF HISTORY

Hopewell documents do not reveal a building date for the blacksmith shop. This is not unusual, since the only structure with documentation in the form of a date stone is the iron furnace, whose erection was begun in 1771. Hopewell records, while complete for business transactions after the erection of the village buildings, are vague on the structures themselves and on the locations of the listings of stone masonry for individual buildings.

There is no doubt that the building dates to the late eighteenth century. The need for the building as an adjunct to the furnace could place the structure as early as 1771-72. The construction and placement of the shop would indicate an early building date, as French Creek was originally to the north side of the building instead of to the south.

The floor of the shop was approximately four feet lower in the original construction than it is at present. Window and door heads, still evident in the stone walls, attest to this fact.

As the groundwater level rose, the walls and roof of the building were raised. Changes also occured in the fenestration. Doors became windows and original windows were walled-in.

The steep pitch of the original roof line is similar to the roof lines in the restored office-store and village barn. These structures show a decided Germanic, or Middle European, influence and more than likely reflect the background of the builder. The simple design is a familiar one in the Berks County area where the seventeenth and eighteenth century German settlers based their buildings on their homeland prototypes.

It must be assumed that Mark Bird did not hire an architect in this outpost settlement, but depended upon builders whom he hired to produce designs based on his requirements.

As has been noted in the Introduction, the blacksmith shop underwent little alteration due to progress. The greatest problem was one of vertical growth brought about by the rising water table. The shop was apparently in near ruinous condition when the site was acquired by the National Park Service. The Hehr drawings show a covering of roofing paper installed by the CCC in the 1930s.

During 1950 there was a restoration of the blacksmith shop. The total scope of the work is not clear because the work was done by day labor and records of what was done are sketchy at best. It is reasonably ascertained from conversations with park personnel and from what evidence could be found (a completion report) that the work included at least in part: (1) lowering of the east and west walls (upon which the wall plates rest). This caused the window in the west wall, near the top of the wall, shown on the 1940 drawings, to be lost; (2) restoration of the roof structure (to present-day condition, including wall plates, rafters, wall ties, tile lath, historic period tile, and enlarged ventilator); (3) replacement of the window in the south wall; and (4) replacement of brick with rubble stone in the chimney stack.

Restoration techniques were not employed as accurately as they might have been, and some of the replacements are obviously modern.

II. EXISTING CONDITIONS

A. Exterior

1. Foundation and Walls

The building is constructed of rubble native stone and measures 25 feet 3 inches by 20 feet 4 inches, with a variation of 2 inches on opposite walls. The front faces east on what was the village road (now restored). The walls are 18 inches thick with a rough stone foundation approximately 4 feet below the present floor and grade level. The exterior and interior surfaces of the walls are roughly plastered and the exterior has been whitewashed according to the custom for most of the buildings in the village. The stone walls extend to include the gables.

The east and west walls and the gables show indications of having been raised and lowered and are presently between what was their lowest height during the historic period and their highest point prior to 1950.

Due to careful attention to maintenance in recent years, the stone walls are in a relatively stable condition.

The walls show definite signs of former doors and windows at levels lower than those extant. As has been noted, this was a result of the rising water table. A similar condition was encountered in the restoration of the cast house to the north of the shop where the current water level was close to the original floor line, resulting in water-filled archeological trenches and later in water-filled foundation pits.

2. Doors and Windows

There are two doors and two windows in the present form of the structure. The long, low window in the south wall is a restoration done by an earlier Park Service administration at Hopewell (1950). It replaces a 15 over 15 light window which is shown in the 1940 measured drawings. The present window has a wood lintel, circular sawn, and a plank frame which is nailed together instead of being mortised, tenoned, and pegged together in the period style. The present 12 light sash are placed on their sides in the frame. Both sash are fixed. A pair of board and batten shutters are placed on this restored opening. These shutters, too, are of recent vintage and obviously of modern machine-made material.

The window in the east wall (front) is also made up of two sash placed side by side. In this case the sash are 6 light. There is no shutter on this window opening at present. The above-mentioned drawings show a top hinged shutter at this location which was in place in 1957 when the writer started the restoration of Hopewell Village. The wrought-iron shutter pintels remain in place. While not original, it is possible that both of these windows contained sliding sash dating to the eighteenth century similar to those discovered during the architectural restoration of the office-store.

Traces of two additional early windows remain clearly evident in the present walls; the former window in the west elevation is now close to grade level. The wood lintel is still intact. The window has been filled in with stone. Similarly, the outline of the former window in the east elevation also has a sill line close to the grade level.

Both existing doors and frames are replacements put in as a part of the normal park maintenance program. The frames are solid plank oak with mortise and tenon joining. The doors constructed of pine are beaded edge, random width board and batten, typical of Hopewell's utilitarian buildings. The door sills are stone and date to the replacement of the present doors and frames, which was within the past few years, but no exact date is available.

The original entrance door was located near the north end of the east elevation--the space now partially utilized by the existing window.

The forge extension slot in the west elevation has no frame, but is merely an opening in the stone wall masonry, reminiscent of a lancet window in medieval buildings. An earlier, smaller slot, located below grade, was investigated by archeologists.

A window shown in the 1940 measured drawings was probably lost when the walls were lowered in 1950. This window was located above the forge area and was apparently a late period addition.

3. Roof

The roof line has undergone some changes resulting from changes in the walls and at the gables. The walls and gables were raised twice due to the rising water table, and the walls were lowered during the 1950 restoration. As a result of the apex of the gables, and the walls being raised and lowered by different amounts, the pitch of the roof has changed, being flatter or steeper as alterations were made. At present the roof is not as steep as it was historically nor as flat as it was prior to 1950.

The existing roof is covered (except for the ridge) with historic period handmade "Dutch" clay tile. The method of application of the tile is probably not correct. The tile are laid in what can best be described as a random pattern, that is, neither stacked nor staggered joint methods. The correct method of laying the tile on this roof would probably be the stacked joint method.

In a conversation with Robert Bucher (author of "Steep Roofs and Red Tiles," in The Pennsylvania Folklife, vol. 2 [Lancaster, Pennsylvania: Franklin & Marshall College, n. d.], p. 22) it was pointed out that the stacked joint method, whereby the joints between tiles are placed in a vertical line, would probably be correct. Although both stacked and staggered joint methods were used historically, the stacked joint method was predominantly used.

The stacked joint method was used on most buildings with tile roofs in that area. This method of tile application used a greater exposure and less overlap on each tile (as opposed to lesser exposure of each tile when the staggered joint method was used) and was lighter, required less support, and was therefore less expensive. This type of tile application was used on utilitarian buildings and on common residential buildings that used clay tile for a roofing material. A staggered joint method of tile application was used on buildings of grander scale such as a church or more elaborate residential buildings.

The roof of the cast house next to the blacksmith shop is laid in the stacked joint method. The tiles are applied by the lug on the back of the tile resting on oak lath. No nails are used in the application of this type of tile roof.

Bits of clay tile were found in 1940 to indicate that there was at one time a clay tile roof on the blacksmith shop. There was not a substantial amount of clay tile, but the tile might have been removed at some point and used elsewhere. The chance of roof fires, resulting from sparks from the forge, was almost as great as it was in the cast house which had a tile roof in the historic period. This is another good indication that the roof was clay tile during the historic period.

A raised roof vent is located in the center of the roof on the ridge and was designed to permit the heat and gasses from the forge to escape. The vent is covered with the same tile used on the adjoining roof areas.

The ridge of the building has a ridge tile which is a modern terra cotta drainage tile that was cut to fit.

4. Chimney

The stone chimney on the west wall is located at the left of the forge on the interior. The chimney is short, extending a few feet above the roof. A tall chimney was not a requisite on a forge due to the forced draft from the huge bellows. The chimney, too, is a restoration.

B. Interior

1. Floor

The interior is one large area with no interior partitions except for the iron protective railing placed close to the middle of the shop. The floor throughout is of earth with a surface covering of burnt molding sand and slag which has been pulverized by use. This is probably the original floor type. It was practical for both the blacksmith and the horses.

The floor surface of the earliest level, between 3 and 4 feet below the present level, has not been fully explored. It can be assumed that it was also originally earth, but at one time the floor was plastered in an effort to combat the dampness of a rising water table. Earth flooring was customary in blacksmith shops. It was also found in the basements of the office-store, and in a portion of the ironmaster's house. It also formed the flooring in portions of the cast house.

2. Walls

The stone masonry walls are exposed on the interior of the building. Some traces of whitewash can be seen but the greater portion of the walls show the worn rubble masonry and broad-pointing. A great many areas of the walls show concrete patching of recent vintage.

3. Roof Structure

The roof is supported on pole rafters approximately 6 inches in diameter and spaced approximately on 2-foot centers. The rafters are halved at the ridge and held with wooden pins. This type of roof construction is typical of most of the Hopewell structures.

The tile lath is oak, approximately 1 by 3 inches. The lugs of the clay tiles are placed on the lath. The weight of the tile is sufficient to hold the tile in place.

The oak wall plates are approximately 8 by 10-1/2 inches. There are three wall ties spanning the east and west walls from plate to plate. The ties near the north and south walls are both approximately 18 inches from their respective walls. The central tie also supports the crane used at the forge.

As has been noted, the ventilator placed at the center of the roof follows the roof slope and is covered with the same red clay tile as the adjoining roof.

4. Forge and Equipment

The forge, chimney, and work bed are constructed of the same rubble stone as the walls. The chimney stack was brick between the old stone wall and the stone chimney above the roof. The brick was replaced with rubble stone during 1950 and at present the forge and chimney are a relatively continuous structure. The forge table is 5 feet 3 inches wide and 5 feet 6 inches long.

The large bellows is located to the south of the forge and stack. It is operated by a lever placed convenient to the working area. The tuyère of the bellows penetrates the stone wall of the forge.

An old plank workbench is placed on the east wall under the window and extends from the northeast corner to the entrance door.

Above the workbench are the remains of a primitive drill press, placed at plate level and supported on the tie beams.

Another built-in feature is the wooden pivoting crane used in supporting the long and heavy material used at the forge. The crane is located in front of the forge and bellows.

5. Hardware

The door hardware consists of wrought-iron strap hinges hung on drive-in pintles. The hasps are the drop type, hung on large wrought staples. Most of the hardware is not original, but correct as to type and material.

III. PROPOSED RESTORATION

A. Scope of Restoration

It is proposed that the blacksmith shop be restored to the pre-1840 period which has been the restoration date for all other buildings in the village.

This restoration will not basically alter the building as it now stands. The creek course was changed at an early date apparently in an attempt to lower the water table and divert the water between the cast house and the blacksmith shop. The tail race, which occupies the former location of French Creek, was walled in with stone and covered through the old stone bridge to a point east of the village barn. It is, therefore, both practical and historically correct to maintain the present site arrangement.

To restore the blacksmith shop to its original condition would entail the lowering of the floor and the surrounding exterior grade approximately 3 feet. If this were done we would again encounter the high groundwater condition which occured during the restoration of the cast house north of the shop. In fact, the floor line would be close to the bed level of the creek which runs a few yards south of the shop.

It is proposed that architectural features, such as the existing doors and windows and the present roof slope, be maintained.

The following is a list of the items to be included in the restoration of the building:

1. Walls and Foundation

The stone walls should be checked for spalls and faults and put into sound condition. Cracked "broad-pointing" on the interior and exterior should be removed and replaced. Areas of modern concrete patching are also to be removed and filled in with matching stone. The area on the interior of the south wall and gable is an example of this.

2. Roof

The present handmade Pennsylvania Dutch red clay tiles are to be removed and relaid in the approved manner, that is in the vertical,

or stacked joint, method instead of the present random pattern. There is a sufficient stockpile of these tiles at the park to re-lay the roof and ventilator properly.

When the tiles are removed, all roof rafters must be checked for decay and failure and replaced as required.

3. Structural Timbers

Repairs were made to the roof framing timbers. The plates were replaced in 1950. If these plates and ties show no potential failure they will be maintained. An examination of these members will be made prior to the preparation of the working drawings.

4. Floor

The present earth floor covered with burnt moulding sand and crushed slag is authentic and will be maintained.

5. Windows

The existing window frames are to be removed and replaced with oak mortised, tenoned, and pegged frames. The present frames date to early attempts at restoration in the 1940s and 1950. The present sash are not authentic, each being stock sash placed sideways. The sash must be made and should be similar in design to the sliding sash found in the office-store in a similar frame situation. The sash and frame will be fabricated to meet the plans and specifications. Shutters were not authenticated to the historic period and will not be replaced at this time.

6. Doors

The present doors and frames, including the wrought-iron hardware, are replacements and are properly fabricated. These have been replaced under the direction of the restoration architect and former Building Restoration Specialist Seidel, and will be retained.

7. Utilities

At this writing there are no utilities in the building. A recently buried electric line has been installed to serve the historic buildings in the lower village area. Service will be made available to the shop for maintenance use. The outlet, or outlets, installed must be unobtrusively located in the interior.

IV. PRELIMINARY COST ESTIMATE

Stone Masonry	
Masonry repairs, walls, forge, chimney, window and door openings	$9,000
Carpentry	
Window frame and sash replacement structural framing and rafter replacement	4,000
Roof	
Removal of existing tile roof, storage replacement of roof	6,000
Painting and whitewashing	2,000
Miscellaneous	1,000
Construction Total	$22,000
Plans and specifications 15% ±	3,300
Historic Structures Supervision 12% ±	2,640
Contingencies 19% ±	4,180
Grand Total	$32,120

ILLUSTRATIONS

Illustration 1.

The east, or front, elevation of the blacksmith shop. The stone walls are whitewashed and the roof covered with red clay tiles. The joints in the stone masonry at the right end of the window, which was the location of the former door, are not visible in the photograph due to preservative maintenance. The door and frame are recent restorations.

Photographed by George Eisenman, September 1973.

BLACKSMITH
SHOP

Illustration 2.

The south elevation, showing the window which was partially restored. (See record measured drawings).

The present roof has a flattened pitch, as compared with the historic roof, due to alterations of walls and gables.

The exterior trim has been painted iron oxide red. No original trim remains to provide an authentic trim color. In other auxiliary buildings at Hopewell, both the red trim and whitewashed trim have been found.

Photographed by George Eisenman, September 1973.

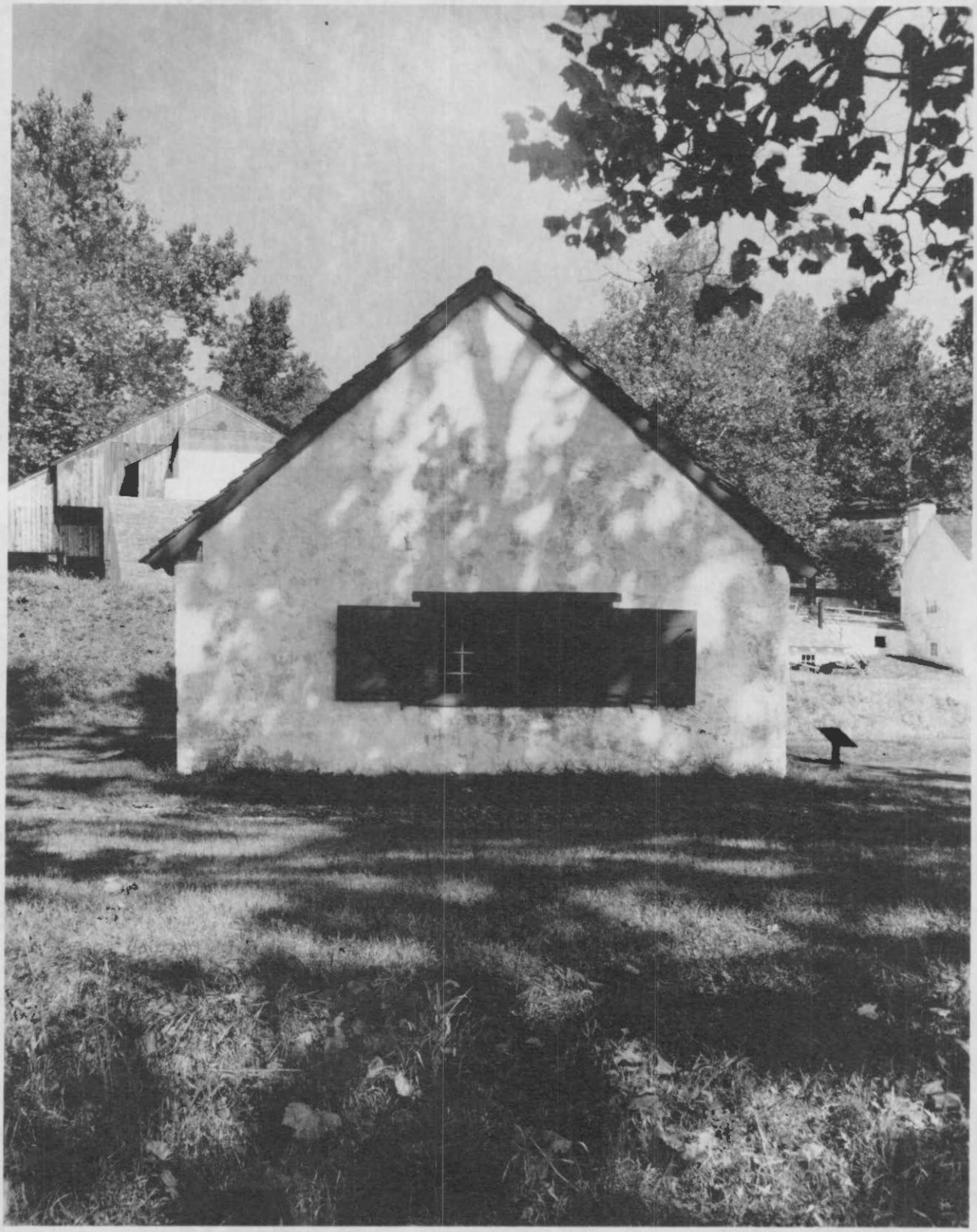


Illustration 3.

The west elevation, showing the closed original window near grade level.

The two forge "extension" holes are near the left of the building. The upper hole is the later of the two openings.

Photographed by George Eisenman, September 1973.

Illustration 4.

The north elevation, showing the later period door placed at the level of the present grade.

The ridge tile shown is not authentic. It is composed of cut terra cotta drainage tile. It is suggested that the existing old roof tile be relaid in the historic manner.

Photographed by George Eisenman, September 1973.

Illustration 5.

The interior of the blacksmith shop, looking north toward the forge and north door. This is the view seen by visitors to the shop. The iron guardrail in the foreground separates the public from the working area.

Note the huge bellows at the lower left and the wooden crane to its right.

The stone masonry is exposed as is the roof area showing the tile and tile lath. The pole rafters average 6 inches in diameter. The beam in the foreground is a hewn tie beam, one of two in the building. The forge, cooling vat, and anvil are located in the left center of the photograph.

The door in the background is the door shown on the north exterior in Illustration 4.

Photographed by George Eisenman, September 1973.

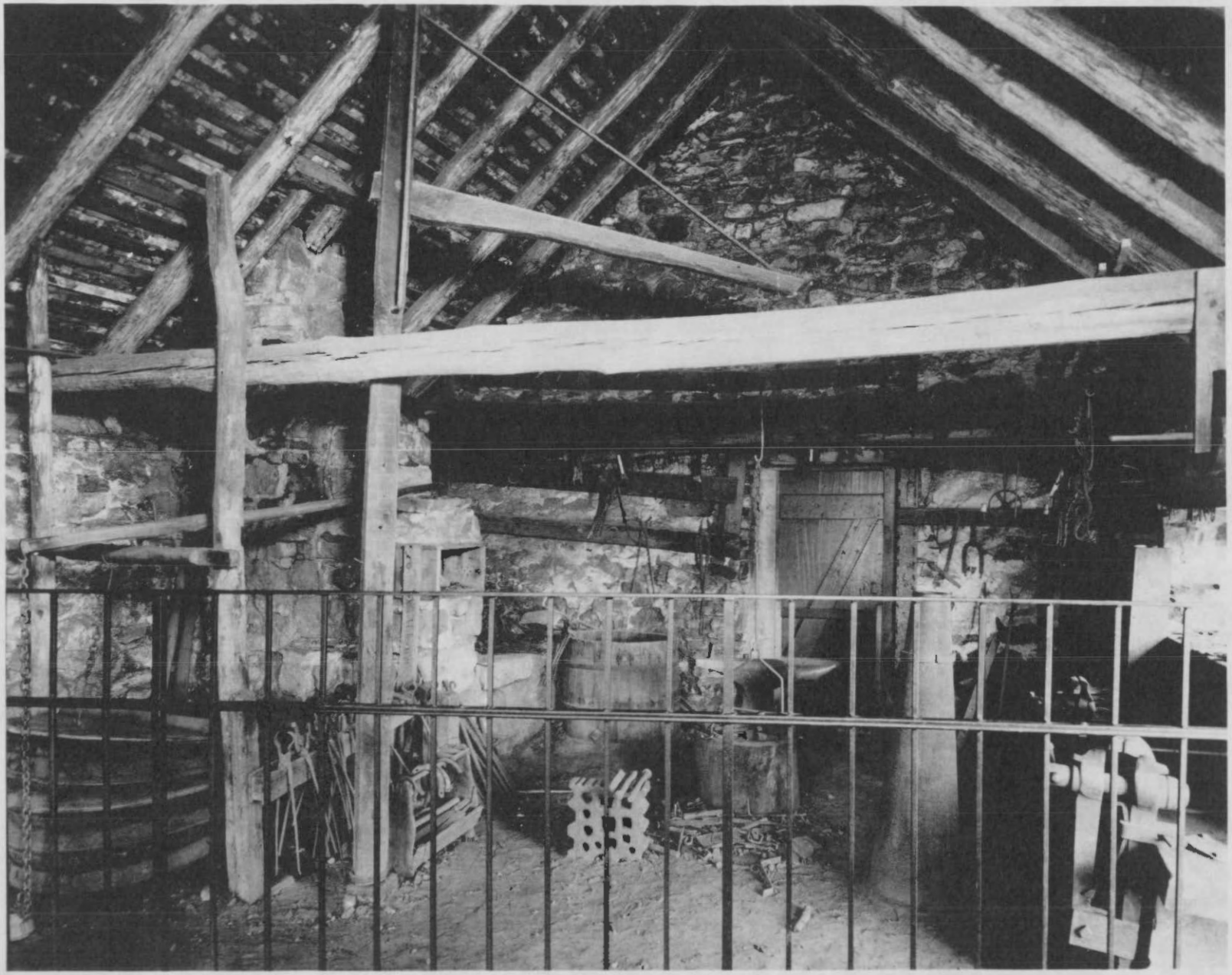


Illustration 6.

The interior,looking south from the north door. The roof structure can be more clearly seen in this photograph.

The bulging wall shown by a light area in the masonry above the tie beam is a repair of an apparent wall failure in the south gable.

The remains of a primitive drill press can be seen at the extreme lower left of the photograph.

The window frame in the background is an early NPS attempt at restoration. The frame should be heavier hewn, and mortised and tenoned, and the sash division pattern needs research for authenticity.

Photographed by George Eisenman, September 1973.

Illustration 7.

A detail photograph of the east entrance door jamb, showing the wood lintels of an original window on the earlier level. The interior wood lintel remains in place and can be seen through the upper part of the protective barrier.

See the accompanying record drawings for the location of this former window.

The restored barn and springhouse can be seen through the open doorway.

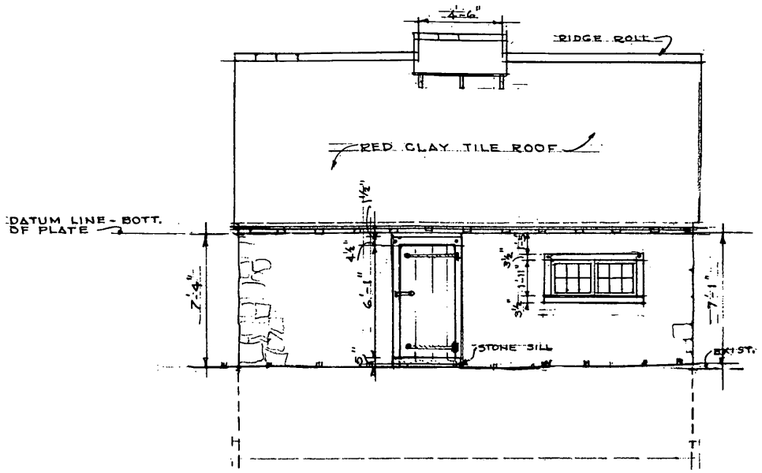
Photographed by George Eisenman, September 1973.

DRAWINGS

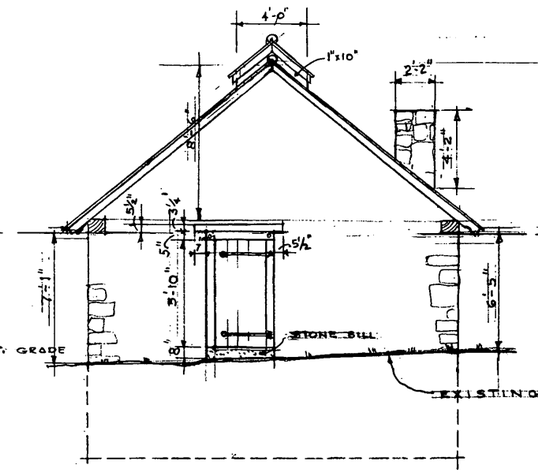
Set of 3 (Sheet 2 not included).

Sheet 1.

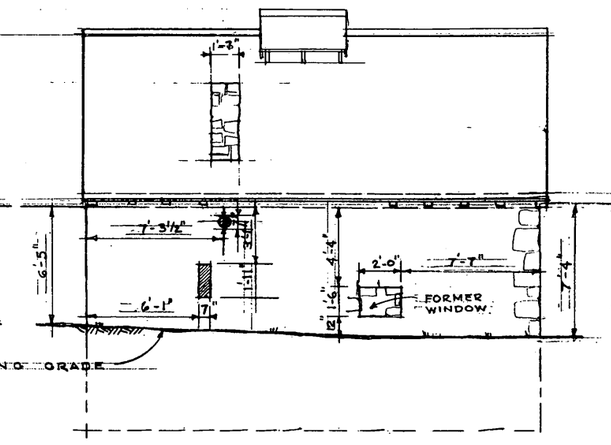
Existing conditions.



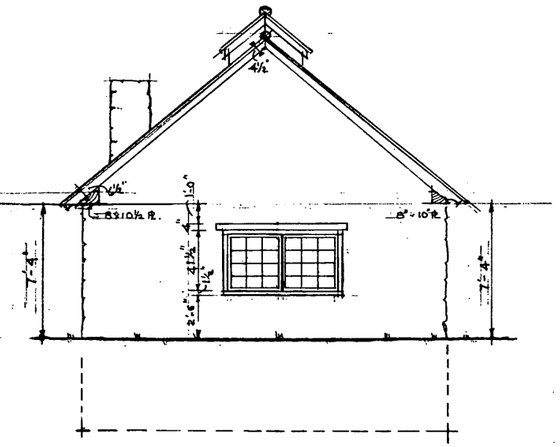
EAST ELEVATION



NORTH ELEVATION

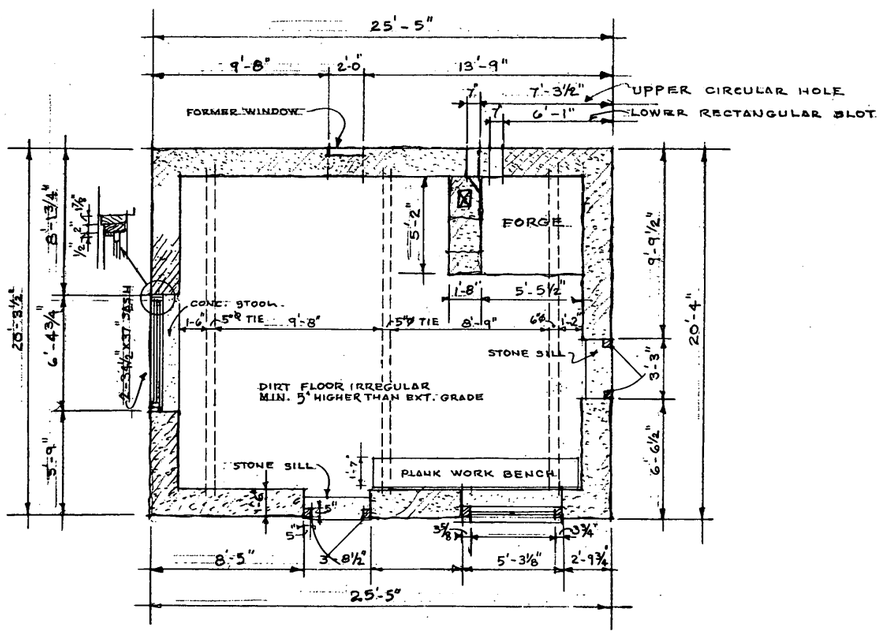


WEST ELEVATION



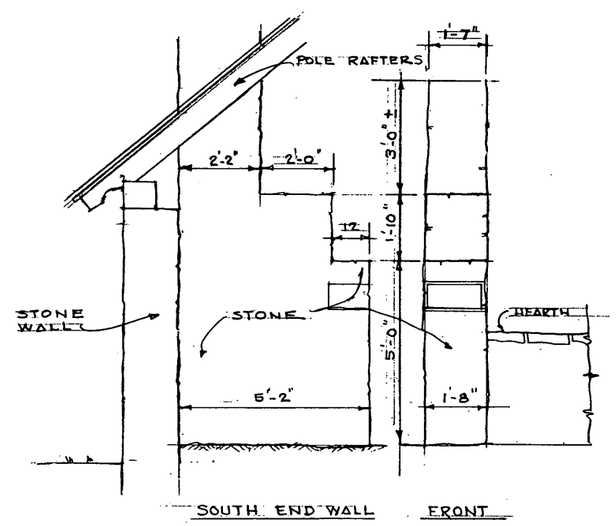
SOUTH ELEVATION

SCALE - 1/4" = 1'-0"



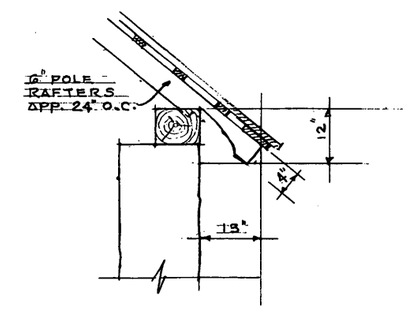
FLOOR PLAN

SCALE - 1/4" = 1'-0"



FORGE DETAIL

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



EAVE DETAIL

SCALE - 3/4" = 1'-0"

ON MICROFILM

PREPARED

SOUDER

MEASURED DRAWING
PROPOSED RESTORATION
BLACKSMITH SHOP

HOPEWELL VILLAGE, NATIONAL HISTORIC SITE

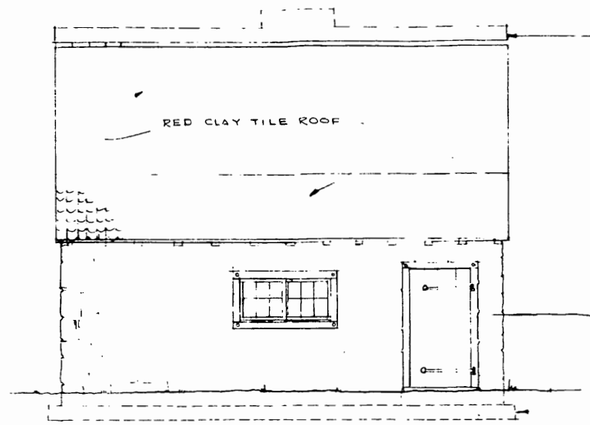
MEASURED - MAY 14, 15, 1974

376
26,000

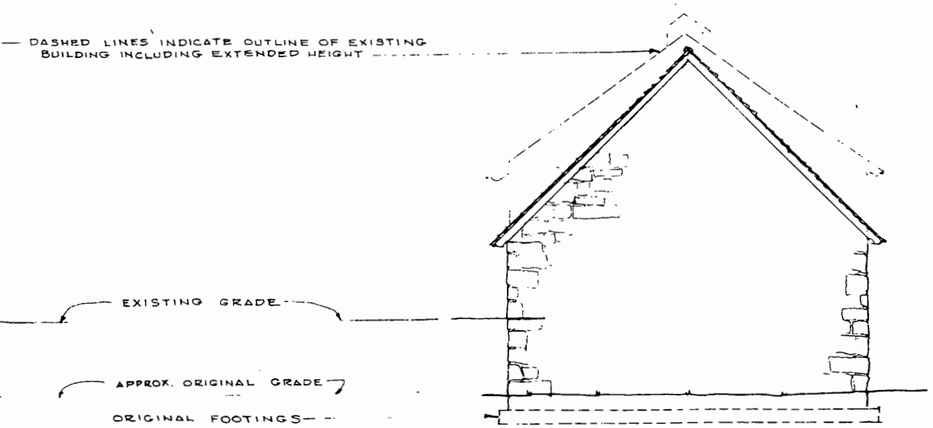
Sheet 1 of 3

Sheet 3.

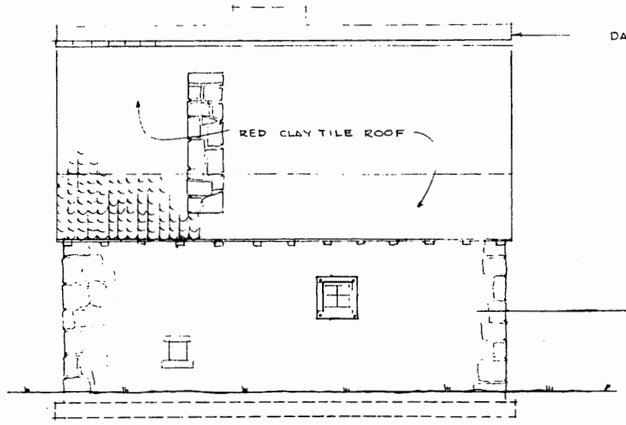
Original conditions.



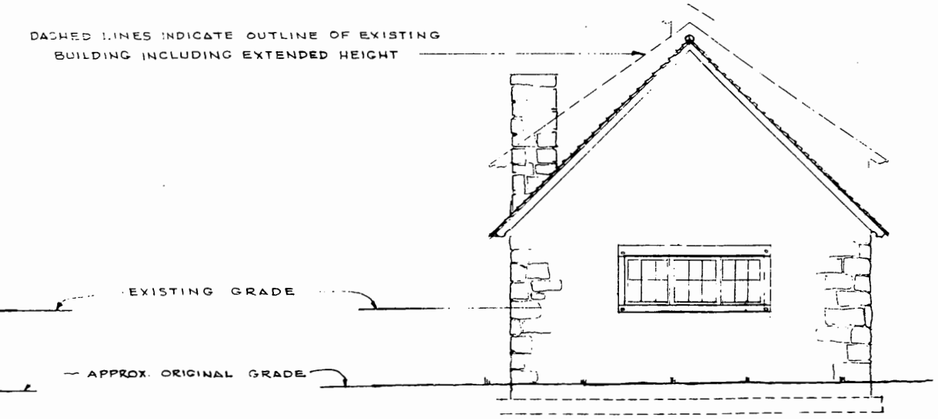
EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION

ORIENTATION

ORIGINAL BLACKSMITH SHOP

SHOWING BUILDING AS CONSTRUCTED CIRCA 1772. TO CHANGE IN HEIGHT AND FENESTRATION CIRCA 1820-1830, AS DETERMINED BY ARCHITECTURAL EVIDENCE.

SCALE - 1/4" = 1'-0"

HOPEWELL VILLAGE N. H. S. - BERKS COUNTY, PENNSYLVANIA

PREPARED	DATE	SURNAME
DESIGNED		SNYDER
DRAWN		
CHECKED		

SYMBOL	REVISIONS — DESCRIPTION	DATE	SURNAME

TITLE OF DRAWING: ORIGINAL CONDITIONS

LOCATION WITHIN PARK: BLACKSMITH SHOP

NAME OF PARK: HOPEWELL VILLAGE NATIONAL HISTORIC SITE

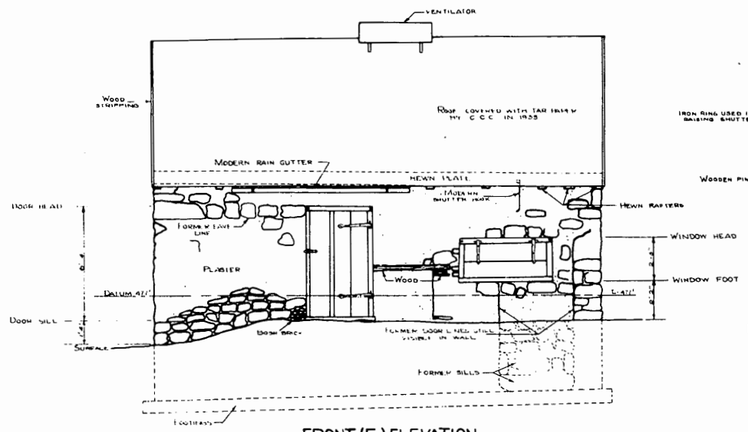
DRAWING NO. 376 / 26,000

SHEET 3 OF 3

ON MICROFILM

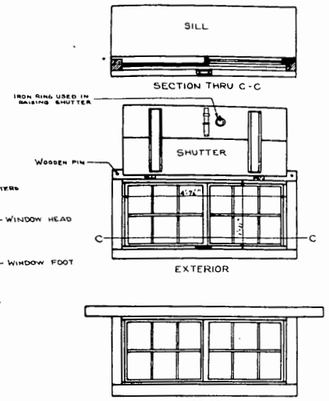
Set of 3.

1940 measured drawings.

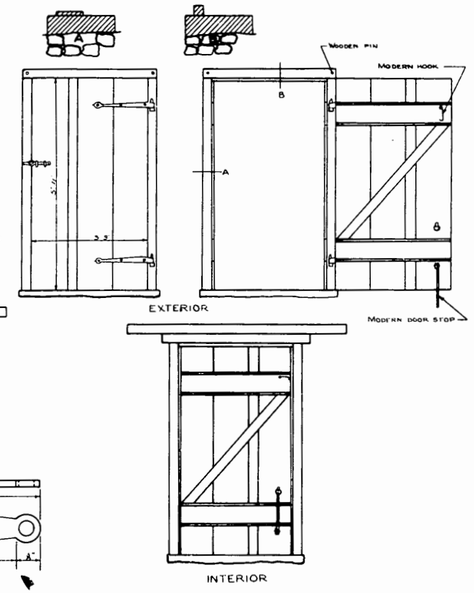


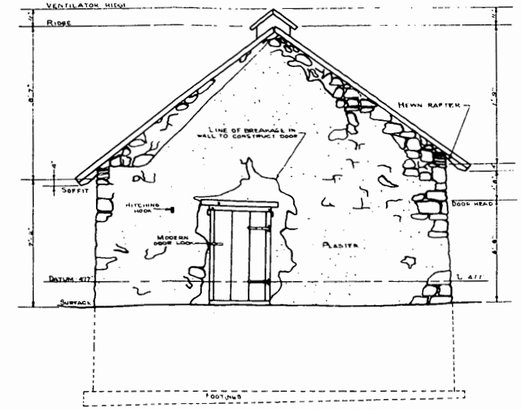
FRONT (E.) ELEVATION
SCALE 1/4" = 1'-0"

WINDOW - E. ELEVATION
SCALE - 1/2" = 1'-0"



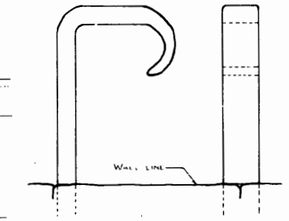
DOOR - E. ELEVATION
SCALE - 1/2" = 1'-0"

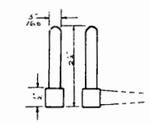




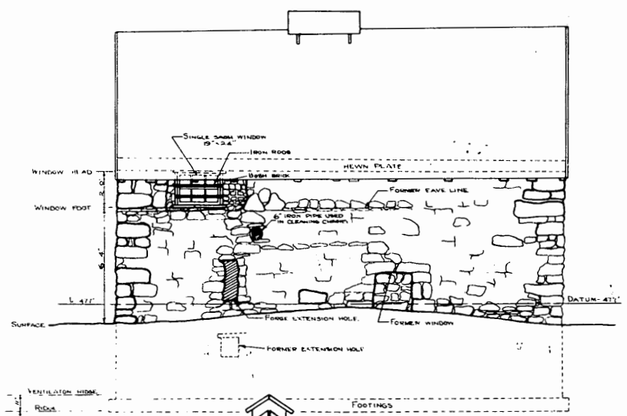
NORTH ELEVATION
SCALE 1/4" = 1'-0"

W.I. HITCHING HOOK
SCALE 12" = 1'-0"



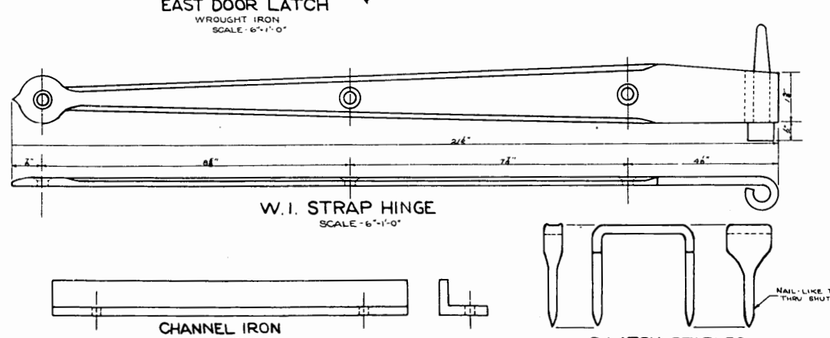


S. HINGE PIN
SCALE 6" = 1'-0"



REAR (W.) ELEVATION
SCALE 1/4" = 1'-0"

EAST DOOR LATCH
WROUGHT IRON
SCALE - 6" = 1'-0"



DOOR - N. ELEVATION
SCALE 1/2" = 1'-0"

W.I. STRAP HINGE
SCALE - 6" = 1'-0"

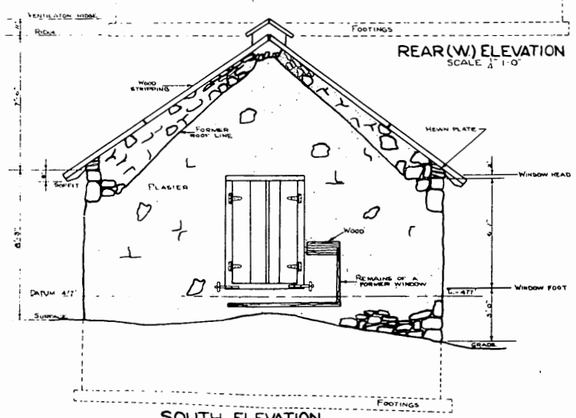
CHANNEL IRON
SCALE - 12" = 1'-0"

S. LATCH STAPLES
SCALE - 12" = 1'-0"

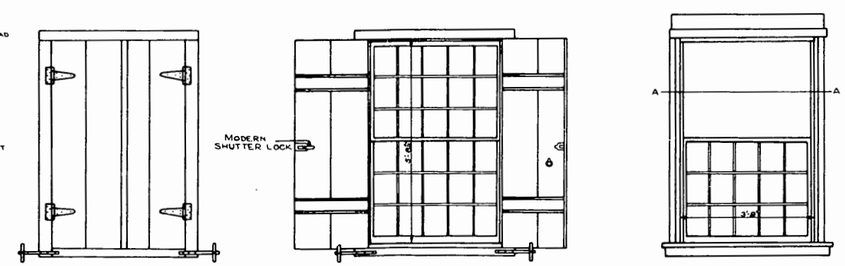
NAIL-LIKE TIPS DRIVEN THRU SHUTTER & CLINCHED.

W.I. STRAP HINGE
SCALE - 6" = 1'-0"

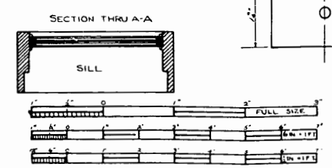
W.I. SHUTTER LATCH
SCALE - 12" = 1'-0"

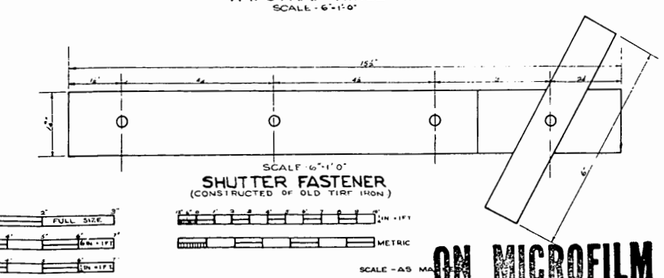


SOUTH ELEVATION
SCALE 1/4" = 1'-0"



WINDOW - S. ELEVATION
SCALE - 1/2" = 1'-0"





SHUTTER FASTENER
(CONSTRUCTED OF OLD TIRE IRON)
SCALE - 6" = 1'-0"

SCALE - AS MA

BASIC DATA - R. D. HEHR READING, PA.

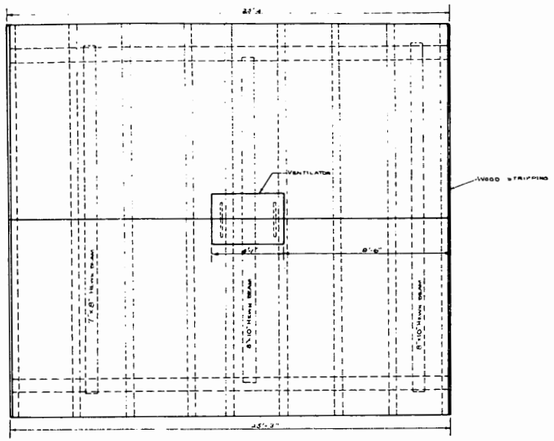
ON MICROFILM

RECOMMENDED _____ CHIEF ARCHITECT DATE _____	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE BRANCH OF PLANS & DESIGN PREPARED BY REGIONAL OFFICE
CONCURRED _____ SUPERINTENDENT DATE _____	BLACKSMITH SHOP (NAME OF JOB) HOPEWELL VILLAGE NATIONAL HISTORIC SITE (LOCATION)
APPROVED _____ DIRECTOR DATE _____	HOPEWELL VILLAGE NATIONAL HISTORIC SITE (NAME OF PARK OR MONUMENT)
	REGION I — SHEET 1 OF 3 — DRAWING NO. NHS-HV 1047

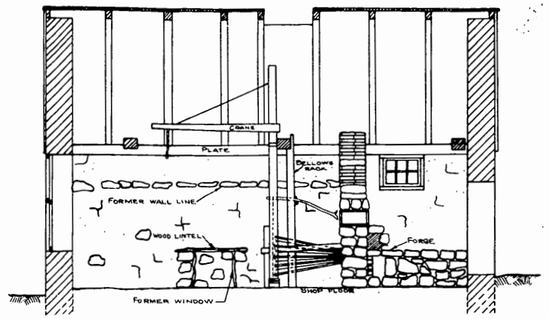
CLEARED — REGIONAL DIRECTOR

REVIEWED — PLANNING AND STATE COOPERATION — RECREATIONAL RESOURCES — PLANNING — RESEARCH AND EDUCATION — SANITATION — HISTORY — ARCHAEOLOGY — ENGINEERING — TESTS AND DESIGN

DESIGNED BY

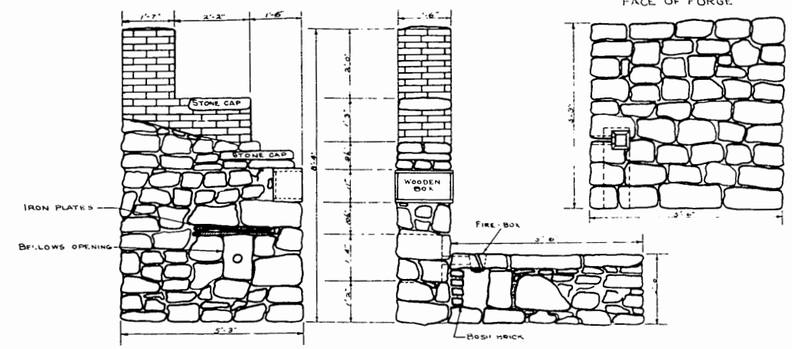


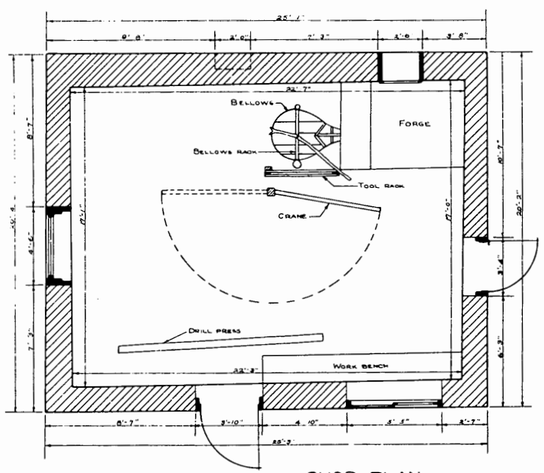
ROOF PLAN
(SHOWING CONSTRUCTION OF ROOF FRAMING)
SCALE - 1/4" = 1'-0"



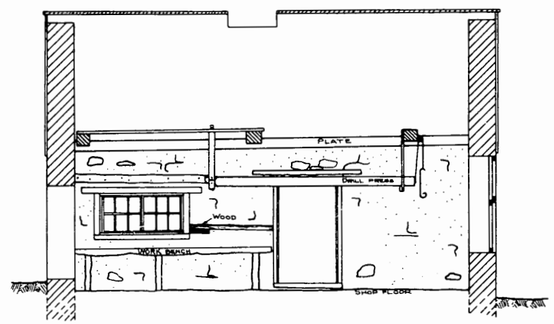
SECTION THRU SHOP LOOKING WEST
SCALE - 1/4" = 1'-0"

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

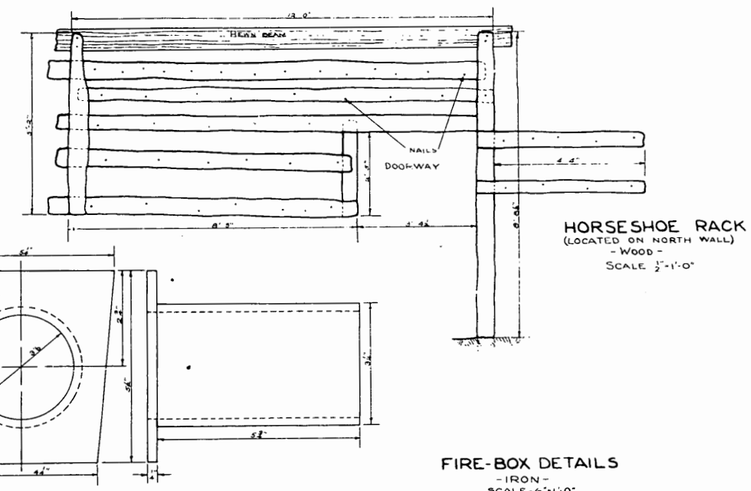




SHOP PLAN
SCALE - 1/4" = 1'-0"

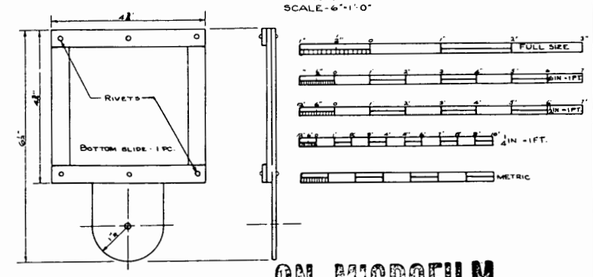


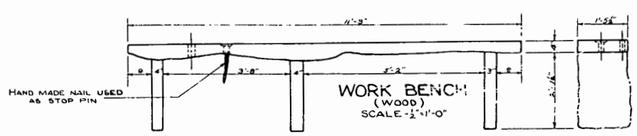
SECTION THRU SHOP LOOKING EAST
SCALE - 1/4" = 1'-0"



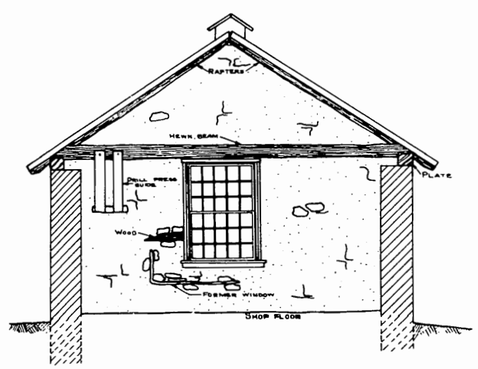
HORSESHOE RACK
(LOCATED ON NORTH WALL)
- WOOD -
SCALE 1/2" = 1'-0"

FIRE-BOX DETAILS
- IRON -
SCALE - 6" = 1'-0"

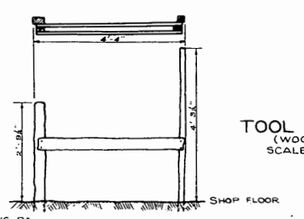




WORK BENCH
(WOOD)
SCALE - 1/2" = 1'-0"



SECTION THRU SHOP LOOKING SOUTH
SCALE - 1/4" = 1'-0"



TOOL RACK
(WOOD)
SCALE - 1/2" = 1'-0"

PLAN LEGEND
MASONRY
WOOD CONST.

N

BASIC DATA - R. D. HEHR - READING, PA.

ON MICROFILM

SCALE - AS MARKED

RECOMMENDED _____ CHIEF ARCHITECT DATE _____	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE BRANCH OF PLANS & DESIGN PREPARED BY PLANNING OFFICE	REGION I
CONCURRED _____ SUPERINTENDENT DATE _____	BLACKSMITH SHOP (NAME OF JOB) HOPEWELL VILLAGE NATIONAL HISTORIC SITE (LOCATION) HOPEWELL VILLAGE NATIONAL HISTORIC SITE (NAME OF PARK OR MONUMENT)	SHEET 2 OF 3
APPROVED _____ DIRECTOR DATE _____		DRAWING NO. NHS-HV 1047

CLEARED
REGIONAL DIRECTOR
RECREATIONAL PLANNING AND STATE COOPERATION
REVIEWED
RESEARCH AND EDUCATION
SANITATION
FORESTRY
HISTORY
DESIGNED BY
PLANS AND DESIGN
ENGINEERING
R. HEHR
12 2 40

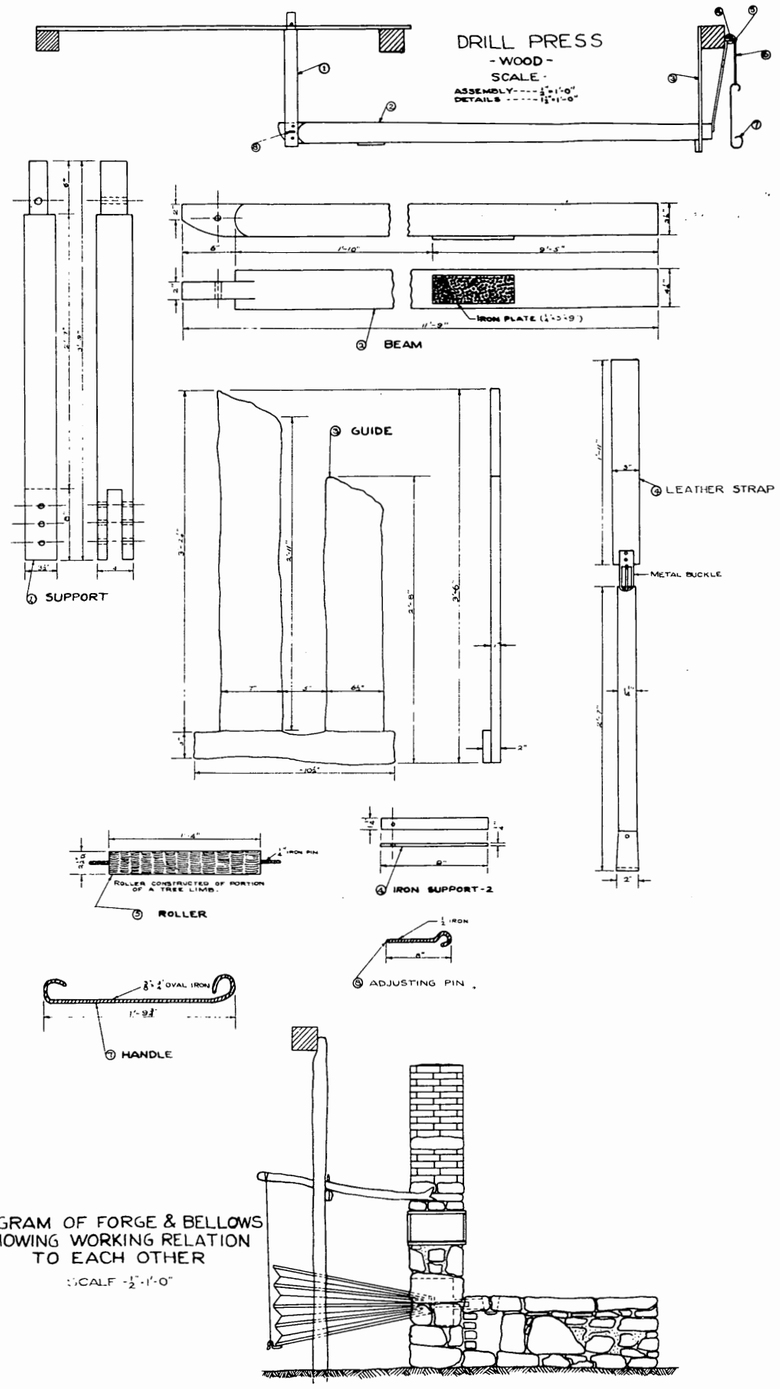
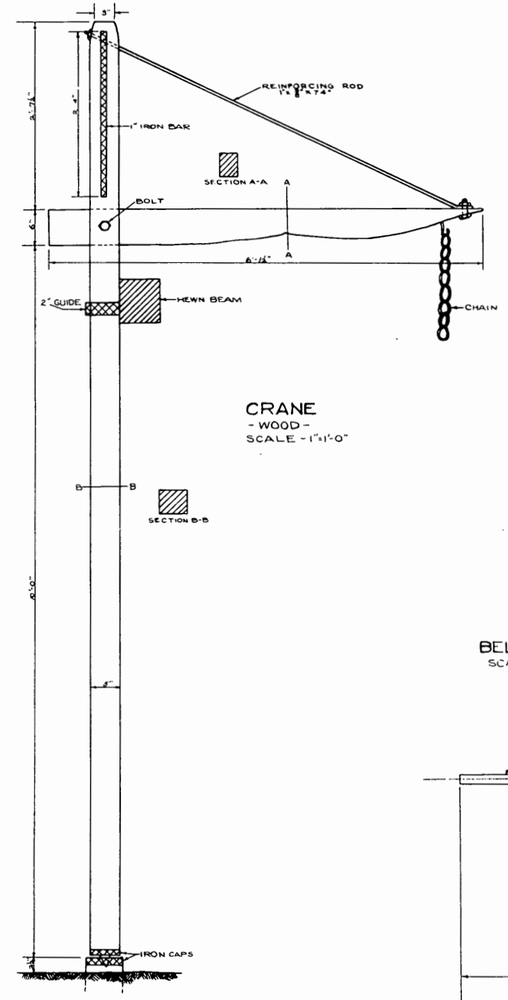
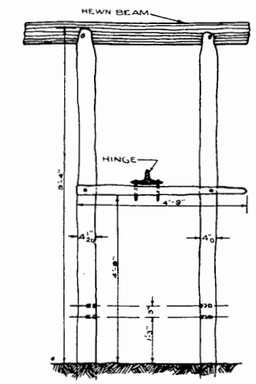


DIAGRAM OF FORGE & BELLOWS SHOWING WORKING RELATION TO EACH OTHER

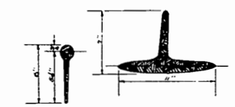
SCALE - 1/2"=1'-0"



CRANE
- WOOD -
SCALE - 1"=1'-0"

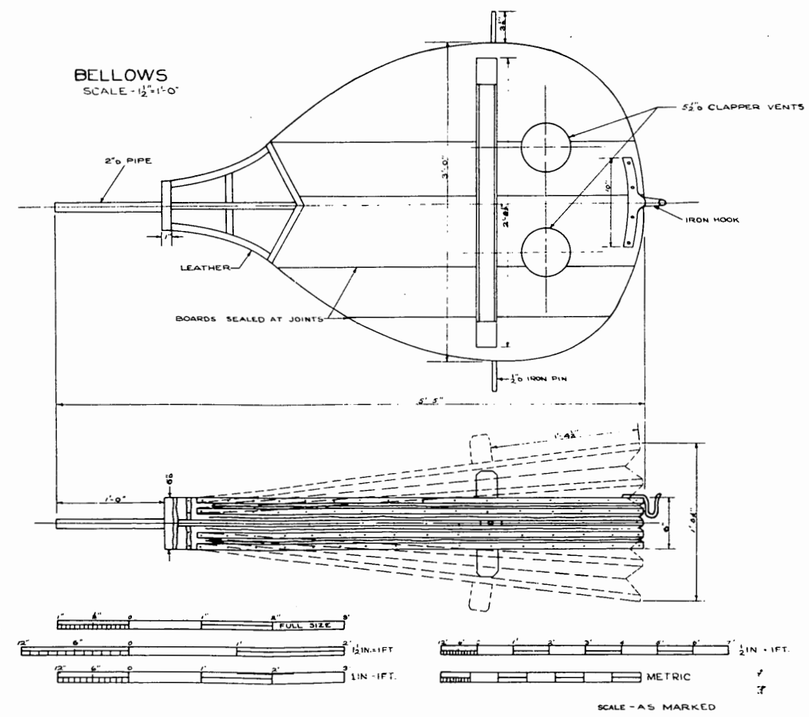


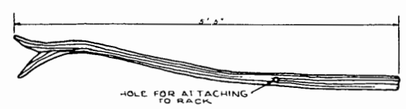
BELLOWS RACK
- WOOD -
SCALE 1/2"=1'-0"



RACK HINGE
- WROUGHT IRON -
SCALE - 1 1/2"=1'-0"

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





BELLOWS LEVER
SCALE - 1"=1'-0"
(FORMER TREE LIMB)

BASIC DATA R D HEHR, READING, PA.

RECOMMENDED _____ CHIEF ARCHITECT DATE _____	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE BRANCH OF PLANS & DESIGN PREPARED BY REGIONAL OFFICE	REGION I
CONCURRED _____ SUPERINTENDENT DATE _____	BLACKSMITH SHOP NAME OF JOB	SHEET 3 OF 3
APPROVED _____ DIRECTOR DATE _____	HOPEWELL VILLAGE NATIONAL HISTORIC SITE LOCATION HOPEWELL VILLAGE NATIONAL HISTORIC SITE NAME OF PARK OR MONUMENT	DRAWING NO. NHS-HV 1047

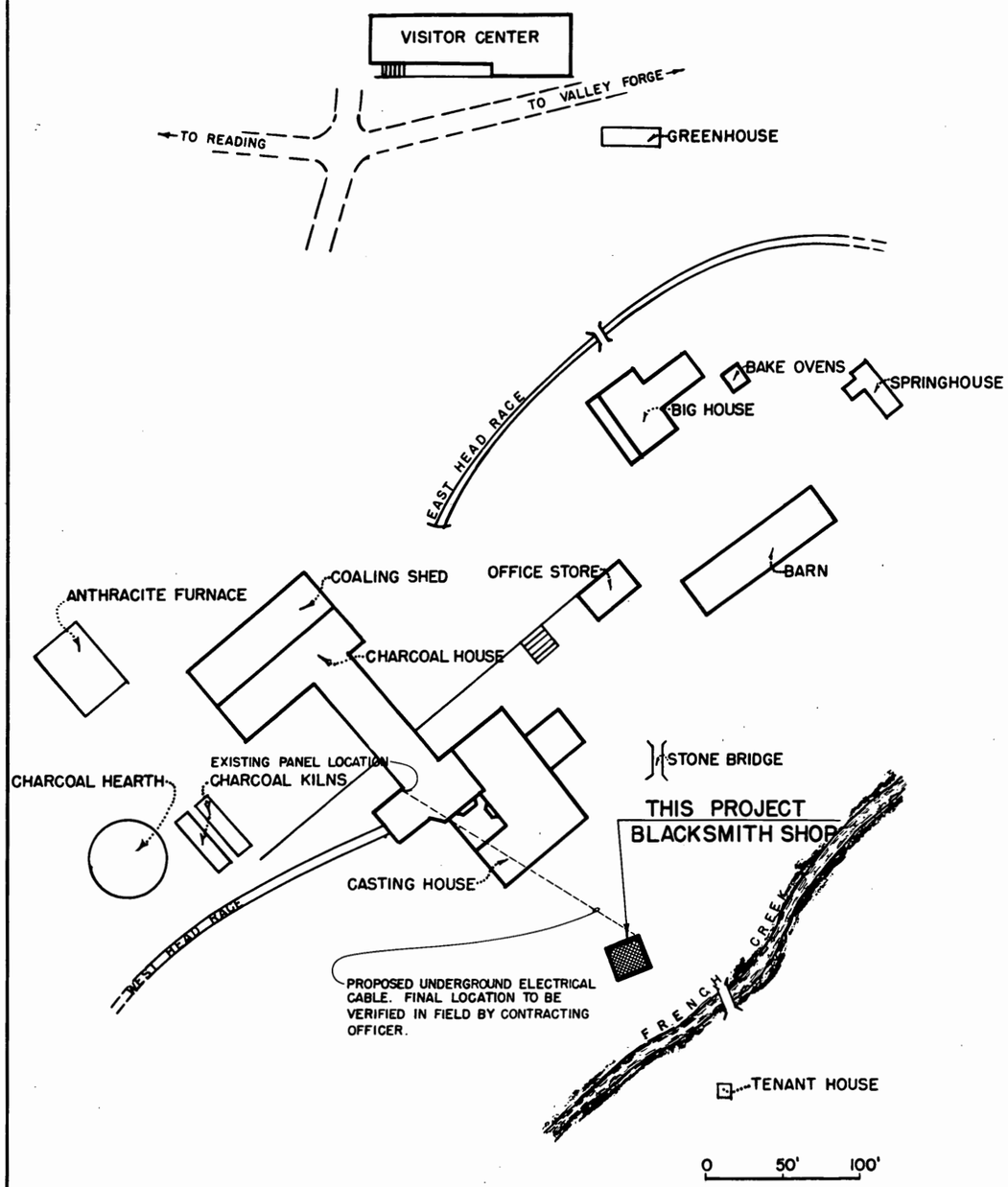
CLEARED

REVIEWED

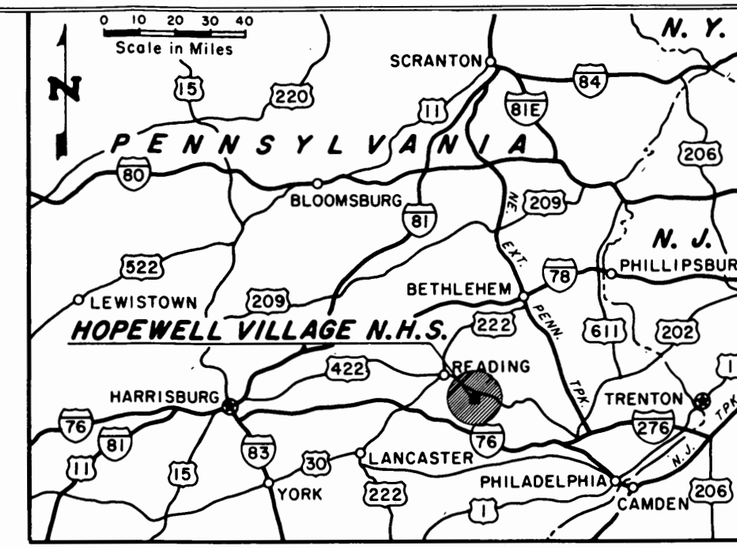
DESIGNED BY

Set of 5.

Construction drawings.



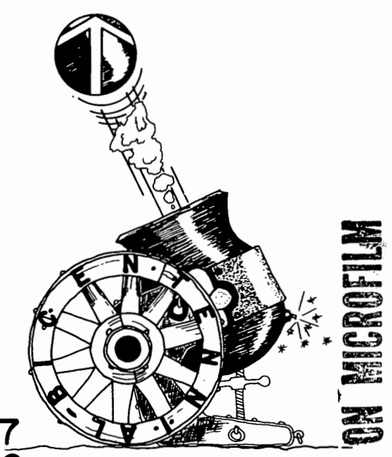
VICINITY PLAN



LOCATION MAP

I N D E X

SHEET NO.	TITLE
1	COVER SHEET
2	ELEVATIONS, CROSS SECTION AND DETAILS
3	WINDOWS
4	ROOF PLAN AND DETAILS
5	EXISTING CONDITIONS



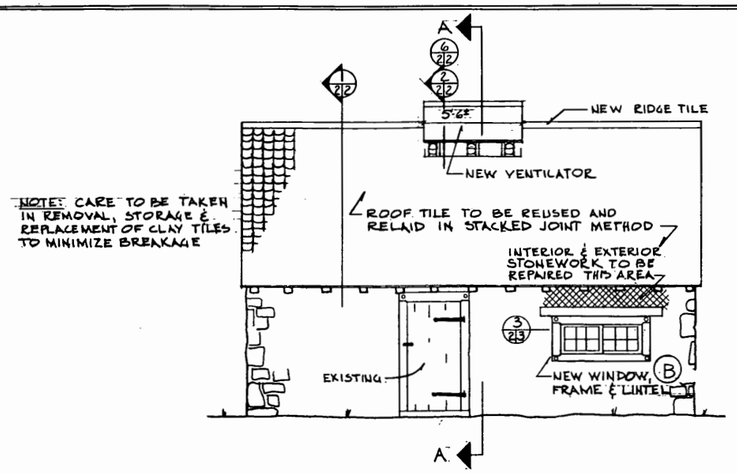
PROJECT NO. 4430-0087
CONSTRUCTION DRAWING

SOURCE: RESTORATION OF BLACKSMITH SHOP COMPLETION REPORT - JAMES CASS 1950, DRAWING NOS. NHS-HV/3040, NHS-HV/3065, NHS-HV/1047, & 376/25,000
STEEP ROOFS & RED TILES BY ROBERT C. BUCHER
HISTORIC STRUCTURE REPORT-BLACKSMITH SHOP-ARCHITECTURAL DATA-SOUDER '74

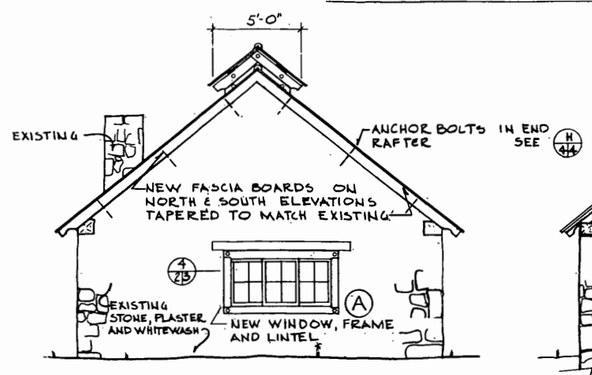
CONSTRUCTION DRAWING	HISTORIC PRESERVATION TEAM	PREPARED	TITLE OF DRAWING	DRAWING NO.
This drawing has been prepared in compliance with the Historic Structures Report. Approved by Chester L. Brooks (signed) Regional Director on 4/15/74 Title. Glenn O. Hendricks 8-6-74 Manager DSC Date	UNITED STATES DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE DENVER SERVICE CENTER	PEDERSEN DESIGNED VARIOUS DRAWN THOMSON CHECKED 7/'74 DATE	PROPOSED RESTORATION BLACKSMITH SHOP-PHASE I LOCATION WITHIN PARK WITHIN THE VILLAGE NAME OF PARK HOPEWELL VILLAGE NATIONAL HISTORIC SITE MID ATLANTIC REGION BERKS COUNTY PENNSYLVANIA STATE	376 25,000 PKG. NO. 106 SHEET 1 OF 5

GPO 847-114

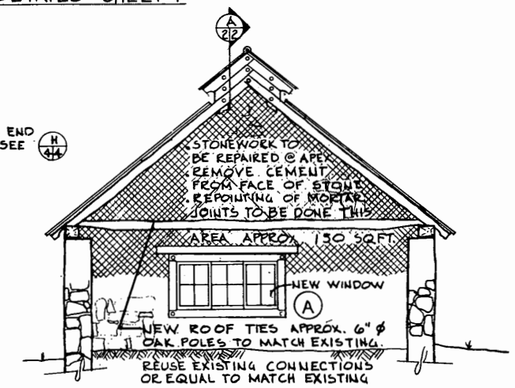
ROOF PLAN AND DETAILS - SHEET 4



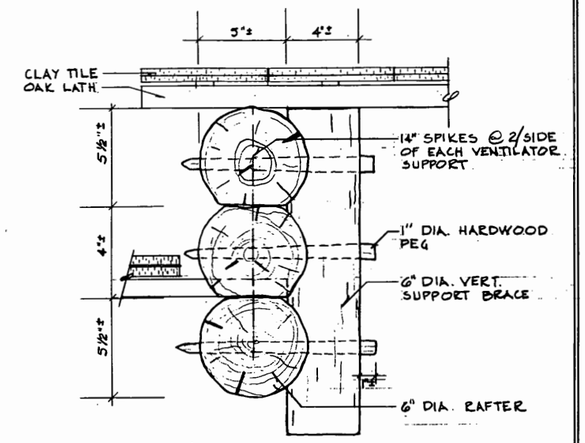
EAST ELEVATION
SCALE: 1/4" = 1'-0"



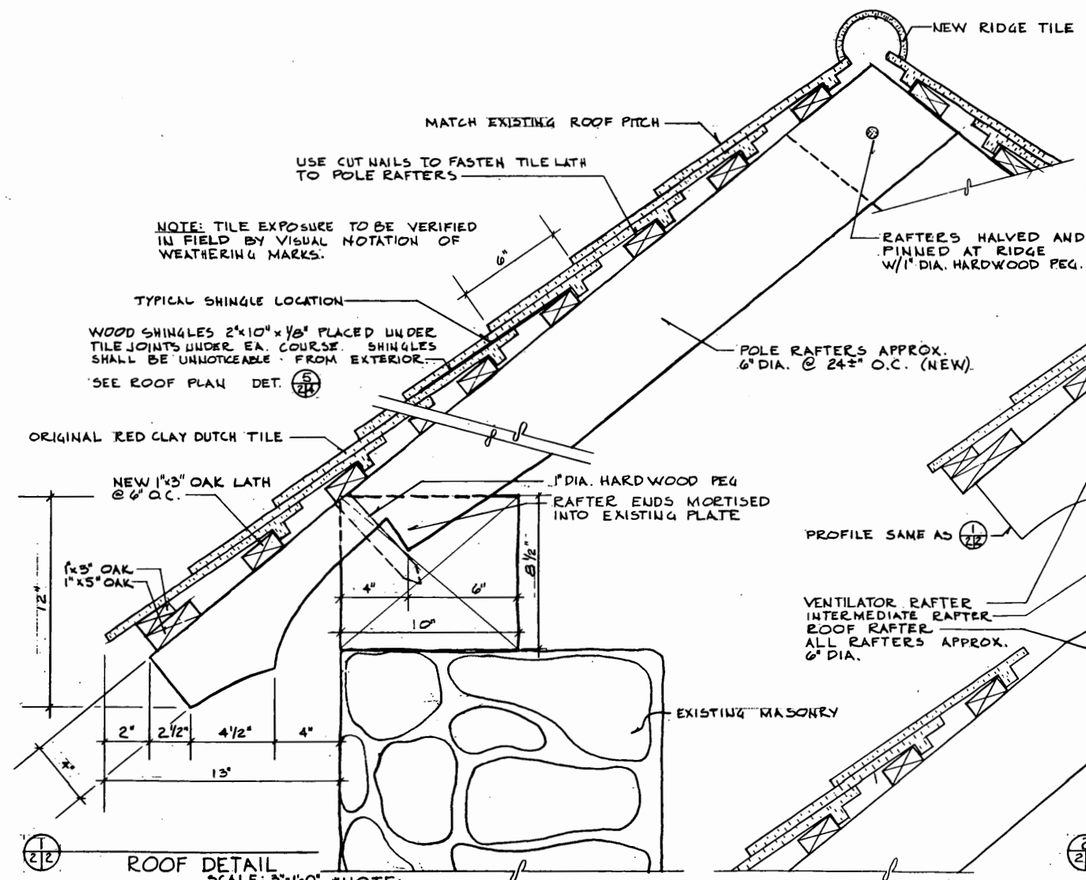
SOUTH ELEVATION
SCALE: 1/4" = 1'-0"



CROSS SECTION A-A
SCALE: 1/4" = 1'-0"

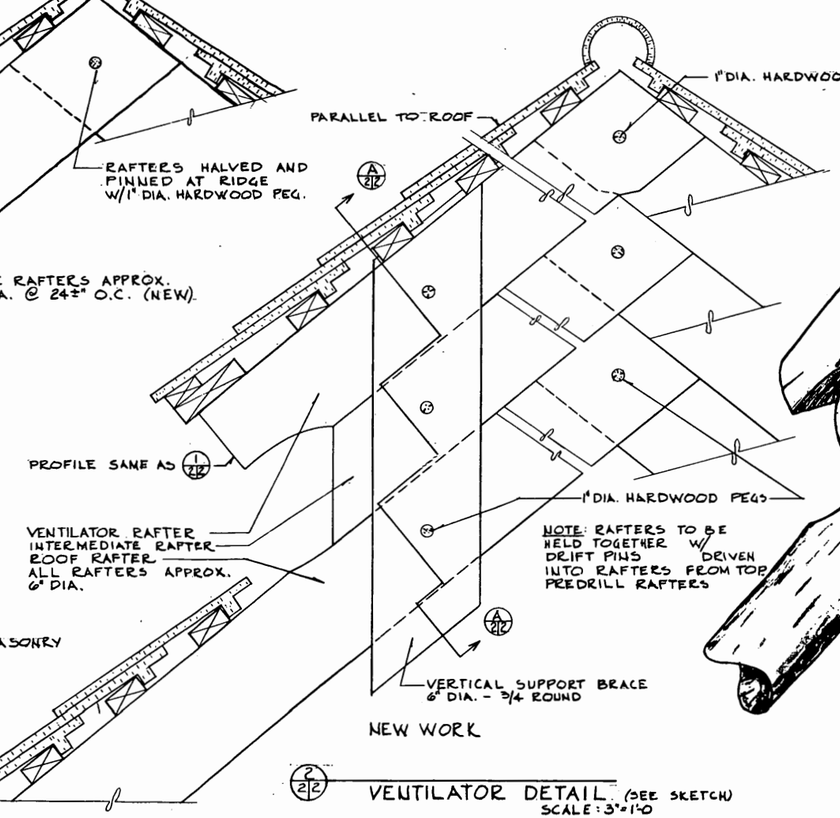


DETAIL SECTION
SCALE: 3" = 1'-0"

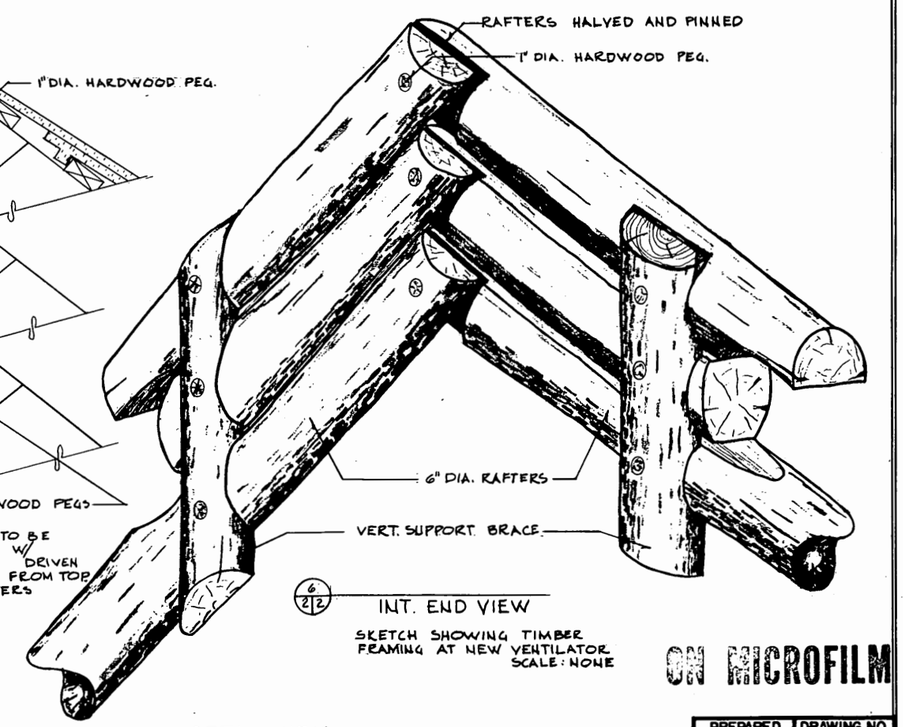


ROOF DETAIL
SCALE: 3" = 1'-0"

*NOTE:
IF EXISTING 8 1/2"x10" WOOD PLATE IS NOT SECURED TO WALL SECURE W/ 3/4 ø ANCHOR BOLTS @ 4'-0" O.C. THRU PLATE EMBEDDED 9" INTO MASONRY WALL



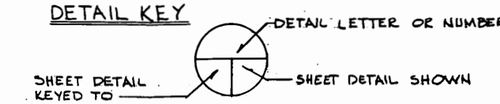
VENTILATOR DETAIL (SEE SKETCH)
SCALE: 3" = 1'-0



INT. END VIEW
SKETCH SHOWING TIMBER FRAMING AT NEW VENTILATOR
SCALE: NONE

ON MICROFILM

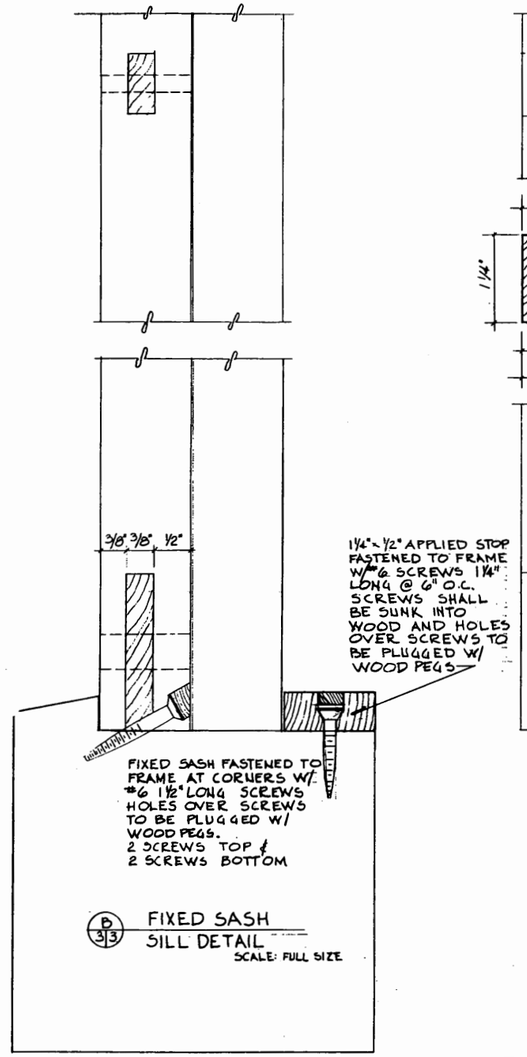
DETAIL KEY



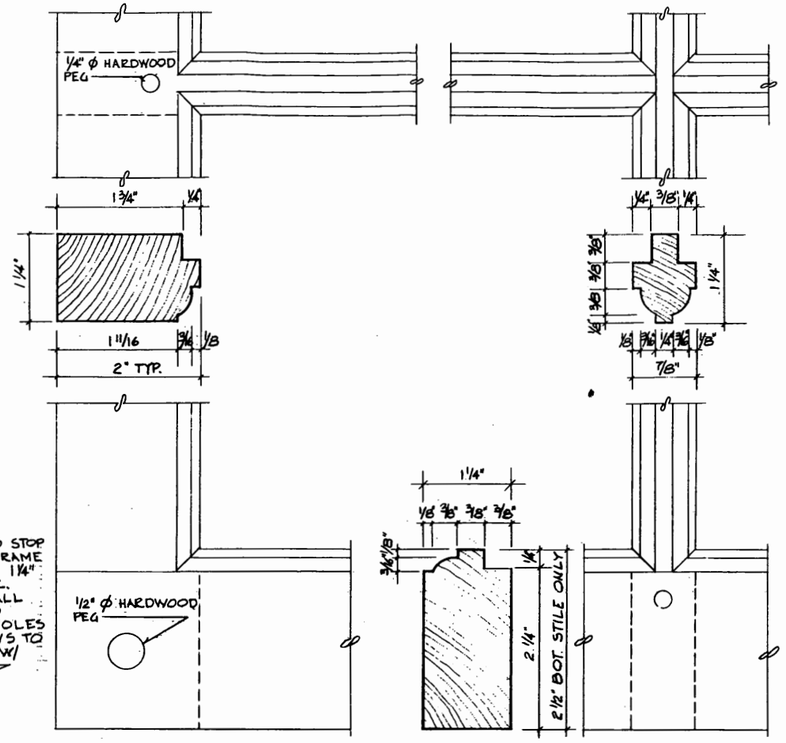
SEE SHEET #5 FOR EXISTING CONDITIONS

ELEVATIONS, CROSS SECTION AND DETAILS

PREPARED	DRAWING NO.
PEDERSEN DESIGNED	374 25000
PEDERSEN DRAWN	PKG. NO. 106 / SHEET 2
CHECKED	OF 5
7-'74 DATE	

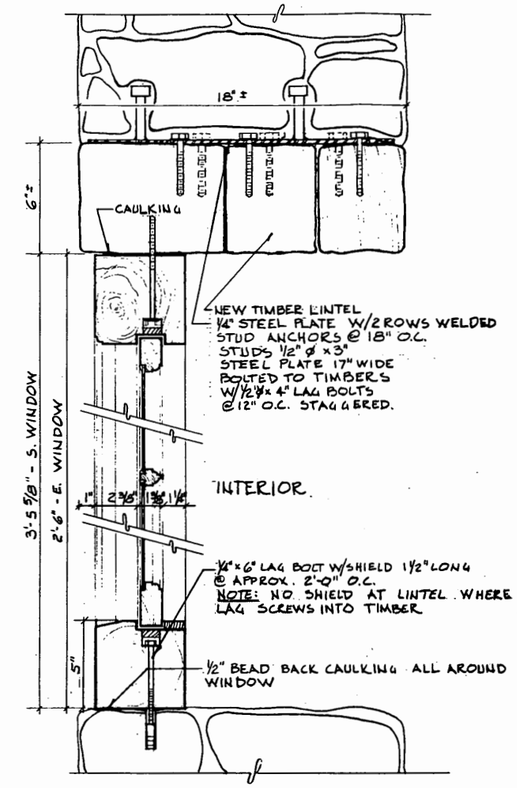


D 3/3 FIXED SASH SILL DETAIL
SCALE: FULL SIZE

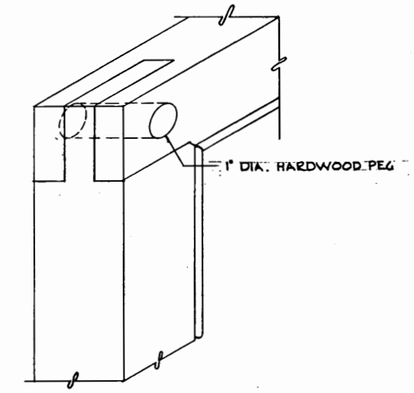


NOTE:
JOINTS TO BE MORTISED, TENONED AND PEGGED

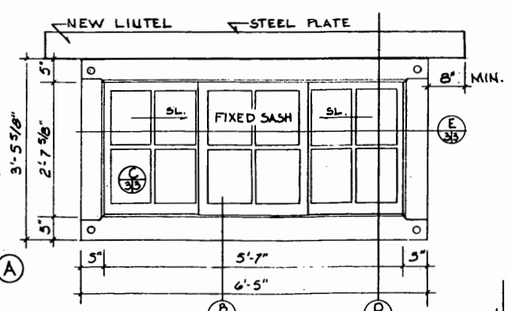
C 3/3 SASH & WINDOW MOLDING DETAIL
SCALE: FULL SIZE



D 3/3 SLIDING SASH WINDOW SECTION
SCALE: 3" = 1'-0"

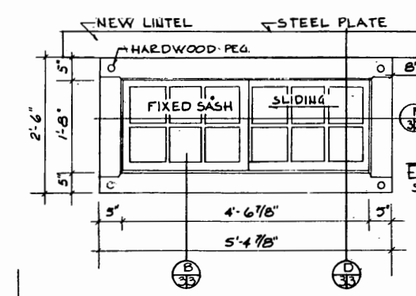


ISOMETRIC DETAIL OF MORTISE AND TENON JOINT TO BE USED IN ALL WINDOW FRAMES



4 2/3 ELEVATION
SCALE ¾" = 1'-0"

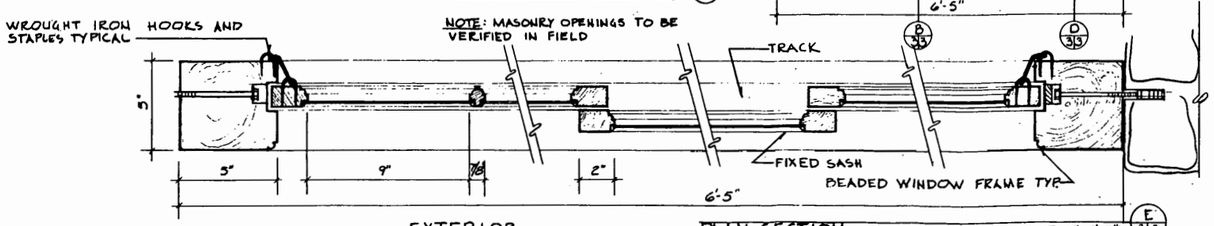
WINDOW-S. ELEVATION (A)



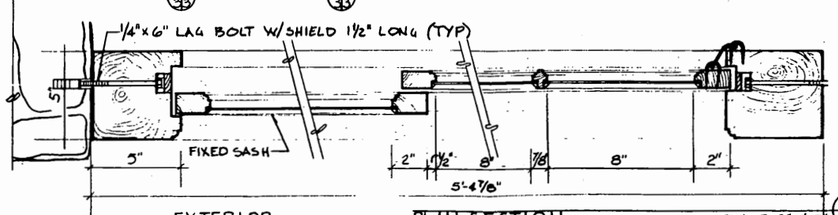
ELEVATION 3 2/3
SCALE: ¾" = 1'-0"

WINDOW-E ELEVATION (B)

NOTE: MASONRY OPENINGS TO BE VERIFIED IN FIELD



EXTERIOR PLAN SECTION
SCALE: 3" = 1'-0" E 3/3

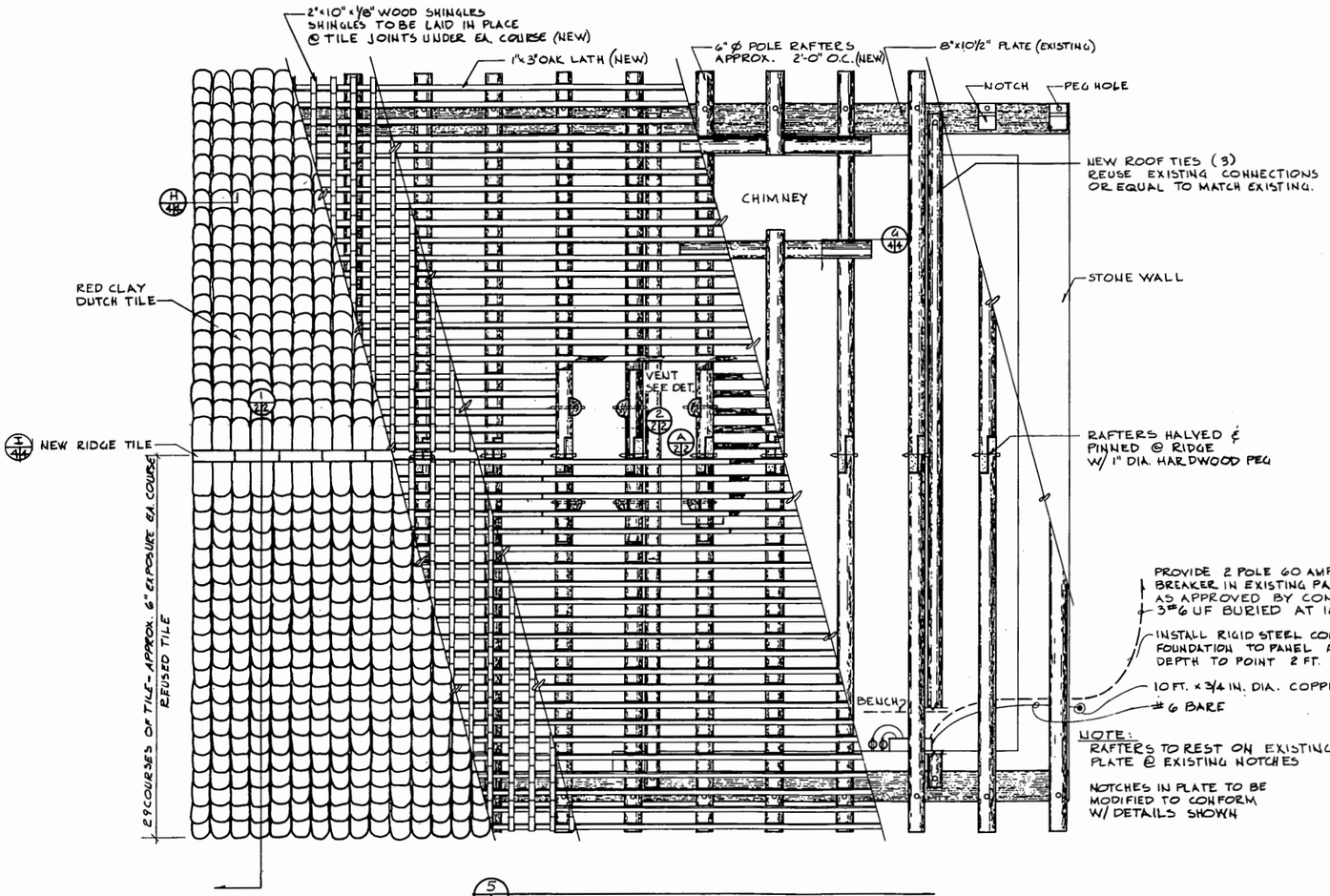


EXTERIOR PLAN SECTION
SCALE: 3" = 1'-0" F 3/3

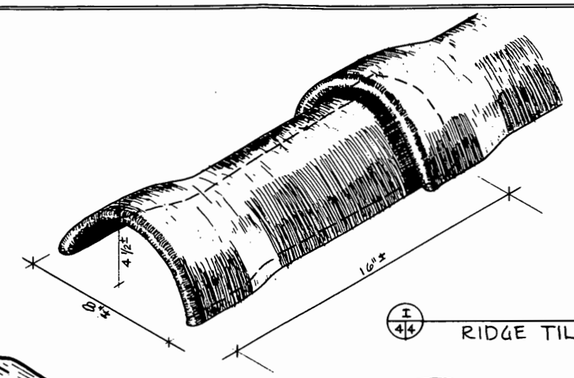
WINDOWS

ON MICROFILM

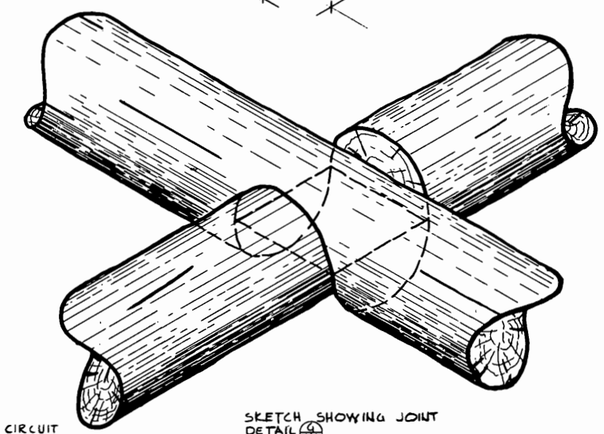
PREPARED	DRAWING NO.
PEDERSEN DESIGNED	376 25000
PEDERSEN DRAWN	PKG. NO. 106
CHECKED	SHEET 3
7-'74 DATE	OF 5



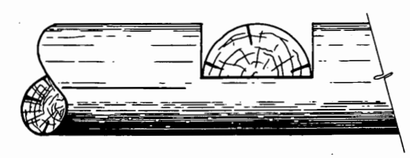
5/2.4 ROOF PLAN SCALE: 1/2" = 1'-0"



I/4.4 RIDGE TILE DETAIL SCALE: NONE



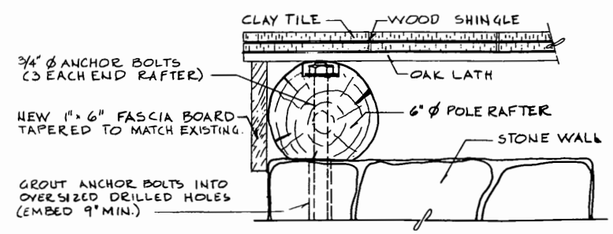
SKETCH SHOWING JOINT DETAIL G/4.4



G/4.4 JOINT DETAIL SCALE: 3" = 1'-0"

ELECTRICAL

- ELECTRIC PANEL TO BE INSTALLED IN SPACE BETWEEN UNDERSIDE OF PLANK BENCH AND DIRT FLOOR PAINT TO MATCH WHITEWASH SURFACE
- PROVIDE 2 GANG CAST BOX WITH TWO 20 AMPERE DUPLEX RECEPTACLES AT SIDE OF PANELBOARD
- PANELBOARD
  100 A BUS MLO
  1 PHASE 3 WIRE 120/240 V
  2 - 1 POLE 20 A BREAKERS
  4 SPACES
  SURFACE MOUNT
  SQUARE D QO 6-12DS OR EQUAL
- PROVIDE 10 FT. × 3/4 IN. DIA. COPPER CLAD GROUND ROD W/ #6 GROUNDING ELECTRODE CONDUCTOR.

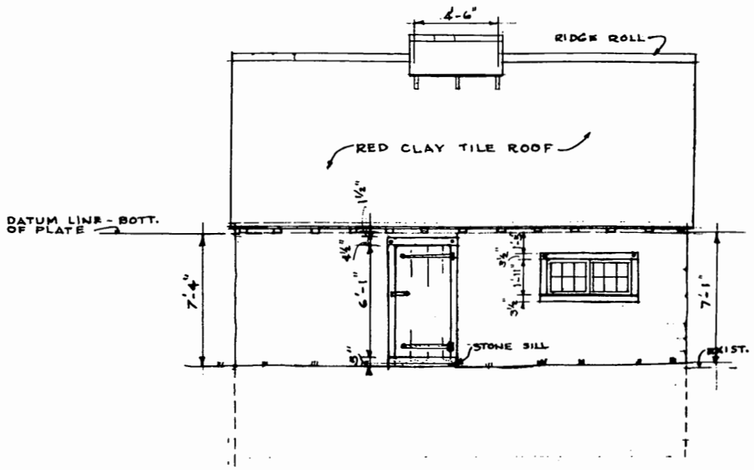


H/4.4 RAKE DETAIL SCALE: 3" = 1'-0"

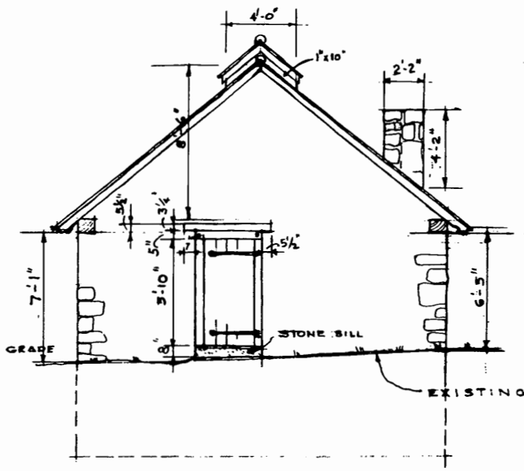
ROOF PLAN AND DETAILS

ON MICROFILM

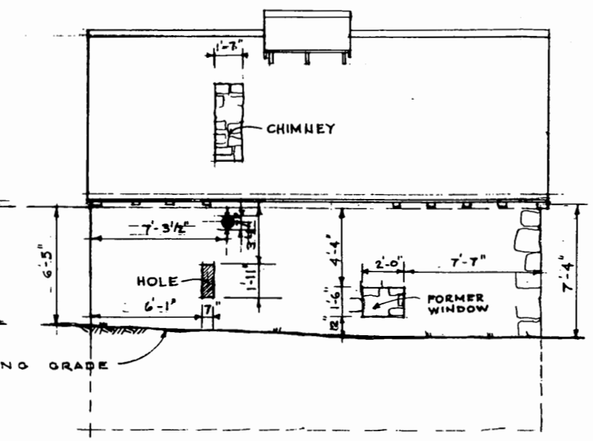
PREPARED	DRAWING NO.
PEDERSEN DESIGNED	376 25000
PEDERSEN DRAWN	PCIP PKG. / SHEET
CHECKED	4
7-'74 DATE	0' 5



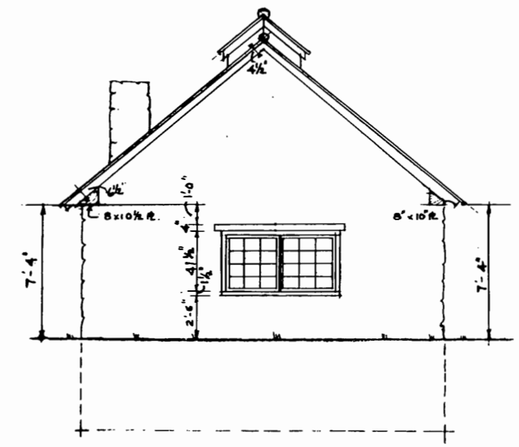
EAST ELEVATION



NORTH ELEVATION

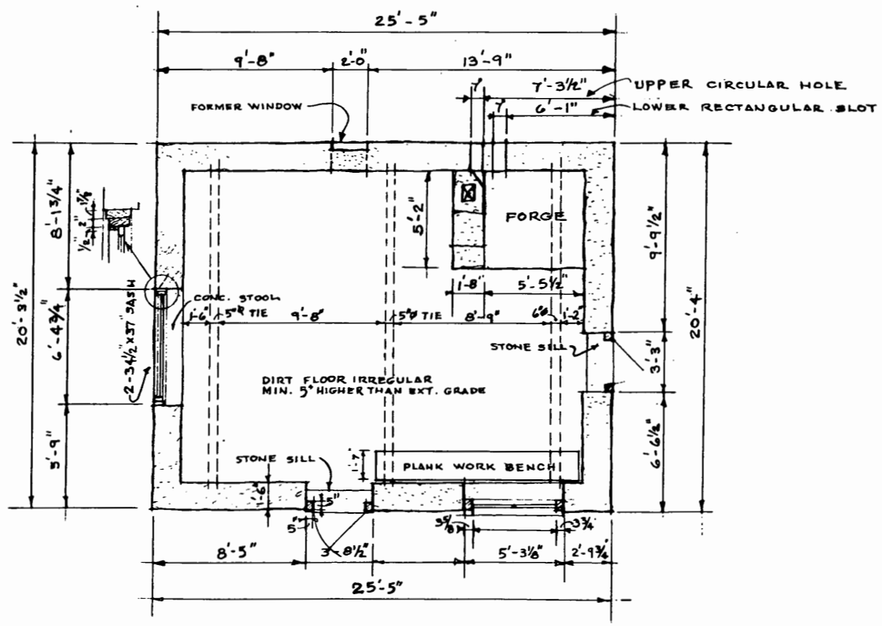


WEST ELEVATION



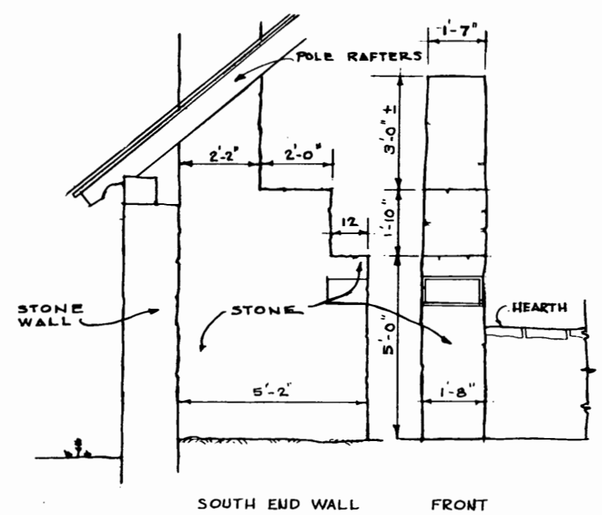
SOUTH ELEVATION

SCALE- 1/4" = 1'-0"



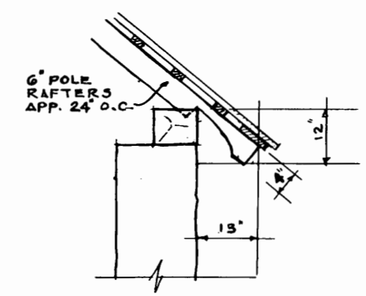
FLOOR PLAN

SCALE - 1/4" = 1'-0"



FORGE DETAIL

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



EAVE DETAIL

SCALE - 3/4" = 1'-0"

ON MICROFILM

EXISTING CONDITIONS

PREPARED	DRAWING NO.
SOUDER DESIGNED	376-25,000
SOUDER DRAWN	PKG. NO. / SHEET
CHECKED	106 / 5
7-'74 DATE	OF 5